MacKays to Peka Peka Expressway Project

Assessment of Environmental Effects Report

Prepared by Beca, Boffa Miskell and Incite

March 2012

NZ TRANSPORT AGENCY
WAKA KOTAHI

Report prepared by Beca, Boffa Miskell and Incite

for the NZ Transport Agency

Quality assurance statement	
Prepared by:	Anna Lewis (Associate Planner, Beca)
	Susan Jones (Senior Planner, Beca)
	Hywel Edwards (Senior Planner, Beca)
	Graham Spargo (Technical Director - Planning, Beca)
	Robert Schofield (Director and Senior Environmental Planner, Boffa Miskell)
	Greg Vossler (Senior Planner, Boffa Miskell)
	Jeremy Brophy (Senior Planner, Incite)
	Louise Miles (Director, Incite)
	Alex Strawbridge (Planner, Beca)
Graphics by	Nikita Bazalo (Graphic Designer, Beca) with assistance from Peter Howman (Graphic Designer, Beca)
Reviewed by	Robert Schofield (Director and Senior Environmental Planner, Boffa Miskell)
Legal counsel for the NZTA	Chapman Tripp
Approved for release	Graham Spargo (Technical Director - Planning, Beca)
Project Manager (NZTA)	Andrew Quinn

With additional technical reviews by:

Technical area	Technical Reviewer
Roading design	Noel Nancekivell (Beca)
Structural design	Noel Nancekivell (Beca)
Construction	Andrew Goldie (Fletcher)
Archaeology and built heritage	Mary O'Keeffe (Heritage Solutions) & Ian Bowman
Tangata whenua/cultural heritage	Amos Kamo (Boffa Miskell)
Traffic and transport	Eric Whitfield (Beca)
Urban form and development	Marc Baily (Boffa Miskell)
Landscape and visual	Bron Faulkner and Boyden Evans (Boffa Miskell)
Lighting	Keith Gibson (Beca)
Noise and vibration	Siiri Wilkening and James Whitlock (Marshall Day)
Air quality	Charles Kirkby (Beca)
Ecology	Matiu Park (Boffa Miskell)
Hydrology and stormwater	Iain Smith and Graham Levy (Beca)
Groundwater	Ann Williams (Beca)
Settlement	Lucy Coe and Gavin Alexander (Beca)
Contamination	Genevieve Smith (Beca)
Water quality	Rebecca Bibby (Beca)
Social	Julie Meade Rose (Social & Environmental Ltd), Noreen Barton, Amelia Linzey (Beca)
Economic Impacts	Mike Copeland (Brown Copeland), Graham Spargo (Beca), Robert Schofield (Boffa Miskell)
Construction Environmental Management Plans	Hugh Leersnyder (Beca)

This report has been prepared by Beca Carter Hollings and Ferner Limited (Beca), Boffa Miskell and Incite for the NZ Transport Agency. No liability is accepted by these companies or the employees or sub-consultants of these companies with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission and approval or to fulfil a legal requirement.

Revision schedule

Rev No.	Date	Description	Prepared by	Reviewed by	Approved by
1	11/2011	First draft for client, technical and legal review	Beca, Boffa and Incite	Robert Schofield (Director and Senior Environmental Planner, Boffa Miskell)	Graham Spargo (Technical Director - Planning, Beca)
2	12/2011	Second draft for client, technical and legal review	Beca, Boffa and Incite	Robert Schofield (Director and Senior Environmental Planner, Boffa Miskell)	Graham Spargo (Technical Director - Planning, Beca)
3	20/02/2012	Draft for EPA completeness check	Beca, Boffa and Incite	Robert Schofield (Director and Senior Environmental Planner, Boffa Miskell)	Graham Spargo (Technical Director - Planning, Beca)
4	16/04/2012	Final for lodgement	Beca, Boffa and Incite	Robert Schofield (Director and Senior Environmental Planner, Boffa Miskell)	Graham Spargo (Technical Director - Planning, Beca)

Table of Contents

Executive Summary

Introduction

The NZ Transport Agency (NZTA) has lodged a notice of requirement for designation and resource consent application for the MacKays to Peka Peka Project.

The application seeks approval for the proposed designation of the MacKays to Peka Peka Project corridor (as shown in Figures I and II) to allow the construction, operation and maintenance of a State Highway formed to an expressway standard from north of MacKays Crossing to Peka Peka. The planned Expressway passes through part of the Kāpiti district. The NZTA is responsible for the proposed designation and subsequent public works.

Since the 1950s, there have been plans and legal protections in place for a future major transport route for much of the planned MacKays to Peka Peka route. Originally identified as future motorway, the legal protections for it over the decades have been modified several times to reflect evolving thinking on safe and efficient highway design and management. A designation in this corridor is currently held by the Kāpiti Coast District Council for a local arterial road known as the Western Link Road. The planned Expressway will supersede this.

The planned Expressway is sufficiently different in terms of design standards and alignment from the Western Link Road that a new designation is being sought.

Once constructed, the planned Expressway will shift State Highway 1 (SH1) from its present alignment to a new route. This will deviate from the current State Highway near Poplar Avenue and re-join current SH1 at Peka Peka. The proposed designation deviates from the Western Link Road designation in several locations in response to a range of RMA considerations around ecological, environmental, social, cultural and economic matters.

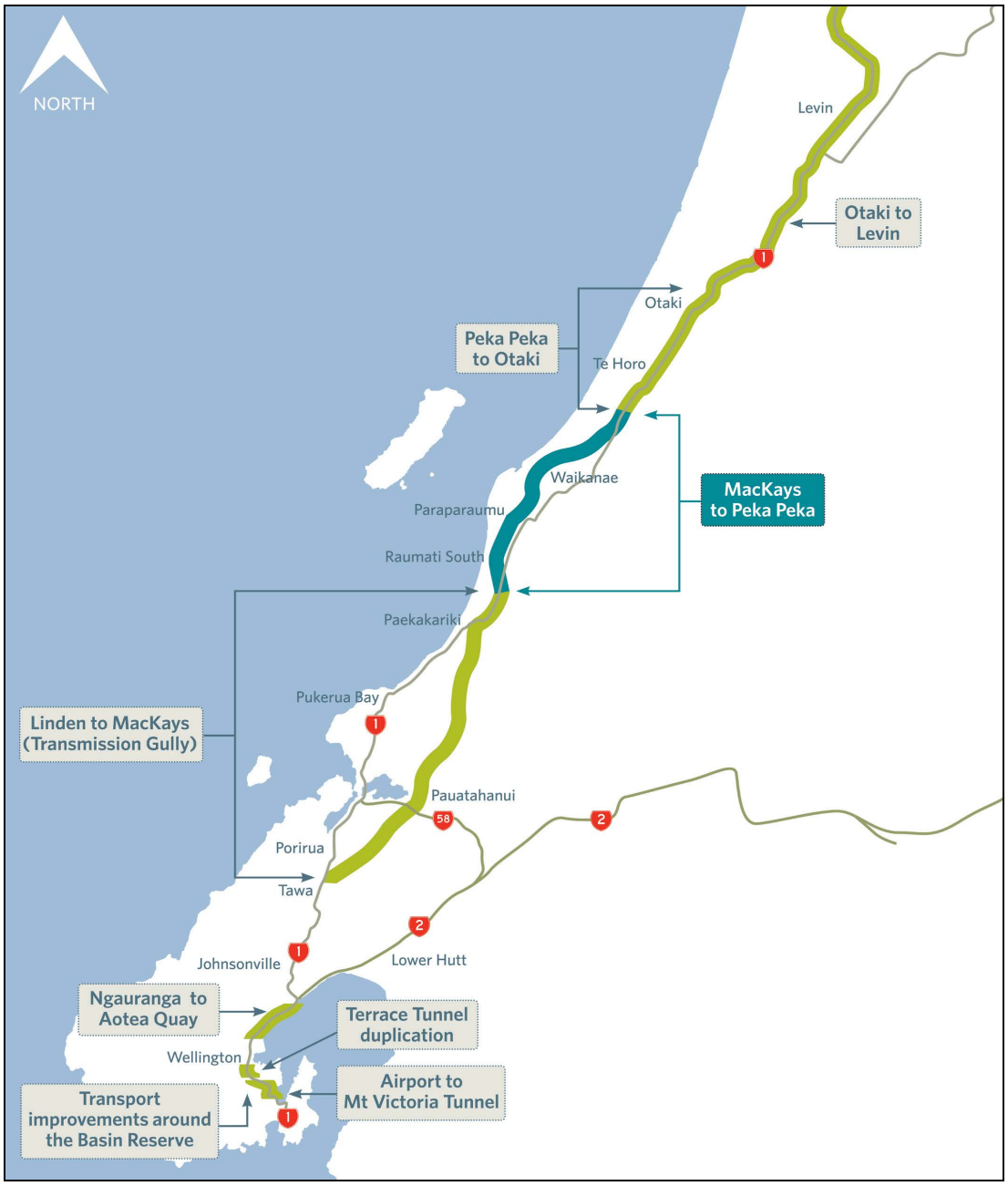

Figure I: Wellington Northern Corridor road of national significance

Figure II: MacKays To Peka Peka planned route

Background to the Proposal

The MacKays to Peka Peka Project culminates 60 years of state highway thinking for the Kāpiti district on how best to provide a safe, efficient, long-term route through one of the fastest growing parts of the Wellington region.

Strategic studies and investigations have varied as to their conclusions on the best solution for moving traffic through the Kāpiti district. Evolving design assumptions for safety, efficiency, cost and other factors have seen options considered ranging from a four-lane motorway (broadly following the 'Sandhills corridor' being used by the planned Expressway), to most recently, a lesser standard upgrade of the current SH1 augmented by a new parallel local arterial road (known as the Western Link Road).

In March 2009, this section of SH1 was classified by the Government as part of the Wellington Northern Corridor road of national significance, one of seven major state highways identified as priorities for upgrading. In mid-2009, a NZTA review of long-term route options for this section of SH1 concluded that the general corridor within which the planned Expressway is located best meets national, regional and district needs for a State Highway.

The Project provides benefits in terms of safety, travel time savings and route security with respect to the overall Wellington Northern Corridor road of national significance. Accordingly, the Project is a key component of a number of national, regional and local transport strategies, policies and plans to improve transport in the Wellington region and nationally.

The Project provides the following benefits:

- Improved safety for motorists compared to the existing SH1 between MacKays Crossing and Peka Peka.
- Improved route security and resilience of the Wellington region's state highway and the Kāpiti district's networks in the event of significant earthquake, road accidents or other disruption.
- Travel time benefits and improved travel time reliability along key routes.
- Increased local accessibility within the Kāpiti district's travel network due to the provision of an additional crossing across the Waikanae River as well as full Waikanae and Paraparaumu interchanges.
- Enhancement of the Kāpiti district's cycling, walking and bridleway network through a new shared route adjacent to the planned Expressway.
- Removal of long-distance traffic from Waikanae and Paraparaumu centres thus allowing easier movement across the existing highway for local traffic, pedestrians and cyclists, and enabling the revitalising and upgrading of the town centres.
- Regional and district economic benefits from improved accessibility to the major business zonings at Paraparaumu.
- Promoting future residential and business growth in the Kapiti district.
- Regional economic benefits resulting from travel time savings, improved trip time reliability and increased accessibility to and throughout the Wellington region.

Management of Environmental Effects

The effects of the planned Expressway on the environment have been avoided, remedied or mitigated through an integrated design process and a comprehensive set of Project conditions. In the event that the RMA statutory authorities are granted, the implementation of mitigation and conditions will be overseen by the Greater Wellington Regional Council for regional consents, and Kāpiti Coast District Council for designation conditions.

Development of the Project design and associated conditions has involved a multi-disciplinary team of technical experts and been informed by public consultation and on-going stakeholder engagement.

Potential operational (when open for traffic) effects of the planned Expressway were, in the first instance, addressed by alignment design choices e.g. using natural dune features for screening. A multi-disciplinary process was also used to identify the comprehensive use of mitigation measures in the design of the route. Examples are the provision of a new shared walkway/cycleway, keeping most local roads at ground level to assist ease of movement for local users, the use of planted bunds, noise barriers, storm water runoff treatment, landscaping and visual-screen planting, native re-vegetation and wetland management.

Prior to, during, and following construction, a programme of monitoring will provide information to help develop and implement the measures to be used and adapted to manage effects.

A comprehensive suite of conditions for the designation and resource consents is proposed. The conditions include an environmental monitoring and management programme for construction effects. Implementing these conditions and framework enables the effects of the Project to be adequately and appropriately avoided, remedied or mitigated in accordance with statutory requirements and the NZTA's commitments to best practice.

Description of the Environment

The planned Expressway passes through a mixture of semi-urban, urban, semi-rural and rural environment along its 16km route:

- At the southern end, the route traverses a small part of the north-eastern corner of Queen Elizabeth Regional Park;
- Between Poplar Avenue and the Wharemauku Stream, the route is located within the residential neighbourhoods of Raumati South and Raumati including part of the undeveloped corridor that separates these communities;
- North of the Wharemauku Stream to Otaihanga Road, the route runs adjacent to the Paraparaumu town centre and Kāpiti Airport, as well as number of residential neighbourhoods on either side of the undeveloped corridor;
- North of Otaihanga Road to the Waikanae River, the route passes through semi-rural and rural settings in the Otaihanga neighbourhood;
- North of the Waikanae River to Te Moana Road, the route traverses a mix of semi-rural and urban land, part of which is of recreational and cultural importance;

- North of Te Moana Road, the route passes through semi-rural land zoned for future urban development;
- At the northern end, the route passes through a predominantly rural area containing rural-residential enclaves.

The Project area consists of areas of native and exotic vegetation, sand dune systems, wetlands, pasture and discrete areas of urbanised land. Much of the Kāpiti district has been modified by human activity over several hundred years resulting in a variable range of terrestrial (land-based) ecological habitat along the route. Design criteria for choosing the Project route included seeking to avoid entirely, or if that was not feasible, minimise the planned Expressway effect on high-value ecological habitats.

The Project traverses seven hydrological catchments. The ecological values of the streams in these catchments vary and range from highly to moderately modified catchments.

All catchments flow east to west to the Kāpiti coast. The Waikanae River and its tributaries is the largest of these catchments and contains wetland and estuarine ecosystems with significant ecological value.

Network utilities present along the route include:

- The 220kV Haywards to Bunnythorpe electricity transmission line which crosses the route between Smithfield Road and Peka Peka. This line will not need to be relocated.
- A high-pressure gas pipeline between the Waikanae River and Te Moana Road. The relocation of this pipeline will be subject to its own separate consenting process.

Description of the Project

The planned Expressway has been designed to an NZTA expressway standard which comprises a minimum of four lanes (two in each direction) with continuous median separation.

Local access to and from the alignment is primarily via two new interchanges - one at Kāpiti Road, and one at Te Moana Road. In addition, the interchanges at the northern and southern tie-ins to the existing SH1 provide partial access:- south-facing ramps only at the southern tie-in at Poplar Avenue, and north-facing ramps only at the northern tie-in at Peka Peka.

At the Poplar Avenue, Kāpiti Road and Te Moana Road interchanges, the planned Expressway passes over the local roads. At the Peka Peka interchange, the planned Expressway passes under the local road which connects back to the existing SH1.

Key features of the Project include the following:

- A sealed 26m-wide carriageway within a 100m-wide designated corridor.
- Provision of buffer areas on either side of the formed carriageway to enable landscape treatment, ecological enhancements, noise attenuation measures and other facilities. The width of the corridor also allows for the retention of existing features and vegetation wherever practicable.
- Provision of comprehensive landscape treatment and for finished slopes of all cuts and fills.

- Quality design of all bridges and structures located in highly visible public locations such as at Kāpiti Road and the Waikanae River Crossing.
- Provision of a new shared walking and cycle track running adjacent to the planned Expressway. This pathway would also act as a bridleway north of Te Moana Road.
- Noise-reducing road surfaces in urban areas with preference for use of planted bunding (earth mounds) where practicable and noise barriers as necessary in other locations.
- No lighting along the planned Expressway except at interchanges, with lighting designed to respond to different urban and rural environments.
- No bridge piers are proposed within the streams or river channels. All bridge and culvert structures include design or associated erosion protection works to prevent scouring during storm events.
- A net increase in the extent of significant vegetation, wetlands or stream related habitat.
- Mass planting along stream edges and in other areas affected by the planned expressway.
- Stormwater runoff is to be collected and treated using swales, filtration-type devices and constructed treatment wetlands.
- Enabling works would include the formation of construction lay-down areas and site compounds. The main construction compound is to be located at the former Otaihanga Landfill next to the planned Expressway route.
- Construction works include earth embankments, areas of cut and fill, reinforced soil embankments, piling and mechanically stabilised earth walls with concrete facing panels (predominantly around bridges).
- Approximately 2.3 million cubic metres of excavated (cut) material will be used as fill within the designation. In addition, there will be approximately 350,000 cubic metres of imported fill, approximately 240,000 cubic metres of sand exported off-site (to quarries), and approximately 200,000 cubic metres of peat exported off-site (to various locations). The total volumes of exported material are anticipated to reduce through further refinements during the construction phase.
- Comprehensive erosion and sediment control measures are to be provided for all earthworks and for works in and around water bodies.
- Construction will be undertaken by a number of work crews working on different parts of the Project either at the same time or at different stages. Construction is expected to take approximately four years.

Consideration of Alternatives

An assessment of route alternatives was undertaken by the NZTA in 2009 to choose the overall Project corridor. Options for constructing an Expressway between MacKays Crossing and Peka Peka that were considered included a route along the existing SH1 as well as alternative alignments further to the west towards the coast including what is known as the 'Sandhills' route. The NZTA's conclusion was that the 'Sandhills' route best addressed environmental, safety, efficiency, value for money, constructability, property impact, and wider community considerations.

In 2010, the initial alternative route evaluation work was further refined and updated. This assessment agreed with and further reinforced the original conclusions as to the appropriateness of the 'Sandhills' route. This process is provided as background report to the application and is available for viewing on the NZTA website.

In parallel, a detailed evaluation process for defining the Expressway route was conducted over 2010 and 2011. This process focused on specific Expressway route choices and the location of interchanges. The process was informed by specialist inputs from a multi-disciplinary team across environmental, social, cultural and economic factors. Two rounds of public consultation and stakeholder engagement further informed and shaped thinking on options.

Design decisions incorporated from this process include:

- Deciding that the optimal arrangement for full interchanges is one at Kāpiti Road and one at Te Moana Road on the basis of best balancing State Highway and local needs.
- At the southern end, the alignment enables long-term urban form opportunities north of Leinster Avenue, reduces the impact on ecological areas, wetlands, terrestrial habitat, public open space in QE Park and on two schools. It also reduces the likelihood for disturbance of potential archaeological sites and/or locations with cultural significance.
- Ensuring the alignment avoids the loss of QEII covenanted wetlands which contain significant indigenous native habitats, and in other non-covenanted areas as far as practicable.
- Provision for replacement of ecological areas and mitigation of adverse ecological effects.
- Selecting an alignment north of the Waikanae River which seeks to reconcile a complex set of values and issues including avoidance of heritage buildings and known archaeological sites, minimising impact on residential properties, recreational value and, seeking to reduce the extent of intrusion into the registered Wāhi Tapu compared with earlier roading proposals.

Consultation and Engagement

Consultation on the Project has been guided by recognised good practice approaches and has included significant levels of interaction with stakeholders at all required levels. Extensive use has been made of one-on-one and group meetings.

In addition, a series of public open days, a written submission process, a freephone service, information centre, and newsletters to households have enabled the sharing of information, views and ideas. In addition, web-based online material has been available throughout the process.

On-going involvement and communication with the relevant regulatory agencies has also been undertaken as part of the preparation of regulatory consent documentation. This engagement will continue as the Project progresses.

Assessment of Effects on the Environment

An Assessment of Effects on the Environment (AEE) of the Project has been carried out in accordance with the relevant provisions of the RMA. The AEE concludes that the Project will have a range of actual or potential positive and adverse effects. The effects vary in significance, scale (local, regional and

national), intensity and duration, and are described in the AEE. Effects also differ during construction compared to when the route is open for traffic.

Traffic and Transport

The Project will have significant positive transport effects at a local, regional and national scale including:

- Improved route security and resilience for the region's state highway network and for district level emergencies.
- Improved safety and reduced road accident risk.
- Significant travel time savings and reduced trip time variability.
- More efficient freight movement and associated economic benefits.
- Improved connections to regional freight hubs and airports including those at Paraparaumu, Wellington Port, Wellington International Airport and other distribution centres.
- Improved local accessibility through the provision of interchange connections to a second north-south route (i.e. the planned Expressway in addition to existing SH1).

During construction, there will be localised short-term traffic effects including delays or inconvenience arising from increased heavy construction traffic and the need to do work on some local roads adjacent the planned Expressway. The use of local roads by construction traffic will generally be minimised with the main direct access to be provided from the existing state highway. The effects on local traffic will be managed as per the Construction Traffic Management Plan provided with the application.

Property Effects

The land that is required for the Project includes Crown land, Council-owned land including road and reserves, Māori land, and privately-owned property. The majority of land is already owned by the Crown or District Council for roading purposes. The NZTA has an active purchase programme which seeks to acquire all required land for the Project that is in private ownership along the route.

Property owners whose land is required for the expressway have been advised and made aware of the extent required (either full or partial acquisition). Effects on other properties (such as site access) have been identified and have been, or are being addressed through property agreements or consultation processes with property owners.

Network Utilities

Protection and/or relocation of utilities located within the planned Expressway will be required. These works will mainly be undertaken as enabling works for the Project. The NZTA has worked closely with the relevant organisations and is satisfied that any adverse effects on network utilities will be able to be managed appropriately.

The most significant extent of effect on a network utility is the Vector high-pressure gas pipeline which runs along the planned Expressway alignment north of the Waikanae River. The consent required for the relocation of the pipeline will be applied for by Vector separately to the MacKays to Peka Peka Project.

The planned Expressway runs below electricity transmission lines to the south of Peka Peka near Smithfield Road. Requirements for this are incorporated in the design of the expressway.

Noise and Vibration

As the planned Expressway passes through established urban areas, a detailed assessment of noise and vibration effects was carried out along the entire route using the process set out in the appropriate national standard (NZS 6806:2010). The assessment determined that specific noise mitigation measures (e.g. bunds, noise barriers) to manage effects from the operation of the road are required in some localised areas.

These types of measures need to meet the 'best practical option' requirements of the Resource Management Act in that they have to be effective in noise attenuation while being the best fit for local environment insofar as being practicable. To identify measures to mitigate potential noise effects, a comprehensive multi-disciplinary assessment process was undertaken to determine the best practical option within each section of proposed Expressway corridor.

Project design included a generous designation footprint of up to 100 metres width, of which the planned Expressway generally takes up around a quarter. In addition, noise-reducing road surfacing is used in urban areas and, where feasible, planted bunds (earth mounds) are used to shield adjacent houses from noise. Noise barriers are needed in some locations.

Construction noise is to be within the limits of the appropriate national standard (NZS 6803:1999). Where construction works are proposed in close proximity to sensitive receivers (e.g. residential dwellings), methods to manage noise and vibration effects are set out in a Construction Noise and Vibration Management Plan.

Air Quality

Construction of the route, particularly earthworks, is to be managed to minimise risk of nuisance dust or sand blow. This will be managed through the Construction Air Quality Management Plan and includes methods such as water spraying during dry periods.

The effect of vehicle emissions on air quality once the planned Expressway is in operation was also assessed. The assessment concluded that there will be an overall reduction in public exposure to vehicle emissions on a regional basis primarily due to the reduced congestion and the splitting of traffic volumes between the planned Expressway and existing SH1.

Contaminated Land

The route of the planned Expressway was assessed in terms of the potential risks around the discovery and handling of contaminated land during construction. A small number of locations along the

alignment have been identified and the management of this risk involves careful investigation, excavation and management/disposal methods following protocols set out in the Contaminated Land Management Plan.

Hydrology and Groundwater

Hydrological, groundwater and related modelling has been undertaken as part of the environmental assessment and Project design process, with particular attention given to any potential 'barrier' effects of the planned Expressway relative to the natural east–west catchment flows, as well as the interaction with the Kāpiti district's wetland systems and aquifers and bore use. The design of the planned Expressway has been determined to avoid, remedy or mitigate potential adverse effects.

As a consequence of the design process, the changes in flood flows in most locations are negligible and in some instances, the Project results in a small reduction in downstream flood risk by containing and managing flows in high rainfall events.

The crossings of water bodies (bridges and culverts) and limited circumstances of stream realignments by the planned Expressway will result in changes to how they flow. By constructing realigned water bodies as close as possible to their existing form (slope, channel size and shape), effects on them (i.e. velocity and flow paths) and hence water quality and ecology are minimised.

Water Quality

Erosion and sediment control management measures meeting best practice standards will be used during construction. These measures will achieve high levels of performance minimising the amount of sediment that enters streams. Consequently, water quality effects during construction are predicted to be minimal, with suspended sediment in water clearing quickly out of streams and with minimal levels of deposition in sensitive locations.

All storm water runoff from finished road surfaces will be treated using natural filtration and treatment methods. As a result, it has been concluded that, in overall terms, contaminants entering the local stream and river systems will decrease from the current situation which will be a positive effect of the Project.

Contaminant levels entering the Waikanae River estuary will remain unchanged.

Terrestrial Ecology

As part of the environmental assessment, the route was comprehensively surveyed by ecologists who confirmed a wide variability of ecology from regionally rare and significant habitats through to urbanised and heavily modified landscapes with limited ecological diversity and values.

The selected Expressway route has enabled avoidance of the most sensitive and highly-valued ecological areas. Ecological input throughout the design process has ensured that adverse effects on terrestrial ecology will be avoided, remedied or mitigated. Around 3.8 hectares of vegetation lost is offset by revegetation of 7.6 hectares.

Unavoidable impacts, such as the culverting or bridging of streams, will be addressed by ecological offsetting consistent with the Greater Wellington Regional Council policy (i.e. ecological enhancements to replace any loss of habitat) e.g. stream restoration and replanting with indigenous (native) vegetation in specified areas. A number of habitats have been identified for revegetation on the basis of the range of potential ecological and hydrological benefits they can provide despite the minimal effects on the Expressway on such habitats.

Effects on the habitat of terrestrial fauna (wildlife) are assessed as minor to moderate and can be effectively managed. Examples include appropriately managing effects on Fernbird and lizard populations, and the recreation of habitats such as wetlands in combination with careful construction management methods.

Freshwater Ecology

Sediment runoff from earthworks during construction has the potential to adversely affect freshwater habitats and species. During construction, the earthworks areas can increase sediment levels in streams particularly during large rainfall events.

Based on the application of best practice sediment and erosion control methodology, the potential ecological impact of predicted sediment runoff is assessed to be negligible. The assessment concludes the ecological effects will be minor as the freshwater species existing in these streams currently face naturally occurring temporary increases in sediment levels and have tolerance to these events. In addition, the need to ensure appropriate fish passage within the water bodies crossed by the planned Expressway will be incorporated in culvert design.

While the need to modify streams has been reduced through route and design decisions, it is not feasible to avoid all effects as the construction of the planned Expressway will require the modification of parts of streams and at the Waikanae River, the need to construct culverts and bridges.

Approximately 5000 metres of streams will be restored or re-established to mitigate approximately 2900 metres of stream that will be modified as a result of the Project.

Mitigation is also provided for the 1.8 hectares of wetlands affected by the Project. This is being offset by 5.4 hectares of wetland restoration.

In addition, ecological value is provided from 13 hectares of mass planted flood storage areas for the planned Expressway.

The Project will therefore result in a net gain in freshwater habitat quality across the Project area. This positive effect will be on-going in association with the indigenous vegetation replanting proposed.

Marine Ecology

There are no works within, or any discharge of contaminants directly into, the coastal marine area. The marine environment is however the ultimate receiving environment for any sediment-carrying water from construction of the route. The use of sound sediment and erosion control methods during construction will ensure that any effects on the coastal environment will be avoided.

Stormwater runoff from the road once it is in operation also carries contaminants which will be managed through the proposed stormwater treatment processes. The potential ecological effects of operational (when the route is open for traffic) stormwater discharges have been assessed as minor. Overall it is likely that there will be a reduction in contaminants from most catchments.

Tangata Whenua

The planned Expressway passes through the mana whenua of several iwi. The rohe of Te Atiawa ki Whakarongotai is the predominant area affected while Ngāti Raukawa, Ngāti Toa and Muaupoko also have interests in the area.

Consultation and on-going engagement with iwi throughout the Project design process has identified key issues as impacts on identified cultural heritage areas, environmental impacts, cultural health effects, and impacts on Māori-owned land. Project design and associated mitigation measures have sought to remedy or minimise adverse effect

Of particular interest to iwi are the direct and indirect effects of construction in the vicinity of the Takamore Wāhi Tapu and the potential ecological impacts of construction. Operational effects include discharge of stormwater from the road surface to streams and eventually to the streams and rivers, and effects on water and habitat quality.

Te Atiawa ki Whakarongotai and the Takamore Trust have provided Cultural Impact Assessments for the Project. These both note a range of matters of significance and acknowledge that the methods proposed by the NZTA seek to manage and mitigate adverse effects on the environment.

Landscape and Visual

The presence of a roading designation over most of the Project route since the 1950s has foreshadowed that significant landscape and visual change could be expected. While the scale of the planned Expressway means that it will inevitably create a significant change to the local landscape, the actual scale and extent of adverse visual and landscape effects varies along the route, and the choice of route and its design have sought to reduce the level of change.

The approach to designing the route and all associated works has been to avoid adverse landscape and visual effects as far as practicable and then to mitigate any remaining adverse effects. During the design of the route, particular focus was given to the design of all significant structures as well as landscape treatment options along the entire corridor including at key points where the planned Expressway will have a visible presence (such as interchanges and the crossing of the Waikanae River). General and specific measures are proposed in the Projects regulatory consent application which avoid, remedy or mitigate the adverse landscape and visual effects resulting from the construction and operation of the expressway. These measures have been underpinned by the urban and landscape design principles developed for the Project and documented in the urban and landscape design framework.

There are also positive visual effects for users of the road and for users of the proposed new shared cycleway/walkway which will offer new vistas of the coast, hills and landscapes of the Kāpiti district that are not currently available.

Archaeology and Built Heritage

There are no known high-value archaeological or built heritage sites within the earthworks footprint of the Project. Non-invasive surveys, predictive modelling, stakeholders' local knowledge and use of previous archaeological work in the Kapiti district have informed the planned Expressway route choices and design. As large sections of the planned Expressway are on embankments, this lessens the need for disturbing archaeological sites.

The history of continual occupation of the Kāpiti district over the years does however mean that archaeological finds are highly likely. The process for addressing the potential impact on archaeological sites is managed by the Historic Places Act which sets out the requirements for obtaining the appropriate authorisations. Detailed archaeological surveys are an integral part of the pre-construction work programme, supplemented by construction staff training and accidental discovery protocols to manage any unexpected discoveries during construction.

In terms of built heritage, the route avoids directly affecting all items either registered under the Historic Places Act or identified by the Kāpiti Coast District Plan as having significant historic heritage values. The assessment of built heritage also considered all identified sites and buildings within one kilometre of the planned Expressway route, and only two buildings identified under the Kāpiti Coast District Plan are located within close proximity to the planned Expressway - the former St Lukes Church at El Rancho and the Greenaway Homestead on Puriri Road. No significant effects on the historic heritage values of these buildings were identified.

Social Effects

The Kāpiti district is a rapidly growing and changing area and the Project will add to and possibly accelerate this change dynamic. The social effects range in significance between adverse and beneficial across the community and along the route length. These effects would also vary over time through the Project's construction and operational phases.

Arising from its economic, safety and transportation benefits, the Project will also have social benefits for the region and the district, particularly in terms of those that arise from the predicted improvements to the existing level of connectivity between communities. However, there will be negative social effects which will be largely borne by those in neighbourhoods immediately adjoining the planned Expressway. The Project design sought to mitigate a number of potentially negative social effects e.g. by maintaining or improving local road accessibility throughout the communities, developing a new shared walkway/cycleway, using planted bunds where feasible to provide visual and noise screening, and by comprehensive landscape treatment contributing to better community amenities.

Many of the negative social effects will occur during construction and it is therefore important that these effects are mitigated through effective construction management, communication and community liaison, and through effective management measures implemented through the Construction

Environmental Management Plan (CEMP) and its subsidiary plans for traffic, noise, vibration and air quality. Monitoring is proposed through a proposed community liaison group to identify adverse social effects that may occur during construction and for the group to assist in formulating possible mitigation measures.

Once in operation, the nature of the social impacts from the planned Expressway will alter as people and communities adjust to the presence of the road. Any long-term issues will be addressed through the on-going relationship between the NZTA and the KCDC around managing the State Highway and local network.

Positive social benefits are also identified in parts of the Kāpiti district from employment opportunities created, reduced traffic, enhanced choices for local travel movement through new road and shared walkway/cycleway links, improved air quality outcomes through distribution of traffic and improved local ease-of-access and new opportunities for community cohesion.

Urban Form and Functioning

The construction of the planned Expressway will affect the urban form of the Kāpiti district although the area has developed around a corridor that has long been designated for roading purposes, particularly in Raumati and Paraparaumu. The part of the route that runs through Waikanae North, which has been identified and recently zoned for urban growth, will be adversely affected by the Project and it is anticipated that some revision of the growth management policies for the area will be required. The route of the planned Expressway and the width of the designation corridor will however allow 'green spaces' to be utilised for the benefit of the local area while careful location and design of urban development will also assist in integrating future residential neighbourhoods into the modified environment. Future connections into this area including cross-Expressway links have been considered in liaison with the KCDC.

The planned Expressway will adversely affect some businesses that rely to a greater or lesser extent on passing through traffic and some adjustments are therefore envisaged. However, it is anticipated that the long-term vitality and vibrancy of the area's commercial areas and town centres will be maintained, if not enhanced, by the benefits to the local economy that are envisaged by the planned Expressway. These include increased regional accessibility, an increased rate of commercial and industrial land uptake, and opportunities for town centre enhancement at Waikanae and Paraparaumu provided by the reduction in traffic particularly freight vehicles.

The existing amenity values enjoyed by residents adjacent to the planned Expressway will be adversely affected by the Project. Accordingly, a focus of the design of the route, particularly in terms of landscape treatment and interchange and bridge design, was to have the road fit into the landscape as much as practicable and to utilise the wide designation corridor to mitigate the effects on amenity values through such measures as earthwork formation, bunding and planting. Residents adjacent to the existing SH1 will benefit through amenity improvements arising from reduced traffic flow. Additionally, an opportunity is enabled for enhancing this road after it is returned to the Kāpiti Coast District Council through the revocation process (i.e. reverting to a local road).

Statutory Matters

A wide range of objectives and policies in national, regional and local policy and other planning instruments are relevant to the MacKays to Peka Peka Project. The Project was assessed against these provisions with the main conclusions as follows:

- Overall the Project is not inconsistent with, and will give effect to (as required) the relevant objectives and policies of the statutory planning documents.
- The Project is a key part of the Wellington Northern Corridor road of national significance programme which will, as a whole, provide significant safety improvements, travel time savings between Wellington Airport and Levin, and facilitate more efficient movement of freight and people into and out of Wellington. This is consistent with the transport related policy in the regional planning strategies.
- The Project will promote the sustainable management of natural and physical resources. It is intended to meet the growing transportation needs of the region and district, and includes elements that will support public transport, walking, cycling and the mobility-impaired. In turn, these outcomes will enhance the social, economic and cultural well-being of people and communities.
- The Project will sustain the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations and satisfactorily safeguard the life-supporting capacity of air, soils, water and ecosystems.
- As a nationally significant infrastructure Project, there will be both significant positive and adverse effects from the construction and operation of the planned Expressway. The route, alignment and design considerations, in conjunction with appropriate management and conditions, are considered to adequately avoid, remedy or mitigate the actual or potential adverse effects in the context of the purpose and principles of the RMA.
- The Project provides for, and has appropriately responded to, the matters in sections 6, 7 and 8 of the RMA.
- Overall, the statutory assessment concludes that the Project meets the statutory tests of the RMA.

PART A: INTRODUCTION

1 Introduction

Overview

The New Zealand Transport Agency ('the NZTA') is lodging a Notice of Requirement (NoR) and resource consent applications to construct, operate and maintain an Expressway between MacKays Crossing and Peka Peka ('the Project' or 'the Expressway') on the Kāpiti Coast.

The Project is one of eight to upgrade the State Highway 1 corridor between Levin and Wellington Airport which has been identified by the Government as a Road of National Significance (RoNS).

The Project is a proposal of national significance and the Notice of Requirement and resource consent applications ('Applications') have been lodged with the Environmental Protection Authority (EPA). The NZTA requests that the Minister for the Environment makes a direction that the Applications be referred to a Board of Inquiry (BoI).

1.1 The requiring authority / applicant

The NZTA is a Crown entity. The NZTA's objective, as set out in section 94 of the Land Transport Management Act 2003 (LTMA), is to *"undertake its functions in a way that contributes to an affordable, integrated, safe, responsive and sustainable land transport system"*. The NZTA's statutory functions include:

- To promote an affordable, integrated, safe, responsive, and sustainable land transport system[1]; and
- To manage the State highway system[2].

One of the NZTA's five strategic priorities, as defined in its Statement of Intent 2011 - 2014, is to plan and deliver the roads of national significance (RoNS).

[1] Section 95 (1)(a) of the LTMA 2003

[2] Section 95 (1)(c) of the LTMA 2003

1.2 The Project

The NZTA proposes to designate land and obtain resource consents to construct, operate and maintain a section of road, approximately 16km in length, between MacKays Crossing and Peka Peka, on the Kāpiti Coast.

The Project will provide for a MacKays to Peka Peka Expressway ('the Expressway') with two lanes of traffic in each direction, connections with local roads at four interchanges, new local roads and access roads to maintain local connectivity and an additional crossing of the Waikanae River.

It is proposed that once the proposed Expressway is completed it will become part of State Highway 1 (SH1) and that the existing section of SH1 between MacKays Crossing and Peka Peka will become a local arterial road. However, the power to declare roads to be State highways or revoke a State highway declaration resides with the Chief Executive of the Ministry of Transport, not with the NZTA.

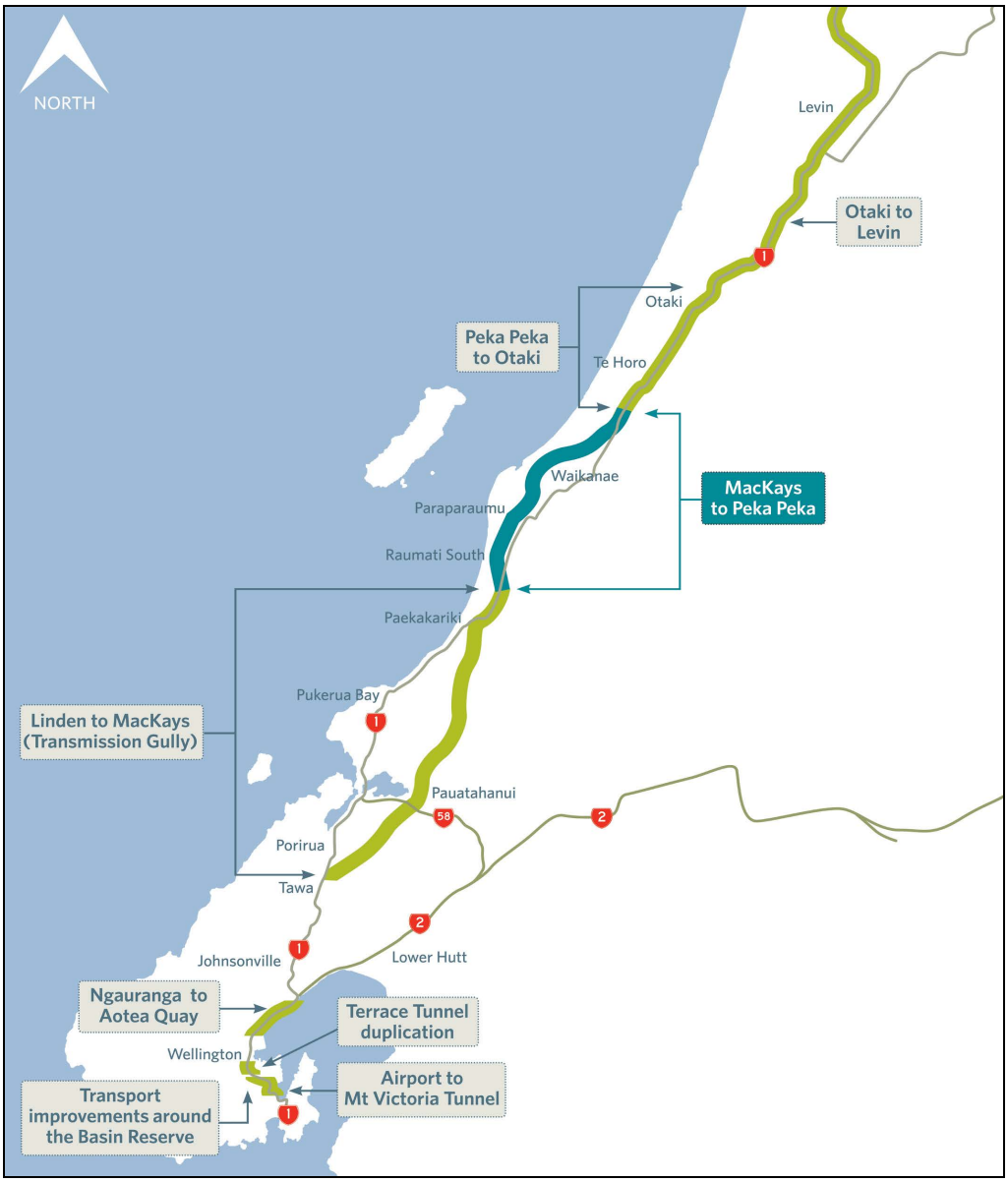

Figure 1.1: The Wellington Northern Corridor RoNS

1.3 MacKays to Peka Peka Expressway Alliance

An alliance is a collaborative way of working on major projects and involves the joint management of project challenges. It provides a different delivery approach from the more traditional forms of contracting and allows the NZTA to work more closely with partners.

An alliance model is considered to be the most suitable method for highly complex projects as it allows the partners to:

- work on a number of areas at once, overlap project phases and promote efficiencies through early contractor involvement
- deliver major projects with greater speed and innovation, and to
- work together to achieve the best transport and community outcomes.

In June 2010, the NZTA entered into an Alliance contract to facilitate the delivery of the Project. The MacKays to Peka Peka Expressway Alliance ("the Project team") comprises Beca, Fletcher Construction, Higgins Group, Kāpiti Coast District Council (KCDC)[3] and the NZTA. In addition, Goodmans Contractors, Incite and Boffa Miskell are subcontracted to the Alliance.

1.4 Purpose and scope of this report

This report (and the supporting information contained in Volumes 1, 3, 4 and 5) has been prepared in support of the NoR for a new designation and applications for resource consents which will authorise, under the Resource Management Act 1991 (RMA), the construction, operation and maintenance of the Project.

In addition to the NoR to be prepared and lodged with the EPA (under section 145(3) of the RMA), the NZTA is lodging applications for regional resource consents under the relevant Regional Plans with the EPA (under section 145(1)(a) of the RMA) for activities required for the construction, operation and maintenance of the proposed Expressway. The NoR and the regional resource consent application forms are provided in Volume 1.

This report includes a comprehensive, integrated AEE which addresses all aspects relevant to the consideration and determination of the NoR and resource consent applications. These matters are all being lodged with the EPA as together they form part of a proposal of national significance.

Further information on the statutory context for the Project is provided in Part B, Chapter 3 to 5 of this report.

[3] KCDC passed resolutions on 25 February 2010 that it intended to work constructively with the NZTA, and that they would be prepared to become a member of the Alliance proposed to design and build the proposed MacKays to Peka Peka Expressway. KCDC formally became a member of the Alliance in September 2010.

1.5 Integrated engineering and environmental assessment process

The information presented in this set of documents for the RMA authorisations is the culmination of an extensive design and environmental assessment exercise undertaken since the Project commenced in 2009.

The engineering and environmental assessment (E&EA) process for the Project has involved the close collaboration of the Project designers (i.e. engineering teams) with the environmental assessment teams. The close working relationship of the Project team has resulted in a high level of integration between the design and mitigation processes.

Specific details about how particular potential adverse environmental effects are proposed to be managed are provided in Parts G and H of this report, but in general terms the approach has been:

- To modify the design of the Project to avoid, or reduce to the extent practicable, potential adverse effects;
- Where avoidance of adverse effects was not possible, to develop measures to adequately remedy and/or mitigate potential adverse effects;
- Where mitigation and/or remediation is required, to co-ordinate these measures as much as possible to promote good environmental outcomes.

A further feature of the E&EA process has been the involvement of a wide range of stakeholders (i.e. wider than just the E&EA teams). In particular, KCDC in its role as an Alliance partner, have been involved throughout the Project development. Representatives of the Council have been involved in the Project Alliance Board, attended key workshops and meetings and acted in a review capacity, providing feedback to the Project team about various aspects of the Project.

A number of other stakeholders also provided input into the E&EA process, including:

- Greater Wellington Regional Council;
- tangata whenua;
- network utility providers;
- Department of Conservation;
- NZ Historic Places Trust;
- community organisations (e.g. public health, schools etc.);
- advocacy groups (e.g. environmental groups);
- directly affected landowners; and
- the general public.

1.6 Structure of this report

The documentation in relation to the NoR and resource consent applications is contained within five volumes[4]. These are:

- Volume 1: Resource Management Act Forms
- Volume 2: Assessment of Environmental Effects ('AEE') Report;
- Volume 3: Technical Assessment Reports and Supporting Documents;
- Volume 4: Management Plans; and
- Volume 5: Plan Set.

This AEE report (in conjunction with supporting information within Volumes 1, 3, 4 and 5) has been prepared in support of the NoR for the Designation and the resource consent applications lodged with the EPA, including:

- A description of the existing environment, including a description of the receiving environment (as necessary);
- A description of the operation and construction of the Project;
- An assessment of alternative sites, routes and methods (as necessary);
- Identification of the persons affected by the Project and a description of consultation undertaken in the development of the Project;
- An assessment of the actual or potential effects on the environment of the construction, operation and maintenance of the Project including, where necessary, a description of proposed mitigation measures;
- An assessment of the Project against relevant provisions of policies and plans (both statutory and non-statutory); and
- Suggested conditions (including proposed management plans and monitoring) for the Designation and resource consents.

The structure of this AEE report is set out in Table 1.1.

[4] In order to assist readers to familiarise themselves with the structure of the lodgement documentation and the key naming conventions used, a *'Guide to lodgement documentation'* has been prepared.

Table 1.1: Structure of this AEE Report

Part	Chapters	Name	Contents
A	1 and 2	Introduction and Background to the Project	An introduction to the Project, including the strategic context, benefits and objectives of the Project
B	3, 4 and 5	Statutory Context	Details of the statutory matters relevant to the development and consideration of the Project
C	6	Description of the Environment	A description of the existing environment, including a description of the receiving environment as necessary
D	7 and 8	Description of the Project	A description of the construction and operation of the Project and the land required for the Project
E	9	Consideration of Alternatives	An assessment of the alternatives considered in the development of the Project
F	10	Consultation and Engagement	Identification of the persons affected by the Project and details of the methods and outcomes of consultation undertaken in relation to the Project
G	11 to 30	Assessment of Effects on the Environment	An assessment of the effects on the environment of the Project
H	31, 32 and 33	Management of Environmental Effects	Details of suggested mitigation and monitoring, including proposed management plans
I	34 and 35	Statutory Assessment	An assessment of the NOR and RCA's against all relevant statutory considerations, including Part 2 of the RMA

Although a single AEE report has been prepared covering all components of the Project, some aspects of the report will only be relevant to:

- specific geographical areas; or
- the NoR and/or applications for resource consent; or
- specific components of the Project.

The RMA forms (Volume 1) set out what information is relevant to specific statutory aspects.

1.7 RMA requiring authority status

A notice of requirement for a designation may only be issued by a requiring authority.

Under section 166 of the RMA, a requiring authority is defined as:

(a) A Minister of the Crown; or

(b) A local authority; or

(c) A network utility operator approved as a requiring authority under section 167

The NZTA was approved as a requiring authority by the Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994, which was notified in the Gazette on 3 March 1994.[5] A copy of this Gazette Notice is contained in Appendix B of this report.

1.8 Consideration of the Project as a Proposal of National Significance

The Project will upgrade part of the Wellington Northern Corridor (SH1 from Levin to Wellington Airport), an identified RoNS in terms of the Government Policy Statement[6]. The NZTA is lodging the NoR and associated resource consent applications for the Project with the EPA pursuant to section 145 RMA, requesting that the Project be directed to and determined by a BoI as a Proposal of National Significance. The EPA will recommend a course of action to the Minister for the Environment (section 146), who will make a decision pursuant to section 147, guided by the advice of the EPA and taking into account the factors for determining whether proposals are of national significance under section 142.

1.9 Aspects not covered in this report

There are some matters which are related to the Project which are not covered in this set of documents. These are:

- the alteration or removal of existing designations (refer to Chapter 3 of this report);
- authorisations required under other legislation (refer to Chapter 3 of this report); and
- Works to existing SH1[7] (refer to Chapter 2 of this report).

1.9.1 The future of existing SH1

Building the proposed Expressway would allow existing SH1 between MacKays Crossing and Peka Peka to be modified and play a new role within Kapiti's urban and rural fabric. It would be able to provide a safe multi-functional alternative route, in accordance with the Project Objectives (refer to Chapter 2) and the benefits and effects of the Project have been assessed based on this assumption. It is emphasised however that any redevelopment of existing SH1 does not form part of the Project. Decisions about the redevelopment of existing SH1 have not yet been made. These decisions will be made in the future in conjunction with KCDC and the community.

[5] Under clause 29 of Schedule 2 of the Land Transport Management Act 2008, the NZTA replaced Transit New Zealand as the requiring authority approved under this Gazette Notice

[6] Government Policy Statement on Land Transport Funding 2009/2010-2018/2019

[7] Except works required for the northern and southern tie-ins with the existing SH1

2 Background to the Project

Overview

The proposed Expressway route[8] generally follows the historical expressway designation referred to as the Sandhills Motorway, and more recently a local road designation for the proposed Western Link Road (WLR) included in the Kāpiti Coast District Plan.

The proposed Expressway alignment[9] deviates from the existing WLR designation in several areas, either as a result of road design requirements or to avoid or mitigate potential environmental effects where it was practicable to do so.

This Project is a key component of a number of national, regional and local transport strategies, policies and plans, including the upgrading of SH1 between the Wellington Airport and Levin having been identified as a RoNS in the Government Policy Statement on Land Transport Funding.

2.1 Introduction

This Chapter of the AEE provides a background to the Project and outlines:

- the history of the Project;
- the national, regional and local strategic context of the Project;
- the benefits of the Project;
- the Project objectives; and
- the property acquisition process.

[8] 'Route' refers to the overall corridor of land between MacKays Crossing and Peka Peka between Chainage 1900m (just South of Poplar Avenue) to Chainage 18050m (just North of Peka Peka Road intersection). Between Chainage 0 and approximate Chainage 1900m the existing State highway will be upgraded to Expressway standards within the existing SH1 designation, which will occur as part of the NZTA's maintenance programme, and is thus not part of the Project Designation to which this AEE relates.

[9] 'Alignment' refers to the Proposed Expressway Designation alignment, based on the centreline of the road.

2.2 History of the Project

There has been a significant amount of historical work undertaken which has led to the selection of the Expressway route. A brief summary of this history is outlined below.

2.2.1 Wellington to Foxton Motorway/Sandhills Route

In 1956, the Governor General issued a mid-line proclamation for a "proposed motorway" between Paekākāriki and Ōtaki (as part of the Wellington to Foxton Motorway) known locally as the "Sandhills Route" or "Sandhills Motorway". In 1965, and again in 1976, requirements were issued to the Hutt County Council and Kāpiti Borough Council respectively, to include provision for a motorway along the Sandhills Route in the relevant district scheme.

2.2.2 Sandhills Motorway

In 1993, the Greater Wellington Regional Council ('GWRC') commissioned a study to investigate future alignment options for SH1 through Kāpiti. The study examined three principal alternative routes and found that the western bypass route ('the Sandhills Route') provided the optimum highway alignment.

In 1994, Transit New Zealand (Transit) issued KCDC with a NoR to designate the Sandhills Route for a 'proposed limited access road, being a future western bypass of Paraparaumu and Waikanae' to replace existing SH1. The NoR was modified by Transit in 1995; this included altering the description of the designation to 'State Highway purposes'. The "Sandhills route" designation was confirmed by KCDC in 1995, but was later uplifted by Transit in 1999.

2.2.3 Western Link Road - local arterial

In November 1994, KCDC commissioned consultants to undertake a study of the Kāpiti Roading Network. The study was designed to examine options and to determine a long term strategy for developing the roading network in the district consistent with Transit's policies regarding the desired optimum location of SH1 as the principal road north from Wellington. The findings of this report indicated that significant changes to the local roading network would be required to service the State highway, if it was relocated to the Sandhills route and that the alignment should instead be used for a local arterial road (termed the 'Sandhills Arterial') with SH1 remaining in its current location. Transit resolved to agree to KCDC's long term strategy of retaining SH1 on its existing alignment in October 1995.

In December 1997 KCDC issued a NoR for a proposed "Local Road" along the Sandhills route between Poplar Avenue and SH1, just south of the Peka Peka Road intersection and for a widened Poplar Avenue through to SH1 (which was referred to as the Western Link Road or WLR). This designation sought to provide for a four lane local road between Raumati Road and Te Moana Road, with a two lane sections south of Raumati Road and north of Te Moana Road.

The NoR for the WLR designation was confirmed by independent hearing commissioners in 1998. However, final confirmation of the designation did not occur until July 2006 following Environment Court

and High Court determinations on appeals lodged by the Waikanae Christian Holiday Camp and the Takamore Trustees. The initial grounds for these respective appeals were that:

- the road would make the effective use of the Waikanae Christian Holiday Camp difficult and the associated noise and air pollution would destroy its peaceful, tranquil character; and
- the road would affect an identified wāhi tapu area that contains taonga (treasures) and koiwi (human bones).

Following confirmation of the designation, Land Transport New Zealand approved a subsidy rate of 90% (in principle) in July 2007 for Stage 1.

Urban design consultant Common Ground Studio was commissioned by KCDC in August 2008 to produce "Concept Designs" for an alternative design for the WLR. Through this design process, KCDC decided to limit the WLR to two lanes throughout its length, with the alignment relocated around dune forms within the 100m wide corridor. The design included walkways, bridleways and cycleways.

The WLR project was proposed to be consented and constructed in three core stages (Stages 1 – 3) and seven sections (Section 1 – 7), within the boundary of the designation. A number of regional consents were obtained for the construction of Stage 1 of the WLR project, between Raumati Road and Te Moana Road (which have not yet lapsed). These approvals covered activities such as discharges to waterways, earthworks and construction related effects. A number of authorities from the New Zealand Historic Places Trust were also sought and obtained to undertake investigative archaeological work within the designated area.

2.2.4 State Highway 1 studies undertaken

In parallel with the development of the WLR, Transit investigated the future of SH1 in the Wellington region. As the only north-south route available through the Kāpiti Coast District, SH1 carries all regional and local traffic movements. Given predicted population growth in the region, as well as the general national increase in vehicle numbers and traffic volumes, traffic congestion, delays and accidents were expected to worsen.

In 2004 Transit, together with the GWRC, commissioned the Western Corridor Study (AECOM), the purpose of which was to investigate the principal options for all transport modes in the Region's western transport corridor (Ngauranga to Ōtaki). The study confirmed the need to develop a four lane alignment for SH1 from MacKays Crossing to north of Ōtaki as part of a series of multi modal transportation improvements along this corridor. Following this, Transit commissioned the State Highway 1 Kāpiti Strategic Study (OPUS) in 2007, which developed and assessed several options for four laning SH1 within the Kāpiti Coast District.

The importance of having a safe and efficient state highway corridor through the Kāpiti Coast District was confirmed in two subsequent studies commissioned by Transit:

- Kāpiti Scoping report by OPUS, July 2008; and
- Kāpiti Technical report by OPUS, August 2009[10]

These studies highlighted that the current configuration of SH1 through Kāpiti faces a number of significant issues, including:

- safety concerns;
- congestion and journey time reliability problems; and
- the need to create more efficient journeys for both local and state highway traffic.

2.2.5 Roads of National Significance

In May 2009, the Government Policy Statement on Land Transport Funding prepared under the Land Transport Management Act 2003 (GPS) came into force. The GPS listed seven roads of national significance, including the Wellington Northern Corridor. The NZTA is developing the Wellington Northern Corridor in geographic sections, with one of these covering the area between MacKays Crossing and Peka Peka.

2.2.6 Expressway route

In August 2009, the NZTA consulted the public on two alternative route options for an expressway between MacKays Crossing and Peka Peka. These were:

- Upgrading the State highway essentially along the current SH1 alignment; and
- Realigning the State highway around Waikanae (to avoid Waikanae township) via the proposed WLR alignment between Otaihanga and Waikanae Beach.

In October 2009, the NZTA extended the consultation period in response to community feedback requesting that it look at another route option for the MacKays to Peka Peka Project. The options consulted on in October 2009 were:

- Western Option: SH1 Expressway avoiding Waikanae town centre, with local supporting roads;
- Eastern Option: SH1 Expressway following the existing rail corridor, with local supporting roads; and
- Western Link Road (Sandhills) option: SH1 Expressway generally following the WLR Corridor.

[10] Both studies can be viewed at http://www.nzta.govt.nz/projects/mackays-to-peka peka/resources.html#news

More detail on the alternative route options that were consulted on is provided in Chapter 9 of the AEE.

The Western Link Road (Sandhills) option received the greatest level of local support during the consultation process. Assessment of these four options was also undertaken within the statutory framework under the Land Transport Management Act (LTMA).

After reviewing the feedback from submissions, the NZTA Board concluded in December 2009 that:[11]

> *The Sandhills route is the preferred Corridor for the SH1 Expressway through Kāpiti, subject to further alignment development within the corridor including more detailed assessment of effects and further community consultation.*

The reasons for Board selection of the WLR corridor were that, when compared with the other route options, it:

- Would have the least impact on properties, least population displacement, and the fewest properties required;
- Would be the least cost option to construct (an estimated 25-30% lower);
- Could be constructed within the shortest period, with least disruption to local communities; and
- Had the greatest proportion of local community support.

The Western Option was not chosen because it offered fewer compelling benefits when compared to the other two options. The Eastern Option was not chosen because the NZTA Board considered that the benefits it would yield did not outweigh the greater cost and land requirement compared with the WLR option.

2.2.7 The MacKays to Peka Peka Expressway Alliance

As outlined in Chapter 1 of the AEE, in June 2010, NZTA selected the MacKays to Peka Peka Expressway Alliance to deliver the planned Expressway on its behalf. Since then, further investigation, consultation and design work has been undertaken to identify and develop the most appropriate alignment and form of the Expressway.

From June 2010 to July 2011, the Alliance carried out Project Scoping and Option[12] assessment and evaluation, informed by community consultation, to develop the final Expressway alignment and design. Major design elements considered during this process included the location and number of interchanges and the detailed route alignment options. The Alliance also undertook an evaluation of the three principal alternative routes that were consulted on in 2009, updated to take into account the decision to have two full interchanges at Paraparaumu and Waikanae, to ensure comparability between the options.

[11] Minutes of NZTA Board meeting, 11 December 2009, Minute 1c

[12] These assessments are contained in the M2PP Options and Scoping Reports prepared for NZTA by the Alliance in 2011

This evaluation confirmed the overall preference of the proposed Expressway route. Further detail regarding these processes and outcomes is contained in Chapter 9 and 10 of the AEE.

2.3 Context of the Project

2.3.1 Strategic context

The GPS states that the RoNS are seven of New Zealand's most essential routes which require significant development to reduce congestion, improve safety and support economic growth.

The Wellington RoNS is approximately 110 km in length and extends from the Wellington International Airport to Levin, as shown in Figure 1.1 in Chapter 1 of the AEE.

The NZTA's objectives for the Wellington RoNS[13] are:

- to enhance inter regional and national economic growth and productivity;
- to improve access to Wellington's CBD, key industrial and employment centres, port, airport and hospital;
- to provide relief from severe congestion on the State highway and local road networks;
- to improve the journey time reliability of travel on the section of SH1 between Levin and the Wellington International Airport; and
- to improve the safety of travel on State highways.

Implementation of the Wellington RoNS programme will be ongoing, with sections of the route being developed at different stages.

2.3.2 National context

At a national level, the Project fits within a number of strategic initiatives including:

- the Government Policy Statement on Land Transport Funding 2012/13 – 2021/22 (GPS 2012) which will replace the Government Policy Statement on Land Transport Funding 2009/10 – 2018/19);
- the National Infrastructure Plan 2011 (NIP); and
- the New Zealand Transport Strategy 2008 (NZTS).

Until the GPS 2012 comes into force on 1 July 2012, the GPS 2009 remains the current GPS.

[13] Wellington Northern Corridor – Project Summary Statement, 2009, page 4

The current GPS came into effect on 1 July 2009. It contains guidance for the NZTA on what the Crown wishes to achieve through the allocation of funding from the National Land Transport Fund (NLTF) towards activities in the land transport sector. It covers the financial period to 2014/15 and provides indicative figures for the period 2015 – 2019. The GPS state that the short to medium term impacts expected to be achieved through the use of the NLTF are:

- improvements in the provision of infrastructure and services that enhance transport efficiency and lower the cost of transportation through:
    - improvements in journey time reliability;
    - easing of severe congestion;
    - more efficient freight supply chains;
    - better use of existing transport capacity;
- better access to markets, employment and areas that contribute to economic growth;
- a secure and resilient transport network;
- reductions in deaths and serious injuries as a result of road crashes;
- more transport choices, particularly for those with limited access to a car, where appropriate;
- reductions in adverse environmental effects from land transport; and
- contributions to positive health outcomes.

The GPS is also complemented by the NIP, the second version of which was released in June 2011. The NIP outlines the Government's intensions for infrastructure development over a 20 year timeframe.

The Project also sits within the context of the NZTS[14], which was developed in 2002 and updated in 2008. Its vision is that by 2040:

> *People and freight in New Zealand have access to an affordable, integrated, safe, responsive and sustainable transport system.*

The objectives of the NZTS are:

- ensuring environmental sustainability;
- assisting economic development;
- assisting safety and personal security;
- improving access and mobility; and
- protecting and promoting public health.

[14] New Zealand Transport Strategy, 2008, page 5

In regard to the NZTS, it should be noted that the GPS 2009 states that:

> *The government in general terms supports the overall intent of the NZTS, but considers that moving too quickly on modal shift will have a negative impact on environmental and economic efficiency*[15].

2.3.3 Regional context

The Project is proposed within the context of a number of inter-related strategic regional transport initiatives, including the:

- Wellington Regional Land Transport Strategy 2010–2040 (RLTS);
- Western Corridor Plan 2006 (WCP);
- Wellington Regional Strategy 2007 (WRS); and
- Wellington Regional Land Transport Programme 2009-2012 (WRLT).

2.3.4 The Wellington Regional Land Transport Strategy 2010- 2040

The current RLTS was approved by the GWRC in September 2010. It is a statutory document prepared under the LTMA 2003. It is the strategic transport document that guides the development of the Region's land transport system and sets the framework and vision for the provision and management of movement and transport throughout the region. Its vision is to[16]:

> *Deliver an integrated land transport network that supports the region's people and prosperity in a way that is economically, environmentally and socially sustainable.*

To achieve this, the objectives set out in the RLTS are to:

- assist economic and regional development;
- assist safety and personal security;
- improve access, mobility and reliability;
- protect and promote public health;
- ensure environmental sustainability; and
- ensure that the Regional Land Transport Programme is affordable for the regional community.

[15] Government Policy Statement on Land Transport Funding 2009/10 – 2018/19, 2010, page11.

[16] Wellington Regional Land Transport Strategy 2010-2040, 2010, page 2

2.3.5 The Western Corridor Plan 2006

The Western Corridor refers to the main transport corridor between Ōtaki and Ngauranga. The Western Corridor Plan (WCP) is a non-statutory document, which sits alongside and supports the statutory Regional Land Transport Strategy 2010-2040 (RLTS) and was adopted in 2006 by Greater Wellington Regional Council (GWRC) to identify the needs and proposed actions specific to this corridor.

The WCP was developed three years prior to the identification of the Wellington Northern Corridor RoNS. The WCP therefore currently anticipates the development of the Kāpiti Western Link Road Project by Kāpiti Coast District Council.

However, the proposed RLTS for 2012 states that, during the next review of the WCP, the relevant projects that make up the Wellington RoNS will be taken into account.

2.3.6 The Wellington Regional Strategy 2007

In 2007, the nine local authorities that make up the Wellington region collaboratively developed the Wellington Regional Strategy (WRS). The WRS is a non-statutory document that set out a strategy to achieve sustainable economic growth strategy in the region. The WRS has a principal aim of making the region internationally competitive, in terms of being a region with great lifestyle and job opportunities, supported by a strong economy.

The WRS identifies three focus areas for sustainable growth. They are:

- **Leadership and partnership** – Key players working together to deliver the Region's sustainable growth;
- **Grow the Region's economy, especially its exports** – Export more and become less reliant on trade within New Zealand; and
- **Good Regional form** – Building on the physical arrangement of our communities and how they link, strengthening our city and town centres, matching transport decisions and land use, creating quality urban design, creating strong open spaces and recreation amenities and providing good housing choice – essentially, making the Wellington region a great place to live, with a good quality of life.

A key aspect of the WRS is the provision of high quality efficient transport routes to support the objectives for economic growth and good regional form. Within the strategy, reference is made to the general benefits associated with the RoNS.

2.3.7 The Wellington Regional Land Transport Programme 2009- 2012

The Wellington Regional Land Transport Programme (WRLTP) is a three year programme that contains all the land transport activities to be undertaken throughout the region for the next three financial years (currently 2009-12), as well as indicative activities over the following three financial years, plus a ten year financial forecast.

As well as maintaining the current transport network, these activities include:

- new public transport infrastructure and services;
- improved local roads and state highways;
- walking and cycling projects; and
- road safety improvements and programmes.

The priorities in the Regional Land Transport Programme (RLTP) respond to the key outcomes sought by the Wellington Regional Land Transport Strategy 2007-2016 and are consistent with the impacts sought by the GPS 2009.

2.4 Need for the Project

The importance of an efficient highway corridor through the Kāpiti District has been highlighted in several studies.[17] The existing SH1 faces a number of issues, including safety concerns, congestion problems, and inefficient journeys for both local and State Highway traffic.

2.4.1 Road safety

The geometry of the existing SH1 is currently substandard with out-of-context curves and an inconsistent speed environment. The high degree of side access and local road connections creates friction which slows traffic on the highway and creates crash risks and other safety issues. Intersections between SH1 and key local arterials have a history of vehicles failing to give way resulting in injury crashes, contributing to the poor crash history in the section of SH1 between MacKays Crossing and Peka Peka. In the period 2005-2009, 399 crashes were reported including four fatalities.

2.4.2 Population growth

The Wellington region is expected to increase by 65,000 people over the next 20 years, primarily along Wellington's northern corridor.

Kāpiti Coast is one of the fastest growing districts in New Zealand, growing nearly 10% over a five year period, from a population of approximately 46,200 as at the 2006 census, to an estimated population of 49,400 at 30 June 2010.

The majority of movement within the District is via private vehicles (i.e., private cars, trucks or vans); the second most common means of travel to work for people in Kāpiti Coast District at the 2006 census was driving a company car, truck or van.

[17] These include the Transit NZ *SH1 Kāpiti Strategic Study* (2008) and *Kāpiti SH1 Strategy Study – Technical Report* (2009) prepared by Opus Consultants Ltd

With significant growth expected to occur in Kāpiti over the next twenty years, private vehicle use is also expected to increase.

2.4.3 Access, congestion and unreliable journey times

Kāpiti's proximity to Wellington and the high volumes of traffic for commuter, business and recreational purposes mean the Kāpiti section of SH1 often operates beyond its design capacity and can become severely congested at peak times. The combination of local traffic and through traffic on the State highway further aggravates this situation.

The traffic growth rate on existing SH1 in Paraparaumu was just under 1% per year during the five year period 2005 to 2009.

An effective, parallel local road network between MacKays Crossing and Peka Peka does not currently exist; thus any congestion or obstruction to traffic impedes both local and through traffic. This congestion results in unreliable travel journey times to and from Wellington for commuters.

Local supporting roads that provide improved access for communities away from the State highway are important, as are improvements to the resilience of the local roading network (in particular, there is currently only one road bridge over the Waikanae River that serves both through and local traffic).

2.4.4 Movement of freight

Currently 6.5% of traffic on SH1 in Paraparaumu is heavy vehicles. The demand for road-based freight movement is expected to grow significantly in the coming years, both as through traffic and within Kāpiti, particularly with the expected population growth and anticipated development of the Kāpiti Landing Business Park at the Kāpiti Coast Airport.

There are a number of issues associated with freight traffic on SH1. Between MacKays Crossing and Peka Peka, the existing SH1 passes through the urban areas of Paraparaumu and Waikanae. All intersections with existing SH1 between MacKays Crossing and Peka Peka require SH1 traffic, including freight, to stop.[18] The operating cost for trucks increases with congestion, and stop-start driving.

[18] This includes one signalised intersection in Paraparaumu (Kāpiti Road) and two signalised intersections in Waikanae (Te Moana Road and Elizabeth Street)

2.5 Benefits of the Project

2.5.1 Project benefits

Completing this Project will assist regional and national economic growth, as well as delivering a range of other benefits, including:

- support for a growing regional population;
- support for the transport of increasing freight volumes particularly by truck;
- improved access to Wellington's key facilities such as the port, central business district, airport and hospitals;
- relief from the current road congestion;
- improved safety for motorists; and
- improved journey time reliability.

To ensure the Project achieves these benefits, a series of objectives were developed to inform route and alignment selection and to direct the design process (refer to Section 2.6).

2.5.2 Other benefits

The proposed Expressway opens up a range of possibilities for the future form and function of existing SH1 when it becomes a local road, managed by KCDC. The NZTA and KCDC have started exploring ideas and concepts and consulting with the local community in regard to the vision for this road in its future role.

The objectives of the ideas and concepts developed for existing SH1 relate to:

- Transport function - retaining the road as main spine road for the local road network and allow it to function as a national distributor road in the event of an emergency;
- Urban form - reducing the width of the road and making the town centres more attractive places to live, work and shop;
- Safety - ensuring safety for all users;
- Economic viability - encouraging economic development in the town centres as social, employment, retail and transport centres;
- Strategy - achieving consistency with the Council's Development Management Strategy and planning rules; and
- Value for money - delivering project solutions that are good value for money.

It is emphasised, however, that any redevelopment of existing SH1 does not form part of this Project. Decisions regarding the redevelopment of existing SH1 have not been made, and there is a separate statutory process for both the revocation of State highway status (decided by the Secretary for Transport, subject to a separate consultation process under the LTMA 2003) and for any works on a

local road (under the LGA 2002). At the appropriate time in the future, decisions will be made on this road by the local authority in collaboration with their local community.

2.6 Project objectives[19]

A series of objectives for the Project have been developed to reflect NZTA's requirements for the Levin to Wellington Airport RoNS and the aspirations of the wider Kāpiti Coast community. They are also the objectives that the proposed Designation seeks to satisfy:

The Project Objectives are:

- To:
    - enhance inter-regional and national economic growth and productivity;
    - enhance efficiency and journey time reliability from, to and through the Kāpiti District, Wellington's CBD, key industrial and employment centres, port, airport and hospital;
    - enhance safety of travel on SH1; and
    - appropriately balance the competing functional performance requirements of inter-regional and local traffic movements, recognising that modal and route choice opportunities need to be provided that enable local facilities and amenities in the Kāpiti Coast District to be efficiently accessed;

  by developing and constructing a cost optimised new State Highway alignment to expressway standards between MacKays Crossing and Peka Peka.
- To manage the immediate and long-term social, cultural, land use and other environmental impacts of the Project on the Kāpiti Coast District and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, expressway design and conditions.
- To integrate the expressway into the urban form of Kāpiti Coast District by taking into account current and future planned settlement patterns in route and alignment selection and expressway design and conditions.

[19] In addition to the Project Objectives the Alliance also agreed to a set of Guiding Objectives to inform the design and construction of the Expressway, this being a precursor to KCDC becoming a member of the Alliance in 2010. These objectives are set out in KCDC paper SP-10-1024 (16 September 2010) - *Guiding Objectives and Membership of the Alliance: MacKays Crossing to Peka Peka Expressway*.

2.7 Property acquisition

2.7.1 Overview

The types of properties affected by the proposed Expressway can be described in three broad categories:

- property required in whole or in part for the Project;
- property with an easement or other property right (including rights-of-way and water rights) that is directly affected by the Project; and
- property adjacent to the Expressway.

Only properties in the first two categories are required to be acquired for the Project, and are deemed to be 'directly affected': i.e., properties where the land is required or where a property right is affected.

The directly affected properties range from land owned by the Crown, the Department of Conservation (DOC), GWRC, and KCDC (including road reserves), as well as privately owned land comprising rural, rural-residential, urban residential and industrial or business landholdings. All the properties required are within the jurisdiction of KCDC, the territorial local authority for the Project Area.

The proposed Expressway would generally follow the vacant corridor of land currently designated for the Western Link Road (WLR), and that was previously designated for motorway purposes as part of the "Sandhills Motorway" since the mid-1950s. The majority of land along the WRL has already been acquired by the Crown or by KCDC for this purpose.

However, in the vicinity of Leinster Avenue, Puriri Road, Ngarara Road and Peka Peka Road, the proposed Expressway alignment deviates away from the existing WLR designation and/or previous motorway designations. Therefore a number of new properties (in whole or in part) are required for the Project.

In total 84 landowners (excluding the Crown and KCDC) have land that needs to be acquired to construct the Project. Agents for the Crown have been proactively liaising with property owners and progressing acquisition with willing sellers and, by the time of lodgement of this NOR and resource consent applications, land has been acquired from 21 of 84 the landowners.

2.7.2 Public Works Act processes

Land acquisition

The Crown has the ability to acquire land under the Public Works Act 1981 ('PWA'), either all or part of a property. The PWA process considers adverse effects on the value of properties when acquiring part of a property, recognising that a property's future use and development potential may be affected where only part of the property is required. For example, a rural property being reduced in size may prevent it from complying with District Plan rules for subdivision. Alternatively, the severance of a property by a public work may prevent its use as one operational land unit. Appropriate compensation will be provided to the land owner where a part acquisition affects the potential and anticipated future development value of the property.

Temporary land occupation

A number of properties will be required for the construction of the Project, but are unlikely to be purchased as they are not required for the operation of the Expressway in the long term. Construction activities that are likely to require the temporary occupation of land include:

- construction yards, for storage of heavy machinery and equipment, project offices;
- lay down areas (such as storage areas for pre-cast concrete);
- fill sites; and
- construction vehicle access tracks, through areas where ground conditions are unfavourable.

The PWA process allows for the temporary occupation of land to carry out construction activities. Through this process, arrangements can be made so that the owners are not disadvantaged by the use of their land. Under this process, the requiring authority must return the land to either its original state or in an altered state only by agreement of the owner once construction is complete.

Properties that will be occupied for construction activities are to be designated for roading purposes (should the NoR be confirmed). Once construction of the proposed Expressway has been completed, the requiring authority will review the Designation footprint and uplift the Designation from areas of land not required for the operation of the Expressway.

Land entry agreements

During the development of the Project, ground investigations were undertaken along the length of the alignment to inform construction methodologies. Agents for the Crown worked through land entry agreements with landowners to access properties for a temporary period whilst those investigations were carried out.

Access, easements and other property rights

A number of private properties have existing property rights such as right-of-ways, water supply arrangements and other easements that will be potentially affected by the Expressway. Agents for the Crown have met with property owners and discussed alternatives to each current situation. Some of the methods used to address affected property rights have included the following:

- where there is available balance land around the Expressway, the provision of service lanes and realigned private driveways has been considered, in conjunction with KCDC which maintains the local road network (including any new or realigned access roads that will become local roads);
- where the Expressway severs physical access, an underpass is an option (for example, such as that proposed to provide access to El Rancho Holiday Camp from Kauri Road);
- Where legal frontage onto a public road is severed, ensuring the proposed designation would provide a future road frontage;

- where property access has been severed and a workable solution cannot be found, full acquisition of the property has been considered (for example, where sole right-of-way access has been severed and the property becomes 'landlocked'); and
- alternative water supplies will be provided for all those with lawfully established water rights that are affected.

2.7.3 Properties within close proximity

The PWA does not provide for the Crown to acquire property that is in close proximity to a public work but that is not directly affected as described above. However, a critical part of the design process has been to identify and assess the actual and potential environmental effects of the proposed Expressway on adjacent properties, informed by feedback during consultation and other engagement, and to develop suitable measures to address the effects on these properties.

The Project team has received a number of questions and requests regarding compensation for potential or perceived loss of property value have been received. Loss of property value is not an 'environmental effect' under the RMA, although the effects on amenity and character can have a relationship with property values, as have other factors such as improved accessibility to residential neighbourhoods and commercial services.

The actual or potential adverse effects of the project on amenity values and character have been fully addressed in the development of the Project, and measures to mitigate the effects to appropriate standards have been fully considered and incorporated into the design of the Expressway. These effects and the proposed measures to mitigate them are outlined in Part G of this AEE.

PART B: STATUTORY CONTEXT

3 Authorities sought under the Resource Management Act 1991

The proposed Expressway is a project of national significance and the NoR and resource consent applications to authorise it under the RMA have been lodged with the EPA. This Chapter outlines the requirements under the RMA for obtaining statutory approvals for the Project and assessing the Project as a proposal of national significance under the RMA.

The NoR has been lodged to identify and protect a corridor of land within the Kāpiti Coast District and to authorise the NZTA to construct, maintain and operate the proposed Expressway. A number of applications for resource consent have also been lodged to authorise various associated activities.

3.1 Introduction

This Chapter outlines the key statutory matters under the RMA which are of relevance to the Project, namely:

- the purpose and principles of the RMA (Part 2);
- consideration of proposals of national significance (Part 6AA);
- notices of requirement for designations, outline plans and review of designation(Part 8); and
- applications for resource consent (Part 6).

In this Chapter the relevant statutory matters are set out but **not** assessed. The assessment of the Project in relation to the statutory requirements is provided in Part I of this AEE.

This Chapter also contains details of the NoR for the designation and the applications for resource consent, sought for this Project.

3.2 Purpose and principles of the RMA

The consideration of the NoR and applications for resource consent are subject to Part 2 of the RMA. Part 2 (sections 5-8) sets out the purpose and principles of the RMA.

Under section 5:

"(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while -

(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and

(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment."

Section 6 prescribes the matters of national importance that all persons exercising functions and powers under the Act shall recognise and provide for, as set out in full below. Paragraphs (a), (c), (d), (e) and (f) are of relevance to the Project:

"In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:

(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

(e) the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

(f) the protection of historic heritage from inappropriate subdivision, use, and development:

(g) the protection of recognised customary rights

'Other matters' to which particular regard shall be given are set out in section 7:

"In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to -

(a) kaitiakitanga:

(aa) the ethic of stewardship:

(b) the efficient use and development of natural and physical resources:

(ba) the efficiency of the end use of energy:

(c) the maintenance and enhancement of amenity values:

(d) intrinsic values of ecosystems:

(e) [Repealed]

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

(h) the protection of the habitat of trout and salmon:

(i) the effects of climate change:

(j) the benefits to be derived from the use and development of renewable energy."

Of particular relevance to the Project are matters (a), (aa), (b), (c), (d), (f), and (i).

Section 8 directs that:

"In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)."

3.3 Proposals of National Significance

Part 6AA (sections 140 – 150AA) of the RMA provides for the consideration of matters (such as notices of requirement for designations and applications for resource consent) which, singularly or collectively, constitute or are part of a proposal of national significance. Section 145 allows certain matters to be lodged directly with the EPA. In particular, these include:

- an application for a resource consent (section 145(1)(a)); and

- a notice of requirement for a designation (section 145(3)).

As has been explained earlier, the NZTA is lodging a NoR for a new designation and resource consent applications for this Project to the EPA in accordance with these sections.

Where an application for resource consent is lodged with the EPA, section 145(5) directs that:

> *"section 88 applies, except that -*
>
> *(a) every reference in that section to a consent authority must be read as a reference to the EPA; and*
>
> *(b) the applicant has no right of objection under section 88(5) if the EPA determines that the application is incomplete under section 88(3)."*

Where a notice of requirement for a new designation is lodged with the EPA, subsection 145(7) directs that:

> *"section 168 applies, except that every reference in that section to a territorial authority must be read as a reference to the EPA."*

In accordance with section 145(10), in conjunction with the lodgement of these matters with the EPA, notice of the NoR and the resource consent applications have also been served on the relevant local authorities (KCDC and the GWRC).

Where a matter is lodged with the EPA under section 145 of the RMA, the EPA must make a recommendation to the Minister in accordance with section 146. The Minister then makes a direction on how the matter will be heard.

Under section 147(1) the Minister has three options:

> "*(a) refer the matter to a board of inquiry for decision; or*
>
> *(b) refer the matter to the Environment Court for decision; or*
>
> *(c) refer the matter to the local authority."*

Subsection 147(2) directs that:

"The Minister may make a direction under subsection (1)(a) or (b) only if he or she considers that the matter is or is part of a proposal of national significance."

In accordance with section 147(3), in making a direction, the Minister is to apply section 142(3) which provides guidance in determining whether a matter is, or is part of, a proposal of national significance. It directs that the Minister may have regard to any relevant factors in making a direction, including whether the matter:

"(a) has aroused widespread public concern or interest regarding its actual or likely effect on the environment (including the global environment); or

(b) involves or is likely to involve significant use of natural and physical resources; or

(c) affects or is likely to affect a structure, feature, place, or area of national significance; or

(d) affects or is likely to affect or is relevant to New Zealand's international obligations to the global environment; or

(e) results or is likely to result in or contribute to significant or irreversible changes to the environment (including the global environment); or

(f) involves or is likely to involve technology, processes, or methods that are new to New Zealand and that may affect its environment; or

(g) is or is likely to be significant in terms of section 8; or

(h) will assist the Crown in fulfilling its public health, welfare, security, or safety obligations or functions; or

(i) affects or is likely to affect more than 1 region or district; or

(j) relates to a network utility operation that extends or is proposed to extend to more than 1 district or region."

In addition to the requirements of section 142(3), section 147(4) states that in deciding whether a proposal is a matter of national significance, the Minister must have regard to:

"(a) the views of the applicant and the local authority; and

(b) the capacity of the local authority to process the matter; and

(c) the recommendations of the EPA."

As discussed in Part A, Chapter 1 of this AEE, the NZTA considers that the NoR and resource consents applications for this Project would best be heard and determined by a Board of Inquiry (BoI), as the Project fulfils the criteria for a proposal of national significance.

If the Minister makes a direction that the NoR and resource consent applications for this Project be heard by a BoI, the processes set out in sections 149A to 149L, 149P to 149S and 149V must be followed. In addition, the Board must release it final decision on the matter within nine months of the Minister's direction being publicly notified by the EPA (section 149R (2)).

If the matters are referred to a BoI, in considering those matters, the Board will be required to have regard to the Minister's reasons for making the direction, and consider any information provided to it by the EPA.

One of the things that the EPA would be required to provide to the Board are reports prepared by relevant local authorities on the key issues in relation to the matters. Under section 149G (3), those reports would need to include:

> *"(a) any relevant provisions of a national policy statement, a New Zealand coastal policy statement, a regional policy statement or proposed regional policy statement, and a plan or proposed plan; and*
>
> *(b) a statement on whether all required resource consents in relation to the proposal to which the matter relates have been applied for; and*
>
> *(c) if applicable, the activity status of all proposed activities in relation to the matter."*

Section 149V directs that the decision of a BoI or of the Environment Court can only be appealed on a question of law.

3.4 Notice of requirement for a designation

As noted above, the NZTA is a requiring authority and has the ability to seek to designate land for the State highway network in accordance with its statutory functions.

The NZTA has given Notice of its Requirement for a new designation of land in the Kāpiti Coast District Plan for the construction, operation, and maintenance of the Project. If confirmed, no district land use consents will be required under the District Plan within the designated area (pursuant to section 176 of the RMA), other than any district land use consents required under a National Environmental Standard that exists when the designation is made, or for any works that fall outside the designated area.

This NoR has been lodged with the EPA under section 145(3) of the RMA and in accordance with section 168(2)[20], which together provide that:

> *"A requiring authority for the purposes approved under section 167 may at any time give notice in the prescribed form to [the EPA] of its requirement for a designation -*
>
> *(a) for a project or work; or*

[20] Noting that every reference to a territorial authority must be read as a reference to the EPA (section 145(7) of the RMA)

(b) in respect of any land, water, subsoil, or airspace where a restriction is reasonably necessary for the safe or efficient functioning or operation of such a project or work."

The prescribed form for a NoR is set out in Form 18 of the Resource Management (Forms, Fees, and Procedure) Regulations 2003. The NoR for this Project (contained in Volume 1 of this set of documents) has been prepared in accordance with these regulations.

If the NoR is directed to a BoI it will be considered under section 149P. Section 149P directs that a BoI:

"(a) must have regard to the matters set out in section 171(1) and comply with section 171(1A) as if it were a territorial authority; and

(b) may-

(i) cancel the requirement; or

(ii) confirm the requirement; or

(iii) confirm the requirement, but modify it or impose conditions on it as the board thinks fit;"

The BoI must have regard to the matters in section 171(1) and comply with section 171(1A). These provisions state that:

"(1A) When considering a requirement and any submissions received, a territorial authority must not have regard to trade competition or the effects of trade competition.

(1) When considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to -

(a) any relevant provisions of -

(i) a national policy statement:

(ii) a New Zealand coastal policy statement:

(iii) a regional policy statement or proposed regional policy statement:

(iv) a plan or proposed plan; and

(b) whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if -

(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or

(ii) it is likely that the work will have a significant adverse effect on the environment; and

(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought; and

(d) any other matter the territorial authority considers reasonably necessary in order to make a recommendation on the requirement.

An assessment of the effects on the environment of allowing the requirement is provided under Part G, Volume 2 of this AEE. Discussion of the consideration given to the necessity of the work and alternatives are considered in Parts A and E respectively. An analysis of the proposal in relation to the relevant policy framework and Part 2 of the RMA is provided in Part I, Volume 2 of this AEE.

3.5 Outline plans

Section 176A sets out the circumstances when an outline plan (which shows the details of the work) must be submitted to a territorial authority before a requiring authority commences construction of a project or work authorised under a designation.

Under section 176A(2) an outline plan need not be submitted to a territorial authority if:

(a) The proposed public work, project, or work has been otherwise approved under this Act; or

(b) The details of the proposed public work, project, or work, as referred to in subsection (3), are incorporated into the designation; or

(c) The territorial authority waives the requirement for an outline plan.

A BoI considering a NoR for a designation has the ability to waive the requirement for an outline plan under section 149P (4) (c)).

This application for the NoR and accompanying information is intended to provide significant details of the work for incorporation into the designation in accordance with section 176A(2)(b). Specifically, in accordance with section 176A(3), the following plans have been submitted as part of the NoR in support of the request for an outline plan waiver:

(a) The height, shape, and bulk of the public work, project, or work; and	This information is found in Volume 5 Plan Set - including Scheme Plans, Geometric Plans, Cross sections, Structural – Bridges, Structural General and the Construction Details
(b) The location on the site of the public work, project, or work; and	Refer to Volume 5 Plan Set, in particular the Scheme Plans
(c) The likely finished contour of the site; and	Refer to Volume 5 Plan Set, in particular the Cross Sections and Earthworks Plans

(d) The vehicular access, circulation, and the provision for parking; and	Refer to Volume 5 Plan Set, in particular the Scheme Plans
(e) The landscaping proposed; and	Refer to the plans in Technical Report 5 - Urban and Landscape Design Framework, and Technical Report 7 - Assessment of Landscape and Visual Effects, Volume 3
(f) Any other matters to avoid, remedy, or mitigate any adverse effects on the environment.	All other matters to avoid, remedy or mitigate any adverse effects on the environment are addressed in this Assessment of Environmental Effects and accompanying documents

On this basis, an outline plan waiver is being sought for the Project, with the exception of the details of the two proposed cycleway/walkway bridges over the proposed Expressway (one in the Poplar Avenue to Raumati Road section and another in the Kāpiti Road to Mazengarb Road section), where the details of the work have not yet been determined. The outline plan requirements for these cycleway/walkway bridges and the required connections will be addressed separately at a later stage outside the BoI process.

Should there be any future changes to the detailed design submitted with the NoR, the need for an outline plan to be submitted to the territorial authority for the specific change would be addressed prior to the construction of that part of the Project.

3.6 Land subject to existing designations

The *proposed Expressway* will traverse areas of land which are subject to existing designations. These designations are referenced in the Kāpiti Coast District Plan as outlined in Table 3.1 below.

Table 3.1: Current Kāpiti Coast District Plan Designations

Designation Name	District Plan Identifier	Location	Requiring Authority
Railway purpose	D0301	Various	NZ Railways Corporation
Local Arterial	D0102	"Western Link Road"	KCDC
Roading	D1135	All local roads	
Paraparaumu Sewage Treatment Plant	D1110	Mazengarb Road, Paraparaumu	KCDC
Otaihanga Landfill	D1119	Otaihanga Road, Otaihanga	KCDC
Queen Elizabeth Park -Regional Park and recreation reserve for the purpose of active and passive recreation, including a golf course, conservation, production farming, facilities and buildings associated with recreational and operational activities of the Park.	D0401	MacKays Crossing between Paekākāriki and Raumati South	GWRC
River Management	D0403	Waikanae River, Waikanae	GWRC
State Highway Purposes	D0101	State Highway 1	Transit New Zealand (now NZTA)

Section 177 applies where land is subject to two designations. To undertake Project works on land on which there are existing designations, the NZTA will need the written consent of the relevant requiring authority in accordance with section177(1)(a). This will require the NZTA to obtain approvals from KCDC, GWRC and the New Zealand Railways Corporation. The relevant consents will be sought after approval from the BoI has been obtained.

3.7 Project designations to be reviewed after construction

Once the Project has been constructed and is operational, the NZTA will review its designation. It is likely that some of the designated land will not be required for the ongoing operation and maintenance of the proposed Expressway: i.e. some of the designated land will be used for construction works, but will not be required for the ongoing operation and maintenance of the proposed Expressway. A review of the Project designation is included as a proposed condition of the designation.

Following such a review, if the NZTA decided that some of the land that was subject to the designation no longer needed to be designated, it may give notice to the Kāpiti Coast District Council seeking to remove the parts of the designation that relate to those areas of land. KCDC would have the ability to decline to remove part of the designation, if it considered that the effect of doing so would be more than minor (section 182(5)).

3.8 Applications for resource consent

The NZTA has also lodged applications for resource consents with the EPA under section 145(1) (a) and in accordance with section 88 of the RMA (as required by section 145(5)). The applications are for regional resource consents under the GWRC regional plans, and land use consents with KCDC with respect to the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES CSHN).

Under section 88(2):

"*An application must -*

(a) be made in the prescribed form and manner; and

(b) include, in accordance with Schedule 4, an assessment of environmental effects in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment."

The prescribed form for an application for resource consent is set out in Form 9 of the Resource Management (Forms, Fees, and Procedure) Regulations 2003. The application forms (contained in Volume 1 of this set of documents) have been prepared in accordance with these regulations.

The information to be included in an assessment of effects on the environment to support applications for resource consents is set out in Schedule 4 of the RMA. Clause 1 of Schedule 4 lists the following matters that, subject to the provisions of any RMA policy statement or plan, should be included:

"(a) a description of the proposal:

(b) where it is likely that an activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:

(c) [Repealed]

(d) an assessment of the actual or potential effect on the environment of the proposed activity:

(e) where the activity includes the use of hazardous substances and installations, an assessment of any risks to the environment which are likely to arise from such use:

(f) where the activity includes the discharge of any contaminant, a description of -

(i) the nature of the discharge and the sensitivity of the proposed receiving environment to adverse effects; and

(ii) any possible alternative methods of discharge, including discharge into any other receiving environment:

(g) a description of the mitigation measures (safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:

(h) identification of the persons affected by the proposal, the consultation undertaken, if any, and any response to the views of any person consulted:

(i) where the scale or significance of the activity's effect are such that monitoring is required, a description of how, once the proposal is approved, effects will be monitored and by whom."

Clause 2 of Schedule 4 provides direction on matters that should be considered when preparing an assessment of effects on the environment:

"Subject to the provisions of any policy statement or plan, any person preparing an assessment of the effects on the environment should consider the following matters:

(a) any effect on those in the neighbourhood and, where relevant, the wider community including any socio-economic and cultural effects:

(b) any physical effect on the locality, including any landscape and visual effects:

(c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:

(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural, or other special value for present or future generations:

(e) any discharge of contaminants into the environment, including any unreasonable emission of noise and options for the treatment and disposal of contaminants:

(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations."

An assessment of effects on the environment (as documented and referred to in Part G, Volume 2 of this AEE) has been undertaken in accordance with Schedule 4 for the Project. A description of the proposal (in Part C, Chapter 6, Volume 2), an assessment of alternatives (Part E, Chapter 9, Volume 2) and a description of consultation (Part F, Chapter 10, Volume 2) have also been provided.

As noted above, if the resource consent applications are directed to a BoI, the Board will consider the applications under sections 149P. Section 149P(2) provides that a Board considering an application for resource consent must apply sections 104 to 112 and 138A as if it were a consent authority.

Section 104 "Consideration of applications" specifies a number of matters, which are subject to Part 2 of the RMA, are to be considered in relation to resource consent applications. A summary of the relevance of these matters, and, where applicable, cross references to where the matters have been addressed is provided in Table 3.2 below.

Table 3.2: Relevant assessment matters under section 104 of the RMA

Section 104	Comment	Cross-reference
Section 104(1)(a) Any actual and potential effects on the environment of allowing the activity	Considered in depth in Part G of this AEE and in the associated Technical Reports	Part G, Volume 2 and Technical Reports, Volume 3
Section 104(1)(b)- Any relevant provisions of certain listed statutory documents	Each of the relevant statutory documents has been identified and assessed in relation to the Project.	Part I, Chapter 35, Volume 2 and Technical Report 32, Volume 3
Section 104(1)(c) - Any other matter the consent authority considers relevant and reasonably necessary to determine the application	There are a number of other statutory and non-statutory documents that have been publicly notified, been through a public process, or are widely available in the public arena. Those considered to be relevant to this Project have been identified and assessed in this report.	Part I, Chapter 35 and Technical Report 32, Volume 3

Section 104	Comment	Cross-reference
Section 104(2) - A consent authority may disregard an adverse effect of an activity on the environment if a NES or Plan permits an activity with that effect	There are no logical or sensible comparisons to the Project that could be constructed as a permitted activity, such as to make a permitted baseline comparison useful.	Not relevant
Section 104(3)(a) - A consent authority must not have regard to trade competition or the effects of trade competition or to any effect on a person who has given written approval to the application.	No written approvals from potentially affected parties have been obtained as at the date of lodgement of this AEE, and trade competition has not been considered to be a factor in relation to an application by the NZTA to authorise an aspect of State highway project.	Currently N/A
Section 104(3)(c) –A consent authority must not grant a resource consent contrary to section 107 of the RMA	Section 107 RMA is discussed in section 3.9.3 of this AEE.	Part B, Chapter 3 (section 3.9.3), Volume 2
Section 104(5) – A consent authority may grant consent on the basis that it is a controlled, restricted discretionary, discretionary or non-complying activity regardless of what type of activity the application was expressed to be for.	The NZTA has discussed the resource consent applications with the GWRC in a pre-lodgement process, and the status of the activities for which NZTA is seeking consent agreed with the Council through this process.	Part F, Chapter 10, Volume 2
Section 104(6) and (7) Ability to decline an application on the grounds of inadequate information	There has been an extensive pre-lodgement process in which the applicants have engaged with the relevant regulatory authorities – including the EPA – to review and consider the adequacy of the information and technical reports provided.	N/A

In addition to the consideration of the matters under section 104, there are further considerations required for particular classes of activity. These requirements are discussed in section 3.10 below.

3.9 Activities requiring resource consent

The Project involves activities which require resource consents under the Wellington Regional Plans and the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Section 87 of the RMA lists the different types of resource consents, of which the following types of consent are relevant to this project:

- Land use consent;
- Water permit;
- Discharge permit.

The resource consents required for the Project are described in further detail below. In addition, a summary of all the resource consents sought is provided in Table 3.3 in Section 3.11 of this AEE.

3.9.1 Land use

Section 9 of the RMA imposes the following restrictions on the use of land:

"(1) No person may use land in a manner that contravenes a national environmental standard unless the use-

(a) is expressly allowed by a resource consent; or"

"(2) No person may use land in a manner that contravenes a regional rule unless the use-

(a) is expressly allowed by a resource consent; or"

Project activities that require resource consent (land use consent) in relation to the use of land include:

- roading and tracking activities;
- vegetation disturbance on erosion prone land;
- the construction or alteration of bores; and
- disturbance of contaminated or potentially contaminated soil.

Section 13 of the RMA imposes the following restrictions on certain uses of beds of lakes and rivers:

"(1) No person may, in relation to the bed of any lake or river, -

(a) Use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed; or

(b) Excavate, drill, tunnel, or otherwise disturb the bed; or

(c) Introduce or plant any plant or any part of any plant (whether exotic or indigenous) in, on, or under the bed; or

(d) Deposit any substance in, on, or under the bed; or

(e) Reclaim or drain the bed -

unless expressly allowed by a national environmental standard, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.

(2) No person may do an activity described in subsection (2A) in a manner that contravenes a national environmental standard or a regional rule unless the activity –

(a) is expressly allowed by a resource consent; or…

(2A) The activities are –

(a) to enter onto or pass across the bed of a lake or river;

(b) to damage, destroy, disturb, or remove a plant or a part of a plant, whether exotic or indigenous, in, on, or under the bed of a lake or river;

(c) to damage, destroy, disturb, or remove the habitats of plants or parts of plants, whether exotic or indigenous, in, on , or under the bed of a lake or river;

(d) to damage, destroy, disturb, or remove the habitats of animals in, on, or under the bed of a lake or river."

Project activities that require resource consent (land use consent) in relation to the use of beds of rivers include:

- the disturbance of river beds;
- the placement of structures in river beds;
- the reclamation of river beds and wetlands;
- removal of structures (culverts) in river beds;
- removal of vegetation in beds of rivers.

3.9.2 Water Permits

Section 14 of the RMA imposes restrictions in relation to water. Under section 14(2):

"No person may take, use, dam, or divert any of the following, unless the taking, using, damming, or diverting is allowed by subsection (3):

(a) water other than open coastal water;"

Under subsection 14(3):

"A person is not prohibited by subsection (2) from taking, using, damming, or diverting any water, heat, or energy if -

(a) The taking, using, damming, or diverting is expressly allowed by a national environmental standard, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent;"

Activities forming part of the Project that require resource consent (water permit) in relation to water include:

- temporary diversion of water during construction works;
- permanent diversion of water (surface water and ground water); and
- the take and use of groundwater for construction activities.

3.9.3 Discharge Permits

Section 15 of the RMA places restrictions on the discharge of contaminants into the environment. As defined in section 2 "Contaminant" includes:

"any substance (including gases, odorous compounds, liquids, solids, and micro-organisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat -

(a) When discharged into water, changes or is likely to change the physical, chemical, or biological condition of water; or

(b) When discharged onto or into land or into air, changes or is likely to change the physical, chemical, or biological condition of the land or air onto or into which it is discharged."

Under section 15(1):

"No person may discharge any -

(a) Contaminant or water into water; or

(b) Contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or

(c) Contaminant from any industrial or trade premises into air; or

(d) Contaminant from any industrial or trade premises onto or into land -

unless the discharge is expressly allowed by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent."

Under section 15(2):

> *"No person may discharge a contaminant into the air, or into or onto land, from a place or any other source, whether moveable or not, in a manner that contravenes a national environmental standard unless the discharge -*
>
> *(a) is expressly allowed by other regulations; or*
>
> *(b) is expressly allowed by a resource consent;*

Under section 15(2A):

> *"No person may discharge a contaminant into the air, or into or onto land, from a place or any other source, whether moveable or not, in a manner that contravenes a regional rule unless the discharge -*
>
> *(a) is expressly allowed by a national environmental standard or other regulations; or*
>
> *(b) is expressly allowed by a resource consent; or…"*

Section 105 sets out further matters which are specifically relevant to discharge permits:

"(1) If an application is for a discharge permit or coastal permit to do something that would contravene section 15 or section 15B, the consent authority must, in addition to the matters in section 104(1), have regard to -

(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and

(b) the applicant's reasons for the proposed choice; and

(c) any possible alternative methods of discharge, including discharge into any other receiving environment."

Furthermore, under section 107:

"(1) Except as provided in subsection (2), a consent authority shall not grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A allowing -

(a) The discharge of a contaminant or water into water; or

(b) A discharge of a contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; … if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other

contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:

(c) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:

(d) Any conspicuous change in the colour or visual clarity:

(e) Any emission of objectionable odour:

(f) The rendering of fresh water unsuitable for consumption by farm animals:

(g) Any significant adverse effects on aquatic life.

(2) A consent authority may grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A that may allow any of the effects described in subsection (1) if it is satisfied -

(a) That exceptional circumstances justify the granting of the permit; or

(b) That the discharge is of a temporary nature; or

(c) That the discharge is associated with necessary maintenance work -

and that it is consistent with the purpose of this Act to do so."

Activities forming part of the Project that require resource consent (discharge permit) in relation to the discharge of contaminants include:

- discharge of sediment and chemical flocculant (during construction) in treated stormwater to water and land where it may enter water;
- discharge of treated cement water to water, and to land where it may enter water; and
- discharge of contaminants to land from contaminated sites.

3.10 Classes of activities

Regional and District Plans set out different classes of activities in accordance with section 87A of the RMA. These classes of activities are:

- Permitted activities;
- Controlled activities;
- Restricted discretionary activities;
- Discretionary activities;
- Non-complying activities; and

- Prohibited activities.

The applications for resource consent for the Project relate to controlled, restricted discretionary, and discretionary activities (refer to table 3.4 in section 3.11 below for further detail on the classes of activity requiring resource consent as part of this Project).

The requirements for the determination of each activity class are set out in sections 104A – 104D as described in the following.

3.10.1 Controlled Activities

Under section 104A:

"After considering an application for a resource consent for a controlled activity, a consent authority -

(a) must grant the resource consent, unless it has insufficient information to determine whether or not the activity is a controlled activity; and

(b) may impose conditions on the consent under section 108 only for those matters -

(i) over which control is reserved in national environmental standards or other regulations; or

(ii) over which it has reserved its control in its plan or proposed plan.

3.10.2 Restricted Discretionary Activities

Under section 104C there are particular restrictions for restricted discretionary activities:

"(1) When considering an application for a resource consent for a restricted discretionary activity, a consent authority must consider only those matters over which -

(a) a discretion is restricted in national environmental standards or other regulations:

(b) it has restricted the exercise of its discretion in its plan or proposed plan.

(2) The consent authority may grant or refuse the application.

(3) However, if it grants the application, the consent authority may impose conditions under section 108 only for those matters over which -

(a) a discretion is restricted in national environmental standards or other regulations:

(b) it has restricted the exercise of its discretion in its plan or proposed plan.

3.10.3 Discretionary Activities

Under section 104B:

"After considering an application for a resource consent for a discretionary activity or non-complying activity, a consent authority -

(a) may grant or refuse the application; and

(b) if it grants the application, may impose conditions under section 108.

3.10.4 Bundling of Activities

The principle of bundling was established by case law under the RMA. According to the "bundling" principle, where there is a group of activities on one site which are closely associated to each other, or are directed towards one dominant use or purpose, they should be assessed holistically as a single bundle, according to the most stringent activity class. For this Project, the following activities are considered as a separate bundle:

3.11 Resource consents sought

A summary of all the resource consents sought is provided in Tables 3.3 and 3.4 below:

Table 3.3: Groups of activities for which resource consent is being sought

Group	General activity	Application ref#	Relevant Council form(s)
Resource consents sought by the NZTA from Kāpiti Coast District Council for the construction and operation of the proposed MacKays to Peka Peka Expressway			
A	Undertaking works on contaminated land under the NES CSHH	NSP 12/01.001	Form 9
Resource consents sought by the NZTA from Greater Wellington Regional Council for the construction and operation of the proposed MacKays to Peka Peka Expressway			
B	Earthworks undertaken for the Project on erosion prone areas and for the purposes of roading and tracking and for associated erosion and sediment control.	NSP 12/01.003-004 NSP 12/01.005 and NSP 12/01.029-030	6e (Tracking, logging and land clearance) 3a (Discharge to land) 4a (Discharge to water)
C	Crossing, occupation and realignment of streams.	NSP 12/01.006-023	2a (Diversion of water) 4a (Discharge to water) 6a (Works in beds of lakes and rivers) 6c (Culvert design) 6d (Erosion protection structures)
D	Construction of bores and take of groundwater for construction purposes and diversion of water from wetlands adjacent to the Project.	NSP 12/01.024-026	6b (Construct or alter a bore) 2a (Diversion of water) 2c (Take and use of groundwater)

Group	General activity	Application ref#	Relevant Council form(s)
E	Partial reclamation of wetlands and vegetation removal in the beds of various watercourses and wetlands	NSP 12/01.027-028	6a (Works in beds of lakes and rivers)

The specific resource consents which the NZTA are seeking for the Project are listed in Table 3.4 below.

Table 3.4: Resource consents sought for the Project

Application ref #	Consent type	Activity	Relevant rule	Activity class	Scope of the application
GROUP A: Undertaking works on contaminated land (triggered by NES CSHH)					
NSP 12/01.002		Disturbing soil containing contaminants which may be a risk to human health.	NES Standard for Assessing and managing contaminants in soil to protect human health.	Restricted discretionary	Application for works on land containing contaminants as a restricted discretionary activity.
GROUP B: Bulk earthworks and construction erosion and sediment control					
NSP 12/01.003	Land use consent - s9(2)	Roading and tracking activities located in Area 1 and, during any 12 month period, will result in a road or track having a continuous length of new upslope batter extending for greater than 200 metres, with a height of greater than 1.5 metres measured vertically.	RSP Rule 1	Restricted discretionary	Application for bulk earthworks and vegetation disturbance activities to construct the Project as a restricted discretionary activity.
NSP 12/01.004	Land use consent - s9(2)	Large scale vegetation disturbance on erosion prone land.	RSP Rule 4	Restricted discretionary	
NSP 12/01.005	Discharge permit – s15(1)(b)	Discharge permit to discharge sediment and chemical flocculant in treated stormwater runoff to water, and to land where it may enter water.	RDLP Rule 2	Discretionary	Application for the discharge of chemically treated sediment laden water from erosion and sediment control devices to land in such a way that it may enter water as a discretionary activity.
NSP 12/01.029	Discharge permit – s15(1)(a)	Discharge permit to discharge treated cement contaminated water to water, and to land where it may enter water.	RFWP Rule 5	Discretionary	Application for the discharge of water used in the pre-cast construction yard via erosion and sediment control devices, to water as a discretionary activity.

Application ref #	Consent type	Activity	Relevant rule	Activity class	Scope of the application
NSP 12/01.030	Discharge permit – s15(1)(b)	Discharge permit to discharge contaminants to land from contaminated sites.	RPDL Rule 22	Controlled	Application for potential migration of contaminants across property boundaries as a controlled activity.
GROUP C: Crossing, occupation, realignment, reclamation and use of waterbodies					
NSP 12/01.006	Land use consent – s13(1)(a) & s13(1)(e)	Use, placement and erection of structures (culverts, rip rap and stormwater outlets); the removal of an existing culvert; and the associated diversion and reclamation of a section of the beds of waterways in the Whareroa Stream Catchment.	RFWP Rule 49	Discretionary	Application for placement of structures in, and removal of an existing culvert, in the Whareroa Stream Catchment, the realignment of part of the waterway bed and the temporary and permanent diversion of water as a discretionary activity.
NSP 12/01.007	Water permit – s14(1)	To temporarily divert the flow of the Queen Elizabeth Park Drain during construction of the culvert and associated structures in the bed of the waterway.	RFWP Rule 16	Discretionary	
NSP 12/01.008	Water permit – s14(1)	To permanently divert the full flow of the the Queen Elizabeth Park Drain.	RFWP Rule 16	Discretionary	
NSP 12/01.009	Land use consent – s13(1)(a) & s13(1)(e)	Use, placement and erection of structures (culverts, rip rap and stormwater outlets); the removal of an existing culvert; and the associated diversion and reclamation of a section of the bed of waterways in the Wharemauku Stream Catchment.	RFWP Rule 49	Discretionary	Application for placement of structures in, and removal of an existing culvert, in the beds of waterways in the Wharemauku Stream Catchment, the realignment of part of the beds of waterways and the temporary and permanent diversion of water as a discretionary activity.
NSP 12/01.010	Water permit – s14(1)	To temporarily divert the flow of Drain 7, an unnamed tributary of Drain 7 and the Wharemauku Stream during construction of the culvert and associated structures in the bed of the waterway.	RFWP Rule 16	Discretionary	
NSP 12/01.011	Water permit – s14(1)	To permanently divert the full flow of the the the the the Drain 7 and an unnamed tributary of Drain 7.	RFWP Rule 16	Discretionary	

Application ref #	Consent type	Activity	Relevant rule	Activity class	Scope of the application
NSP 12/01.012	Land use consent – s13(1)(a) & s13(1)(e)	Use, placement and erection of structures (culverts, rip rap and stormwater outlets); the removal of an existing culvert; and the associated diversion and reclamation of a section of the bed of waterways in the Waikanae River Catchment.	RFWP Rule 49	Discretionary	Application for placement of structures in, and removal of an existing culvert, in the beds of waterways in the Waikanae River Catchment, the realignment of part of the beds of waterways and the temporary and permanent diversion of water as a discretionary activity.
NSP 12/01.013	Water permit – s14(1)	To temporarily divert the flow of Mazengarb Drain, Waste Water Treatment Pond Drain, Landfill Drain, Otaihanga Drain, an unnamed tributary of the Muaopoko and the Waikane River during construction of the culvert and associated structures in the bed of the waterway.	RFWP Rule 16	Discretionary	
NSP 12/01.014	Water permit – s14(1)	To permanently divert the full flow of Mazengarb Drain, Waste Water Treatment Pond Drain, Landfill Drain, Otaihanga Drain, an unnamed tributary of the Muaopoko, Muaopoko Stream and the Waikane River.	RFWP Rule 16	Discretionary	
NSP 12/01.015	Land use consent – s13(1)(a) & s13(1)(e)	Use, placement and erection of structures (culverts, rip rap and stormwater outlets); and the associated diversion and reclamation of a section of the bed of waterways in the Waimeha Stream Catchment.	RFWP Rule 49	Discretionary	Application for placement of structures in, and removal of an existing culvert, in the beds of waterways in the Waimeha Stream Catchment, the realignment of part of the beds of waterways and the temporary and permanent diversion of water as a discretionary activity.
NSP 12/01.016	Water permit – s14(1)	To temporarily divert the flow of the Market Garden Drain and the Waimeha Stream during construction of the culvert and associated structures in the bed of the waterway.	RFWP Rule 16	Discretionary	
NSP 12/01.017	Water permit – s14(1)	To permanently divert the full flow of the Market Garden Drain.	RFWP Rule 16	Discretionary	

Application ref #	Consent type	Activity	Relevant rule	Activity class	Scope of the application
NSP 12/01.018	Land use consent – s13(1)(a) & s13(1)(e)	Use, placement and erection of structures (culverts, rip rap and stormwater outlets); the removal of an existing culvert; and the associated diversion and reclamation of a section of the bed of waterways in the Ngarara Stream Catchment.	RFWP Rule 49	Discretionary	Application for placement of structures in, and removal of an existing culvert, in the beds of waterways in the Ngarara Stream Catchment, the realignment of part of the beds of waterways and the temporary and permanent diversion of water as a discretionary activity.
NSP 12/01.019	Water permit – s14(1)	To temporarily divers the flow of the Ngarara Creek, Kakariki Stream (at the local road bridge), Smithfield Drain, an unnamed tributary of the Paetawa Drain and the Paetawa Drain during construction of the culvert and associated structures in the bed of the waterway.	RFWP Rule 16	Discretionary	
NSP 12/01.020	Water permit – s14(1)	To permanently divert the full flow of the Ngarara Creek, Kakariki Stream (at the local road and *proposed Expressway* bridges), Smithfield Drain, an unnamed tributary of the Paetawa Drain and the Paetawa Drain.	RFWP Rule 16	Discretionary	
NSP 12/01.021	Land use consent – s13(1)(a) & s13(1)(e)	Use, placement and erection of structures (culverts, rip rap and stormwater outlets); the removal of an existing culvert; and the associated diversion and reclamation of a section of the bed of waterways in the Hadfield/Te Kowhai Stream Catchment.	RFWP Rule 49	Discretionary	Application for placement of structures in, and removal of an existing culvert, in the beds of waterways in the Hadfield/Te Kowhai Stream Catchment, the realignment of part of the waterway bed and the temporary and permanent diversion of water as a discretionary activity.
NSP 12/01.022	Water permit – s14(1)	To temporarily divers the flow of the Hadfield/Te Kowhai Stream during construction of the culvert and associated structures in the bed of the waterway.	RFWP Rule 16	Discretionary	
NSP 12/01.023	Water permit – s14(1)	To permanently divert the full flow of the Hadfield/Te Kowhai Stream.	RFWP Rule 16	Discretionary	

Application ref #	Consent type	Activity	Relevant rule	Activity class	Scope of the application
GROUP D: Borehole construction and taking and diversion of groundwater					
NSP 12/01.024	s9(2) – Land use consent	Construction of boreholes (including bores for the purpose of abstracting groundwater and bores for bridge piles where they intercept groundwater).	RFWP Rule 15	Discretionary	Application for construction of bores and the abstraction diversion of groundwater as a discretionary activity.
NSP 12/01.025	s14(2) – Water permit	Taking of groundwater for bore testing, dewatering of excavations, dust suppression and construction purposes.	RFWP Rule 16	Discretionary	
NSP 12/01.026	s14(2) – Water permit	Diversion of groundwater from wetlands adjacent to the proposed Expressway.	RFWP Rule 16	Discretionary	
GROUP E: Partial reclamation and removal of vegetation in the beds of wetlands					
NSP 12/01.027	s13(1)(e) – Land use consent	Partial reclamation of wetlands (defined as lakes), including associated disturbance of the beds.	RFWP Rule 49	Discretionary	Application for partial reclamation and vegetation removal as a discretionary activity.
NSP 12/01.028	s13(1)(c) – Land use consent	Removal of vegetation in the beds of various watercourses and wetlands (defined as lakes), including associated disturbance of the beds.	RFWP Rule 49	Discretionary	

4 Statutory considerations

Overview

In making a determination on whether or not to confirm the designation and grant the resource consent applications, the RMA requires consideration of a number of statutory documents. These include the relevant provisions of national, regional and district level planning documents. In addition, there are a range of 'other matters' that may be considered. The RMA does not define what 'other matters' are to be considered; however, it is accepted that these can include matters outside the RMA, including non-statutory processes.

This Chapter provides a brief description of the main statutory considerations of relevance to this Project. An analysis of the Project against the relevant provisions in these documents is provided in Part I of this AEE, and the full wording of the relevant provisions is outlined in Technical Report 2, Volume 3.

4.1 Introduction

In considering a NoR (under section 171) and the applications for resource consent (under section 104), regard must be given to various matters.

These include a range of RMA documents and relevant non-RMA documents. In particular, section 171(9) (which applies through section 149P) requires consideration of any relevant provisions of:

- a national policy statement;
- a New Zealand Coastal Policy Statement;
- a regional policy statement; or proposed regional policy statement;
- a plan or proposed plan (regional and district); and
- any other matter which the consent authority considers is reasonably necessary to determine the application.

Section 104 requires the consideration of the same set of RMA documents, as well as any relevant provisions of:

- a national environmental standard; and
- other regulations.

This Chapter sets out those key statutory, non-statutory documents and regulations that have been considered in the development of the Project, providing a brief description of the main aspects of relevance to the Project. An assessment of the Project against these relevant documents is provided in

Part I of this AEE. The full wording of the provisions of each relevant document is contained in Technical Report 2, Volume 3.

4.2 National Policy Statements

The purpose of a national policy statement (NPS) is to state objectives and policies for matters of national significance which are relevant to achieving the purpose of the RMA (section 45(1)).

There are currently two national policy statements of relevance to the Project:

- National Policy Statement on Electricity Transmission (NPS ET); and
- National Policy Statement for Freshwater Management (NPS FM).

The only other relevant NPS is the New Zealand Coastal Policy Statement 2010 (NZCPS). The purpose of the NZCPS is to state policies in order to achieve the purpose of the RMA in relation to the coastal environment of New Zealand (section 56).

4.2.1 National Policy Statement on Electricity Transmission 2008

The NPS on Electricity Transmission (NPS ET) came into effect on 10 April 2008.

The objective of the NPS ET is:

> *"to recognise the national significance of the electricity transmission network by facilitating the operation, maintenance and upgrade of the existing transmission network and the establishment of new transmission resources to meet the needs of present and future generations, while:*
>
> - *managing the adverse environmental effects of the network; and*
> - *managing the adverse effects of other activities on the network."*

As described in Chapter 6, Volume 2, the proposed Expressway crosses under the HAY-BNN 220kV transmission line near Smithfield Road, and thus the effects on the electricity transmission network will need to be considered and managed in accordance with the NP SET.

An assessment of the Project in relation to the NPS ET is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.2.2 National Policy Statement for Freshwater Management 2011

The NPS for Freshwater Management (NPS FM) came into effect on 1 July 2011.

The NPS FM sets out objectives and policies for freshwater management. Two of the objectives in the NPS are to safeguard freshwater's life-supporting capacity, ecosystem processes and indigenous species, in sustainably managing:

- the use and development of land and discharges of contaminants; and
- the taking, using, damming, or diverting of fresh water.

The NPS FM contains the following five groups of objectives and policies:

- water quality (A)
- water quantity (B)
- integrated management (C)
- tangata whenua roles and interests (D); and
- progressive implementation programme (E)

The Project includes works that have implications for some areas of freshwater in the District. Accordingly, an assessment of the Project in relation to the NPS FM is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.3 New Zealand Coastal Policy Statement 2010

The current New Zealand Coastal Policy Statement (NZCPS) came into effect on 3 December 2010. The NZCPS sets out policies in order to achieve the sustainable management of the natural and physical resources in relation to the coastal environment of New Zealand. Both land-based and coastal activities are required to have regard to the NZCPS, which provides guidance on the management of the coastal environment to local authorities.

The NCPS provides that the coastal environment encompasses not only the coastal marine area (CMA), but also:

- Islands within the CMA;
- Areas where coastal processes, influences or qualities are significant, including coastal lakes, lagoons, tidal estuaries, salt marshes, coastal wetlands and the margins of these;
- Areas at risk from coastal hazards;
- Coastal vegetation and the habitat of indigenous coastal species including migratory birds;
- Elements and features that contribute to the natural character, landscape, visual qualities or amenity values;
- Items of cultural and historic heritage in the coastal marine area or on the coast; Inter-related coastal marine and terrestrial systems, including the intertidal area zone; and
- Physical resources and built facilities, including infrastructure, that have modified the coastal environment.

There is some uncertainty as to the scope of the term ‘coastal environment’. The seaward limit is 12 nautical miles offshore from the line of mean high water springs (roughly the high tide). The inland limit is not defined in law and varies from region to region according to local geography.

For the avoidance of doubt, an assessment of the Project in relation to the objectives and policies of the NZCPS is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.4 National Environmental Standards

A national environmental standard (NES) is a regulation made under section 43 of the RMA. The standards are mandatory and have the force of regulations, and apply nationally. Where the rules in regional and district plans are either more lenient than the rules in the NES and the NES does not expressly say that a plan rule can be more stringent than it, the local authority is required to amend their plan to remove the conflict between the NES and the plan rules.

There are four NES's which are considered relevant, or potentially relevant, to the Project:

- The Resource Management (National Environmental Standards for Air Quality) Regulations 2004;
- The Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007;
- The Resource Management (National Environmental Standards for Electricity Transmission; Activities) Regulations 2009; and
- The Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2001.

4.4.1 National Environmental Standards for Air Quality 2004

The National Environmental Standards for Air Quality[21] (NES AQ) are intended to protect public health and the environment of New Zealand by, among other things, setting ambient air quality concentration limits for certain air pollutants. Different parts of the NES AQ came into effect between 2004 and 2006.

Schedule 1 of the NES AQ sets out ambient air quality concentration limits for the following:

- carbon monoxide (CO);
- nitrogen dioxide (NO2);
- sulphur dioxide (SO2);
- ozone; and
- fine particulate matter (PM_{10}).

An assessment of the Project in relation to the NES AQ is provided in Part I, Chapter 35, Volume 2 of this AEE.

[21] Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004, gazetted on 9 September 2004.

4.4.2 National Environmental Standards for Sources of Human Drinking Water 2007

The NES for Sources of Human Drinking Water[22] (NES SHDW) came into effect on 20 June 2008.

The NES SHDW aims to reduce the risk of contamination of drinking water sources by requiring regional councils to consider the effects of certain activities on drinking water sources when granting water permits or discharge permits. Sources of drinking water have been identified in the vicinity of the Project, including sources of both private and Council supplies. No consents relating to this standard are required for the Project.

4.4.3 National Environmental Standards for Electricity Transmission 2009

The NES for Electricity Transmission (NES ET) came into effect on 14 January 2010. The NES sets out a national framework of permitted activities and consent requirements for most activities that relate to the operation, maintenance, upgrading, relocation or removal of existing electricity transmission lines. Activities regulated by the NES ET include the operation, maintenance and upgrading of existing lines. This NES is applicable to the Project as relocation of some transmission lines will be required. An assessment of the Project in relation to the NES ET is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.4.4 National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health 2011

The NES CSHH came into effect on 1 January 2012. It contains a set of nationwide regulations for undertaking certain land use activities and subdivisions in relation to contaminated or potentially contaminated land. The NES CSHH is intended is intended to increase protection for human health. The provisions of the NES have particular emphasis on methods of sampling contaminated soil and providing the findings of investigations to the relevant territorial authorities. The NES CSHH identifies five activity categories that are subject to the regulations:

- Removing or replacing fuel storage systems
- Sampling of soil to determine whether or not it is contaminated
- Disturbing the soil
- Subdividing land
- Changing the use of land to a use that because the land is contaminated or potentially contaminated, is likely to harm human health.

Sections of the Project area have soil that exceeds the permitted volumes detailed in the Regulations and therefore require consent. An assessment of the Project against the NES CSHH is provided in Part I, Chapter 35, Volume 2 of this AEE.

[22] Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007, gazetted on 20 December 2007.

4.5 Regional Policy Statements

The following documents are relevant to the Project:

- the operative Regional Policy Statement for the Wellington Region; and
- the proposed Regional Policy Statement for the Wellington Region.

4.5.1 Operative Wellington Regional Policy Statement 1995

The Operative Regional Policy Statement for the Wellington Region (RPS) became operative on 15 May 1995.

The RPS identifies the regionally significant issues around the management of the Region's natural and physical resources and sets out what needs to be achieved (objectives) and the way in which those objectives will be achieved (policies and methods). Both regional and district plans are required to give effect to the RPS.

Chapters of the Operative RPS that are relevant to the Project are:

- the iwi environmental management system (Chapter 4);
- freshwater (Chapter 5);
- soils and minerals (Chapter 6);
- air (Chapter 8);
- ecosystems(Chapter 9);
- landscape and heritage (Chapter 10);
- natural hazards (Chapter 11);
- energy (Chapter 12);
- waste management and hazardous substances (Chapter 13); and
- the built environment and transport (Chapter 14).

An assessment of the Project in relation to the RPS is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.5.2 Proposed Wellington Regional Policy Statement

Although the Operative RPS still has effect, there is also a Proposed Regional Policy Statement for the Wellington Region (PRPS), which was publicly notified on 21 March 2009. Hearings were held in November 2009 and GWRC's decisions on the submissions to the PRPS were released in May 2010. The PRPS is currently subject to appeals to the Environment Court although none of the points of appeal are directly relevant to the Project. The NZTA has not lodged an appeal to the PRPS. Relevant resource management issues of the Project which are addressed in the PRPS include:

- air quality (Section 3.1);
- coastal environment (including public access) (Section 3.2)
- energy, infrastructure and waste (Section 3.3);
- fresh water (including public access) (Section 3.4);
- historic heritage; (Section 3.5)
- indigenous ecosystems (Section 3.6);
- landscape (Section 3.7);
- natural hazards (Section 3.8);
- regional form, design and function (Section 3.9);
- resource management with tangata whenua (Section 3.10); and
- soils and minerals (Section 3.11).

The PRPS also defines 'regionally significant infrastructure' and contains objectives and policies regarding recognising the benefits of and protecting regionally significant infrastructure. The definition of 'regionally significant infrastructure' includes the strategic transport network as defined in the 2007-2016 Wellington Land Transport Strategy; that definition includes SH1and the Kāpiti Western Link Road.

An assessment of the Project in relation to the PRPS is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.6 Regional Plans

The GWRC administers five regional plans to assist in carry out its functions under the RMA. These plans are:

- the Regional Freshwater Plan for the Wellington Region 1999;
- the Regional Air Quality Management Plan for the Wellington Region 2000;
- the Regional Coastal Plan for the Wellington Region 2000;
- the Regional Plan for Discharges to Land for the Wellington Region 1999; and
- the Regional Soil Plan for the Wellington Region 2000.

An assessment of the Project in relation to the objectives and policies of each of the relevant regional plans is contained in Part I, Chapter 35, Volume 2 of this AEE.

4.6.1 Regional Freshwater Plan for the Wellington Region 2000

The Regional Freshwater Plan for the Wellington Region (RFP) became operative on 17 December 1999. There have been four plan changes which have been made operative since 1999.[23]

The RFP applies to most freshwater in the region, including water in rivers, lakes, streams, ponds, aquifers and artificial water courses, but excluding any freshwater in the coastal marine area. It also applies to all land in river and lake beds. The RFP applies to all types of activities that take, use, dam or divert freshwater, discharge contaminants into freshwater or that are located in the beds of rivers and lakes. Activities covered by the RFP which are relevant to the Project include:

- discharges to freshwater;
- the taking, using, or diverting of freshwater and groundwater;
- disturbing river beds;
- building and modifying structures in river beds;
- removal of structures in/over river beds;
- construction of bores;
- removal of vegetation in beds of rivers.

An assessment of the Project in relation to the RFP is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.6.2 Regional Air Quality Management Plan for the Wellington Region 2000

The Regional Air Quality Management Plan for the Wellington Region (RAQMP) became operative on 8 May 2000. There has been one plan change to the RAQMP, which was made operative in 2003.

The RAQMP applies to discharges to air in the whole of the region, except for the coastal marine area (CMA). The RAQMP contains objectives, policies, methods and rules related to managing the air quality impacts of the discharge of contaminants to air. An assessment of the Project in relation to the RAQMP is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.6.3 Regional Coastal Plan for the Wellington Region 2000

The Regional Coastal Plan for the Wellington Region (RCP) became operative on 19 June 2000.

There are no proposed plan changes to the RCP currently notified. The RCP applies to the CMA of the region. The CMA includes the foreshore, seabed and coastal water, and the air space above the water, between the outer limits of the territorial sea and the line of mean high water springs. It also includes

[23] This includes the recent Transmission Gully Plan Change (operative 10 October 2011), which is not of relevance to the Project

parts of the rivers immediately landward of mean high water springs. The RCP identifies areas of significant conservation value within the CMA.

The Project does not have any activities that take place in the CMA or affect any areas of significant conservation value within it. However, some of the activities involved in the Project do have the potential to cause effects in the coastal environment. This relates to the potential effects on streams and the Waikanae River, all of which ultimately discharge to the coastal environment.

An assessment of the Project in relation to the RCP is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.6.4 Regional Plan for Discharges to Land for the Wellington Region 1999

The Regional Plan for Discharges to Land for the Wellington Region (RPDL) became operative on 17 December 1999. Plan Change 1 to the RPDL came into effect on 1 September 2003.

The RPDL applies to the whole of the Region, except the CMA. It aims to manage the discharge of contaminants to land, whether or not the discharge enters water, in order for the receiving environment to be sustainably managed. Provisions of the RPDL of relevance to the Project are:

- the discharge of stormwater and treated water to land; and
- the discharge of contaminated fill to land.

An assessment of the Project in relation to the RPDL is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.6.5 Regional Soil Plan for the Wellington Region 2000

The Regional Soil Plan for the Wellington Region (RSP) became operative on 9 October 2000. Plan Change 1 (made operative on 1 September 2003) changed the definition of 'soil' in the RSP but there were no changes to the rules.

The RSP applies to the whole of the region, except the CMA. It identifies issues to be addressed so that the effects of soil disturbance and vegetation clearance can be sustainably managed. Objectives, policies, and methods (including rules) are set out in the RSP to address these issues.

The project is located entirely within Area 1 of the RSP.

Activities addressed by the RSP which are relevant to the Project include:

- roading and tracking activities; and
- vegetation disturbance on erosion prone land.

An assessment of the Project in relation to the RSP is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.7 Kāpiti Coast District Plan 1999

The KCDP became operative on 30 July 1999. The District Plan includes the following three operative plan changes as follows:

- Private Plan Change 69 Waikanae North Developments (operative 19 March 2009
- Plan Change 79 Waikanae North Urban edge (operative 26 March 2010)
- Private Plan Change 80 Ngarara (operative 22 March 2010)

The Council is currently undertaking a review of the KCDP. This has to date involved the issue of a series of discussion documents and background work to produce a set of draft District Plan provisions. However, no Proposed Plan has been publicly notified to date. There are no plan changes relevant to this project.

The vision for the KCDP (as set out in Section A.7 of the Plan) includes provision for a variety of lifestyles, recreational and cultural experiences and basic infrastructure, whilst protecting the natural environment and cultural heritage of the District. The KCDP also seeks to provide and maintain public utility services, and a transport system which meets high standards of environmental protection and provides for safe and efficient movement of people and freight through the District, with and between communities, as well as offering residents a selection of transport mode alternatives. The KCDP also recognises the District as a major growth centre in the region, and sets an objective to continue to provide water, essential public utility systems, efficient arterial traffic links and employment opportunities for the community, whilst conserving and enhancing natural resources, valuable agricultural land, visual values and taonga (treasures, spiritual, physical) and protecting land, air and water from pollution.

The Project is proposing to designate land in the following KCDP zones:

- Residential zone;
- Town Centre zone;
- Rural zone;
- Open Space zone;
- River Corridor zone; and Ngarara zone.

In addition to the underlying zoning, there are a number of other KCDP notations recorded against parts of the area to be designated as follows:

- Notional Road (Ihakara Street);
- Outstanding Landscape (Waikanae River);
- Ecological Sites (K066 – Te Harakeke Swamp and K170 – El Rancho Manuka Wetland);
- Waahi Tapu Sites (W1 – Takamore Cemetery and W4 – Takamore Waahi Tapu Area);
- Low Impact Urban Area (Ngarara Zone);

- EcoHamlet (Ngarara Zone);
- High Voltage Transmission Lines; and
- Natural Gas Lines.

The objectives and policies of these zones, and any provisions that apply district wide provisions, will be relevant to the consideration of the NoR.

For these activities, the relevant objectives, policies and rules of the KCDP will be applicable in the consideration of the resource consent applications.

An assessment of the Project in relation to the KCDP is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.8 Other relevant regulations

Regulations may be made for various purposes as listed under section 360(1) of the RMA.

Regulations relating to the Measurement and Reporting of Water Takes[24] (MRWT Regulations) came into effect on 10 November 2010. These regulations were made under section 360(1)(d) of the RMA. This regulation is relevant to the Project as the NZTA is seeking resource consent for water take.

The regulations require consent holders to keep records and provide reports to regional councils on their consented water takes. Water takes for the Project will need to comply with these regulations.

4.9 Other relevant matters

For the resource consent applications, the BoI must have regard to "any other matter the consent authority considers is relevant and reasonably necessary to determine the application" (section 104). For the NoR, a BoI must have regard to any other matter it considers reasonably necessary in order to make the decision (section 171(1)(d)).

The RMA does not define what matters are to be considered under these sections. However, it is accepted that these can include matters outside the RMA, including non-statutory processes. It is considered that there are a number of other non-RMA matters relevant to the assessment of the Project. Factors that were used to determine what other relevant matters to consider were:

- the subject and spatial relevance of the matter;
- whether the matter had been through a public process; and

[24] Resource Management (Measurement and Reporting of Water Takes) Regulations 2010, gazetted on 26 August 2010.

- whether the outcome of the matter (for example, a plan or strategy document) was widely publically available.

Some of the matters relevant have already been identified (and discussed) in Part A Chapter 2 Background to the Project. These include the following documents:

- Government Policy Statement on Land Transport Funding 2009/10 – 2018/19 –prepared under the LTMA;
- New Zealand Transport Strategy 2008;
- National Infrastructure Plan 2011;
- Western Corridor Plan 2006;
- Wellington Regional Land Transport Strategy 2010-2040 – prepared under the LTMA; and
- Wellington Regional Strategy 2007.

In addition, the following matters are also considered to be relevant "other matters" and are briefly discussed below:

- National Land Transport Programme (2009-2012) - prepared under the LTMA;
- National State Highway Strategy (2007);
- The 2011/12 State Highway Plan;
- NZTA Environmental Plan (2008);
- Getting There – On Foot, By Cycle Strategic Implementation Plan 2006-2009 – Ministry of Transport;
- New Zealand Urban Design Protocol (2005);
- Wellington Conservation Management Strategy (1996) – prepared under the Conservation Act 1987;
- Greater Wellington Parks Network Plan (2011);
- Draft Regional Freight Plan – Greater Wellington Regional Council (2011);
- Kāpiti Coast Choosing Futures: Community Plan (2009);
- KCDC Development Management Strategy (2007);
- KCDC Sustainable Transport Strategy (2008);
- KCDC Cycleways, Walkways and Bridleways Strategy (2009);
- KCDC Subdivisions and Development Principles and Requirements (2005);
- Kāpiti Coast Streetscape Strategy and Guideline (2008); and
- Proposed National Policy Statement on Indigenous Biodiversity.

An assessment of the Project in relation to these other relevant matters is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.1 National Land Transport Programme (2009- 2012)

The NZTA Land Transport Programme gives effect to the Government Policy on Land Transport Funding. It lists the land transport activities which have either been approved for funding or are proposed for funding from the national land transport fund over the following three financial years.

An assessment of the Project in relation to this Programme is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.2 National State Highway Strategy (2007)

The NZTA New Zealand National State Highway Strategy (NSHS) responds to the New Zealand Transport Strategy and describes the NZTA's goals, objectives, policies and priorities for the state highway system. It sets out how the NZTA will move towards and manage the operation and development of the State highway system as part of a multi-model transport system over 30 years. It also sets out how the State highway system will support economic transformation and the objectives of the New Zealand Transport Strategy.

An assessment of the Project in relation to this Strategy is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.3 The 2011/12 State Highway Plan

The State Highway Plan sets out NZTA's State highway annual work programme, within the context of the wider NZTA strategic priorities. It provides internal guidance on how the State highway network can be best developed to achieve the Government's objectives and meet customer needs, while balancing available funding over the period. There are five strategic priorities that influence this Plan as follows:

- Delivering the roads of national significance;
- Improving road safety;
- Improving customer service and reducing compliance costs;
- Improving public transport; and
- Improve freight efficiency.

4.9.4 Transit (now the NZTA) Environmental Plan (2008)

The Transit Environmental Plan's (TEP) purpose is to set a framework for managing the interface between the environment and the State highway system in a way that improves environmental sustainability and public health in New Zealand. The NZTA's environment policy is to be socially and environmentally responsible and improve the contribution of State highways to the environmental and social wellbeing of New Zealand by:

- Protecting and enhancing the environment where appropriate;
- Avoiding adverse effects to the extent reasonable in the circumstances;

- Using and managing resources efficiently;
- Considering environmental issues early;
- Contributing to sustainable outcomes by working with others; and
- Continually improving environmental performance.

The TEP outlines the key social and environmental impacts that typically result from the construction and operation of the State highway network (for example, noise, air quality, and heritage impacts), and discusses methods to address these impacts.

An assessment of the Project in relation to this Plan is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.5 Getting There – On Foot, By Cycle – Strategic Implementation Plan 2006- 2009

Getting There - On Foot By Cycle, is essentially a New Zealand cycling and walking strategy. The document was published in 2005 in response to the New Zealand Transport Strategy 2002 and sets out a strategy to advance walking and cycling in New Zealand transport. It is a high level strategic document with a vision of:

"A New Zealand where people from all sectors of the community walk and cycle for transport and enjoyment".

The document recognises that not all New Zealanders have independent access to motor vehicles and therefore cycling and walking needs be provided for.

An assessment of the Project in relation to the "Getting There – On Foot, By Cycle – NZ Transport Strategy" is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.6 New Zealand Urban Design Protocol (2005)

The New Zealand Urban Design Protocol (NZUDP) aims to make New Zealand's towns and cities more successful by applying quality urban design principles when developing in these areas. The NZUDP identifies seven essential key design qualities that together create quality urban design. These qualities include context, character, choice, connections, creativity, custodianship and collaboration.

Both the NZTA and KCDC are signatories to the NZUDP and it has been taken into consideration in the development of the Project. In particular, an Urban and Landscape Design Framework has been prepared to provide an outline of the key urban design principles to be applied to the project and within which detailed design has been developed. Refer to Technical Report 5, Volume 3 for further detail on the Urban and Landscape Framework.

An assessment of the Project in relation to the NZUDP is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.7 Wellington Conservation Management Strategy (1996)

The Wellington Conservation Management Strategy 1996 (WCMS) is a statutory document prepared under Part 3A of the Conservation Act 1987 which implements general policies and establishes objectives for the integrated management of natural (including land and species) and historic resources managed by DOC under various Acts.

This document is relevant as the project passes through QE Park. An assessment of the Project in relation to the WCMS is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.8 Greater Wellington Parks Network Plan Greater Wellington Regional Council (2011)

The Greater Wellington Parks Network Plan (GWPNP) came into effect on 1 January 2011. It is a statutory document prepared by the GWRC under section 41 of the Reserves Act 1977. It combines and supersedes previous separate management plans for each of the regional parks in the Wellington region. As the Project will affect part of the QE Park, which is one of the parks and reserves managed under the GWPNP, the provisions of the Plan are relevant.

An assessment of the Project in relation to the GWPNP is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.9 Draft Regional Freight Plan – Greater Wellington Regional Council (2011)

The Wellington Regional Freight Plan (Freight Plan) is one of a number of implementation plans that have been developed to respond to the Regional Land Transport Strategy (RLTS). The Freight Plan identifies issues and opportunities in relation to improving rail and road freight efficiency and reliability both within the Wellington region and between regions.

The Freight Plan was published in 2007 and an updated document was published in draft for consultation in April 2011. The Freight Plan is a supporting document to the RLTS, as it provides a pathway to implement the RLTS objectives and policies that are relevant to freight. Since the adoption of the current Freight Plan in 2007, there have been a number of changes to the context within which freight is planned for. These include:

- the growth of just-in-time delivery of services;
- the consolidation of freight distribution hubs;
- trends pointing towards a doubling of the amount of freight moving throughout New Zealand in the next 30 years; and
- the price of diesel is expected to become more volatile but will increase overall.

The draft Regional Freight Plan 2011 responds to these changes by broadening the scope of the action programme from that contained in the 2007 plan. The draft 2011 plan now includes relevant work being done at a national level by the NZTA (including the projects to upgrade the RoNS) and the KiwiRail Turnaround Plan (which focuses on improving the reliability and economic performance of rail freight).

An assessment of the Project in relation to the Regional Freight Plan is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.10 Kāpiti Coast Choosing Futures: Community Plan (2009)

Kāpiti Coast Choosing Futures: Community Plan is the name of the KCDC's Long Term Plan (LTP) prepared under the Local Government Act 2002. The LTP was adopted by KCDC on 3 June 2009, prior to the NZTA's decision that the proposed Expressway was its preferred option for upgrading the Wellington RoNS between MacKays Crossing and Peka Peka being announced. There are seven community outcomes identified in the Plan as follows:

1. There are healthy natural systems which people can enjoy;
2. Local character is retained within a cohesive District;
3. The nature and rate of population growth and development is appropriate to community goals;
4. The Community makes wise use of local resources and people have the ability to act in a sustainable way on a day to day basis;
5. There is increased ability to work locally;
6. The District is a place which works for young people;
7. The District has a strong, healthy, safe and involved community.

Detailed sections of the LTP provide a strategy for Council activities through the implementation of a range of projects and programmes that will contribute to the achievement of Community Outcomes.

It should be noted that, under the section headed 'Major Projects', it states that the KCDC is committed to building a Western Link Road.

An assessment of the Project in relation to the Kāpiti Coast Choosing Futures: Community Plan is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.11 KCDC Development Strategy (2007)

The KCDC Development Management Strategy was published in September 2007. It was produced as part of the overall 2003/04 Choosing Futures: Community Plan. When the 2009 Choosing Futures Plan was adopted (superseding the 2003/04 version), the Development Management Strategy (2007) remained applicable. The document contains KCDC's strategy for the management of development and settlement patterns by setting out a framework for:

- the management of location and intensity of growth pressures and change
- improvement to the quality of the built environment

- the development management processes that Council will use over time.

An assessment of the Project in relation to the KCDC Development Strategy is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.12 KCDC Sustainable Transport Strategy (2008)

This document was published in 2008 and, according to its introduction, is –

> *"deliberately entitled 'Towards a Sustainable Transport System'. It is concerned with reshaping the local transport system to a position where it has the characteristics of a sustainable system. It is about dealing with key problems which are a barrier to sustainable outcomes."*

The document contains five focus areas, being:

- Overall Transport System
- Shifting Travel Modes
- Network Hierarchy
- Vehicle Fleet Emissions
- Living with the State Highway

The document recognises that a second arterial route through the Kāpiti Coast is required, with reference to the proposed Western Link Road (Note, the document was published before the NZTA Board's decision regarding the MacKays to Peka Peka Expressway proposal).

An assessment of the Project in relation to the KCDC Sustainable Transport Strategy is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.13 KCDC Cycleways, Walkways and Bridleways Strategy (2009)

The Cycleways, Walkways and Bridleways Strategy was published by KCDC in December 2009 as part of the overall Kāpiti Coast: Choosing Futures (LTP). The strategy gives direction for the future planning of cycling, walking and horse riding in Kāpiti, as well as providing a foundation for implementation of a network that will enhance the user's experience of walkways, cycleways and bridleways. The vision of the strategy is that:

"The Kāpiti Coast is renowned for its walking, cycling and horse riding".

An assessment of the Project in relation to the Cycleways, Walkways and Bridleways Strategy is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.14 KCDC Subdivisions and Development Principles and Requirements (2005)

The KCDC's Subdivisions and Development Principles and Requirements (2005) was published in 2005, and, among other things, sets out what KCDC requires from all developers in the District with regard to the provision for cycling, walking and bridleways.

There is one transportation objective in the document, being:

"..to plan, provide and maintain an efficient roading network appropriate to the level of use that will ensure the safe and orderly passage of road users (including cyclists) and pedestrians throughout the Kapiti Coast District. The Council wishes to encourage pleasant, walkable neighbourhoods, with a low speed environment, which provides increased amenity by, for example, enhancing connectivity, decreasing the area of "black top", differentiating parking bays and providing associated landscaping."

An assessment of the Project against the Subdivisions and Development Principles and Requirements is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.15 KCDC Streetscape Strategy and Guideline (2008)

The Kāpiti Coast Streetscape Strategy and Guideline was published in 2008. This strategy and guideline support the assessment of subdivision consents and proposed upgrades of existing streets. It provides design guidance to enable a coordinated approach to streetscapes. The streetscape of SH1 is included in the document. Important issues and elements of the existing SH1 streetscape in the Kāpiti Coast District are recognised in the document as including:

- The lack of access to highways means they are often treated as 'backs' to land use, with solid fencing and poor interfaces presented. The use of back-lane or slip-road approaches in particular can reduce connection issues.
- Reverse sensitivity issues (especially related to large freight vehicles in terms of noise, visual and air pollution) means uses turn their backs to highways, which causes the loss of passive surveillance;
- State Highways are not designed for pedestrians or cyclists, as such there are inherent safety issues that limit crossing opportunities to selected signalled interchanges within certain town centres;
- Changes to the strategic network, including new or realigned sections of the highway and new on / off ramps can isolate communities and further limit crossing opportunities;
- Large-scale concrete barriers or acoustic fences can present monotonous mass for several continuous kilometres, reducing the quality of views of the District;
- Interchanges act as critical entry / departure gateways to the District and towns within it. The opportunity to integrate these with land uses, specific art or architectural statements, and other treatments to maximise this 'front door' effect have traditionally been ignored in other places.

Key treatments to improve the streetscape of the different categories of road are provided within this document.

An assessment of the Project in relation to the KCDC Streetscape Strategy is provided in Part I, Chapter 35, Volume 2 of this AEE.

4.9.16 Proposed National Policy Statement on Indigenous Biodiversity

The proposed National Policy Statement on Indigenous Biodiversity (NPSIB) is intended to provide clearer direction to local authorities on their responsibilities for managing indigenous biodiversity under the Resource Management Act 1991. It outlines policies and decision-making frameworks for the identification and management of indigenous biodiversity found outside the public conservation estate. The proposed NPSIB also contains a list of criteria for identifying areas of indigenous vegetation and habitats of indigenous animals that have been recognised as being rare and/or threatened at a national level.

While the NPS is not operative, and therefore has no statutory weight, for completeness it has been referred to here.

5 Additional considerations

Overview

In addition to the matters requiring consideration under the RMA, there are a number of additional statutory requirements that are relevant to this Project. This section outlines other legislation which has informed the development of the Project, and/or under which separate approvals may be required.

5.1 Introduction

In addition to the matters outlined in Part B, Chapters 3 and 4, Volume 2 of this AEE, there are some further statutory considerations which have informed the development of the Project. These either have direct relevance to an aspect of the Project and/or are matters which the NZTA is legally required to comply with in undertaking its functions and responsibilities. Some matters also have relevance in terms of the section 104(1)(c) or section 171(1)(d) and this is covered in the statutory assessment contained in Part I, Chapter 35, Volume 2 of this AEE.

The additional statutory considerations discussed in this Chapter are:

- Land Transport Management Act 2003;
- Public Works Act 1981;
- Historic Places Act 1993;
- Reserves Act 1977
- Wildlife Act 1953
- Te Ture Whenua Māori Act 1993;
- QEII National Trust Act 1977; and
- Freshwater Fisheries Regulations 1983.

As discussed in section 1.9 of this AEE any authorisations required under other legislation are not applied for as part of this set of documents and the requirement for additional authorisations is merely noted for completeness.

5.2 Land Transport Management Act 2003

The Land Transport Management Act 2003 (LTMA) provides the statutory framework for the management of New Zealand's land transport system. It is also one of the main statutes under which the NZTA operates (in conjunction with the Government Roading Powers Act 1989 (GRPA)).

The purpose of the LTMA as set out at section 3 is as follows:

"(1) The purpose of this Act is to contribute to the aim of achieving an affordable, integrated, safe, responsive, and sustainable land transport system."

(2) To contribute to that purpose, this Act -

(a) provides an integrated approach to land transport funding and management; and

(b) improves social and environmental responsibility in land transport funding, planning, and management; and

(c) provides the Agency[25] with a broad land transport focus; and

(d) improves long-term planning and investment in land transport, including planning and investment in coastal shipping and rail; and

(e) ensures that land transport funding is allocated in an efficient and effective manner; and

(f) improves the flexibility of land transport funding by providing for alternative funding mechanisms"...

The NZTA's objective is set out in section 94 as being:

"to undertake its functions in a way that contributes to an affordable, integrated, safe, responsive, and sustainable land transport system."

There are a number of functions set out in section 95(1), but of specific relevance to the Project are:

(a) to promote an affordable, integrated, safe, responsive, and sustainable land transport system:"

...and

(c) to manage the State highway system, including planning, funding, design, supervision, construction, and maintenance and operations, in accordance with this Act and the Government Roading Powers Act 1989:"

The principles under which the NZTA must operate are set out in section 96. Of specific relevance to the Project are those in subsections (1) (a)(i) and (iii) and (b):

"In meeting its objective and undertaking its functions, the Agency must -

[25]. Agency means NZTA

(a) exhibit a sense of social and environmental responsibility, which includes -

(i) avoiding, to the extent reasonable in the circumstances, adverse effects on the environment; and ...

(iii) meeting the requirements of section 18H (Māori contribution to decision making);

(b) uses it revenue in a manner that seeks value for money.."

The Act also recognises the importance of the Treaty relationship with Māori and directs those exercising functions under it to maintain and improve opportunities for Māori to contribute to land transport decision making processes.[26]

5.3 Public Works Act 1981

The PWA enables land to be acquired, either by agreement or by compulsion, for the construction of public works including roads. The PWA also contains provisions for disposal of land no longer required for a public work.

Under section 185 (1) of the RMA, in certain circumstances, the owner of an estate or interest in the land that is subject to a NoR may apply at any time to the Environment Court for an order obliging the requiring authority responsible for the designation or requirement to acquire or lease all or part of the land under the PWA.

As discussed in section 2.7 of Chapter 2 of this AEE some land has already been acquired for the Project, and further land is required (either entirely or partially) from a number of properties within the Kāpiti Coast District.

5.4 Historic Places Act 1993

The Historic Places Act 1993 (HPA) established the NZ Historic Places Trust (NZHPT) and its role in preserving, marking and recording places of historic interest in New Zealand.

The purpose of the HPA as set out in section 4(1) is:

"to promote the identification, protection, preservation, and conservation of the historical and cultural heritage of New Zealand, including archaeological sites.

The protection of archaeological sites is covered by sections 9 to 19 of the HPA, with section 10 stating that it is unlawful for any person to destroy, damage or modify the whole or any part of an archaeological site without the prior authority of the NZHPT. This applies regardless of whether the land

[26] Refer to sections 4 and 11 (H) and (G) of the LTMA

on which the site is located is designated, the activity is permitted under a District or Regional Plan, or a resource or building consent has been granted.

Under section 12 of the HPA, the NZHPT can grant a general authority to destroy, damage, or modify all archaeological sites within a specified area of land. Earthworks and clearing work associated with constructing the proposed Expressway is likely to result in the destruction, damage or modification to recorded and unknown sites along the alignment. Consequently, the NZTA will be making applications in this respect to the NZHPT under section 12 alongside the RMA process. These applications will also extend to include land contained within the HPA registered 'Takamore Wāhi Tapu Area'. Evidence of consultation with a mandated representative of affected iwi will be included in the supporting information supplied with these applications.

5.5 Reserves Act 1977

The Reserves Act 1977 provides for the acquisition, preservation and management of areas for their conservation values or public recreational and educational values.

Section 3(1) of the Reserves Act states it purpose as:

(a) *providing, for the preservation and management for the benefit and enjoyment of the public, areas of New Zealand possessing -*

  (i) *Recreational use or potential, whether active or passive; or*

  (ii) *Wildlife; or*

  (iii) *Indigenous flora or fauna; or*

  (iv) *Environmental and landscape amenity or interest; or*

  (v) *Natural, scenic, historic, cultural, archaeological, biological, geological, scientific, educational, community, or other special features or value:*

(b) *Ensuring, as far as possible, the survival of all indigenous species of flora and fauna, both rare and commonplace, in their natural communities and habitats, and the preservation of representative samples of all classes of natural ecosystems and landscape which in the aggregate originally gave New Zealand its own recognisable character:*

(c) *Ensuring, as far as possible, the preservation of access for the public to and along the sea coast, its bays and inlets and offshore islands, lakeshores, and riverbanks, and fostering and promoting the preservation of the natural character of the coastal environment and of the margins of lakes and rivers and the protection of them from unnecessary subdivision and development.*

The Project affects a section of the QE Park which is a regional park under the Local Government Act 2002 and a recreation reserve under the Reserves Act 1977. This Park is owned by DOC but is managed by GWRC as part of the regional parks network.

Under section 17(1) of the Reserves Act, recreation reserves are to be administered for the purpose of:

> *"providing areas for the recreation and sporting activities and the physical welfare and enjoyment of the public, and for the protection of the natural environment and beauty of the countryside, with emphasis on the retention of open spaces and on outdoor recreational activities, including recreational tracks in the countryside."*

No other reserves are affected by the Project.

5.6 Wildlife Act 1953

The Wildlife Act 1953 deals with the protection and control of wild animals and birds and the management of game. It provides varying levels of protection to different species. The effects of the Project on the species that are protected under the Wildlife Act are discussed in Chapters 21 to 23 of this AEE and in Technical Reports 1 to 5 in Volume 3.

All native animals other than those outlined in Schedules 1-5 of the Act are protected under the Wildlife Act 1953. This includes terrestrial or freshwater invertebrate declared to be an animal under Schedule 7 of the Act, and marine species declared to be animals under Schedule 7A of the Act. On the basis of the findings of the ecological assessment, the following authorisations will/or may need to be acquired under the Wildlife Act:

- an 'Authority to Disturb Protected Wildlife' permit for lizard translocations and potentially for freshwater fish through culvert replacement and stream diversions; and
- for the North Island fernbird, permission may be required for translocation/monitoring (if it involves trapping or physical stress e.g. banding) under the Wildlife Act 1953. This population needs to be monitored and adaptive management put in place if required.

5.7 Te Ture Whenua Māori Act 1993

The intent of the Te Ture Whenua Māori Act 1993 is to facilitate and promote the retention, use, development and control of Māori land by its owners and their whanau, hapu and descendants, and to protect wāhi tapu.[27]The Act sets out the provisions governing dealings that alter the ownership status of Māori land, including alienation. Where any Māori land or interest in Māori owned land is alienated due

[27] Refer section 2(2) of the Te Ture Whenua Māori Act 1993

to it being required for a work under the Public Works Act 1991, an application for confirmation must be lodged with the Māori Land Court for determination.[28]

There are 4 blocks of land in Māori ownership that are either within the area designated for the proposed Expressway alignment.

5.8 QEII National Trust Act 1977

The QEII National Trust Act 1977 sets out the duties, purpose and powers of the QEII National Trust. The Trust is a statutory organisation set up in 1977 to encourage and promote the protection and enhancement of open space. The Trust is managed by a Board of Directors who represents environment and conversation values and interests of rural landowners and the Māori community.

One of the key responsibilities of the Trust is in relation to QEII covenants. A QEII covenant is an open space covenant which is registered on a title to land. The covenant is a legally binding document agreed to between a landowner and the QEII National Trust, with the QEII Trust acting as a perpetual trustee.

The QEII covenant usually contains terms and conditions which are agreed to between the QEII Trust and the landowner. The effect of an open space covenant is for the land to which it applies to be maintained as open space in accordance with the terms and conditions of the covenant.

While there are some covenanted areas located in close proximity to the alignment, there are no QEII covenanted areas within the alignment of the proposed Expressway or the proposed Designation.

5.9 Freshwater Fisheries Regulations 1983

The Freshwater Fisheries Regulations 1983 (FFR) are regulations made under the Fisheries Act 1983. Part 6 of the FFR relates to fish passage and applies to *"every dam or diversion structure in any natural river, stream, or water"*.

Under regulation 41(2):

> *"no person shall construct any culvert or ford in any natural river, stream, or water in such a way that the passage of fish would be impeded, without the written approval of the Director-General incorporating such conditions as the Director-General thinks appropriate"*

These regulations require that the approval of the Director-General[29] be obtained for culverts where the passage of fish will be impeded. The Director-General can either:

- issue a dispensation from the requirement to provide fish passage; or

[28] Refer Part 8 of the Te Ture Whenua Māori Act 1993

[29]. The Director-General of Conservation

- specify that fish passage be provided and maintained.

All river and stream crossings required for the Project, whether by ford, culvert or bridge, have been designed to ensure adequate fish passage is provided where it is necessary. Approval from the Director-General under the FFR is therefore not considered necessary for this Project.

PART C: DESCRIPTION OF THE ENVIRONMENT

6 Description of the environment

Overview

The Project is located on the Kāpiti Coast, within the Wellington Region. The Kāpiti Coast District is on the southwestern coastline of the North Island, approximately 50km north of Wellington.

The route of the proposed Expressway is located on a coastal plain, comprising a complex dune system with interdunal wetlands and low-lying peaty land, with some alluvial soils in the vicinity of the Waikanae River.

An area rich with natural resources, the Kāpiti Coast has long been inhabited by Māori, with numerous pā and kainga. After European settlement, the indigenous vegetation of the area was largely cleared and the wetlands drained for farming purposes. Due to the Kāpiti Coast's proximity to Wellington, over the last fifty years, the railway townships at Paraparaumu and Waikanae and the small beachside settlements at Raumati, Paraparaumu Beach and Waikanae Beach have rapidly grown into a substantial urban area, accommodating over three-quarters of the Kāpiti Coast District's population of 48,900 (2009).

Most of the Expressway alignment is located within an area long designated for a major road. A motorway along this alignment was first proposed in the 1950s when a mid-line proclamation for the Wellington to Foxton Motorway was put in place; the route was first designated in the 1960s. In the late 1990s, the limited access road designation for the route was replaced by a designation for a local arterial road, the Western Link Road. The urban areas of Raumati, Paraparaumu and Waikanae have grown around the designations, and thus much of the land within the alignment has remained largely undeveloped, with a greater preservation of natural features, including dunes and wetlands.

There is a diversity of land use and urban and rural character within the Project area, ranging from open farmland, rural lifestyle blocks, scrub covered dunelands and urban areas. The residential communities adjacent to the alignment are diverse and maintain their own sense of identity and character.

This Chapter contains a description of the existing natural, built and human environment within which the Project is proposed to be constructed and operated.

6.1 Introduction

This Chapter commences with an overview of the general environmental context of the Project, and then provides a more detailed description of the environment within each of the four geographic Project Sectors (the Project Sectors are defined and illustrated within Chapter 7 of this AEE Report).

Information from a number of sources, principally the design and Technical Reports contained in Volume 3, are cross referenced throughout this Chapter. These reports include:

- Technical Report 5: Urban and Landscape Design Framework (ULDF);
- Technical Report 7: Assessment of Landscape and Visual Effects;
- Technical Reports 26 – 31: Ecology Assessment Reports;
- Technical Report 9: Archaeological Scoping Report;
- Technical Report 10: Assessment of Built Heritage Effects;
- Technical Reports 11 and 12: Cultural Impact Assessments;
- Technical Reports 13 and 14: Air Quality Assessment Reports;
- Technical Report 15 - 17: Noise Assessment Reports;
- Technical Report 21: Assessment of Groundwater Effects;
- Technical Report 22: Assessment of Hydrology and Stormwater Effects;
- Technical Report 32: Assessment of Transport Effects;
- Technical Report 20: Assessment of Social Effects; and
- Technical Report 36: Geotechnical Interpretive Report.

Each of these reports has more detailed information on the relevant aspects of the existing environment to those assessments.

The term 'Project area' refers to the wider area of relevance to the Project and will vary depending on the topic area discussed (for example, ecology, noise, and traffic).

6.2 Regional context

The Project area is located between MacKays Crossing and Peka Peka on the Kāpiti Coast. The Kāpiti Coast District is located on the southwestern coastline of the North Island, approximately 50km north of Wellington, New Zealand's capital city (refer to Figure 1.1, Chapter 1 of this AEE Report).

There are a number of prominent natural and built features within the Kāpiti Coast environment, as illustrated in Figure 6.1. These include:

- The Kāpiti coastline, a continuous sandy beach extending between Paekakariki and Ōtaki;
- Kāpiti Island, located 5-6km offshore, rising to an elevation of 125m amsl[30];
- The coastal residential communities of Raumati South, Raumati Beach, Paraparaumu Beach, Waikanae Beach and Peka Peka Beach, and the rural hamlet of Otaihanga;

[30] Above mean sea level.

- The inland urban areas of Raumati, Paraparaumu and Waikanae and their town centres, including the Kāpiti Coast's principal commercial and administration centre in Paraparaumu;
- Kāpiti Coast Airport (formerly the Paraparaumu Aerodrome), located between Paraparaumu and Raumati;
- A growing commercial and industrial area centred on Kāpiti Road;
- Queen Elizabeth Park, a regional park between Raumati South and Paekākāriki;
- The Tararua Range, rising to an elevation of between 350m- 540m amsl in the foothills to the immediate east, and up to 1540m in the main divide; and
- The existing State Highway 1 (SH1) and the North Island Main Trunk railway line (NIMT), which run along the base of the Tararua foothills, on the inland edge of the coastal plain.

Approximately halfway along the route, the Waikanae River flows westwards out of the Tararua Ranges, and into the Tasman Sea via a large sandy estuary. The proposed Expressway alignment itself generally contains either largely undeveloped dunelands or farmland, although parts of the alignment currently contain a number of residential properties.

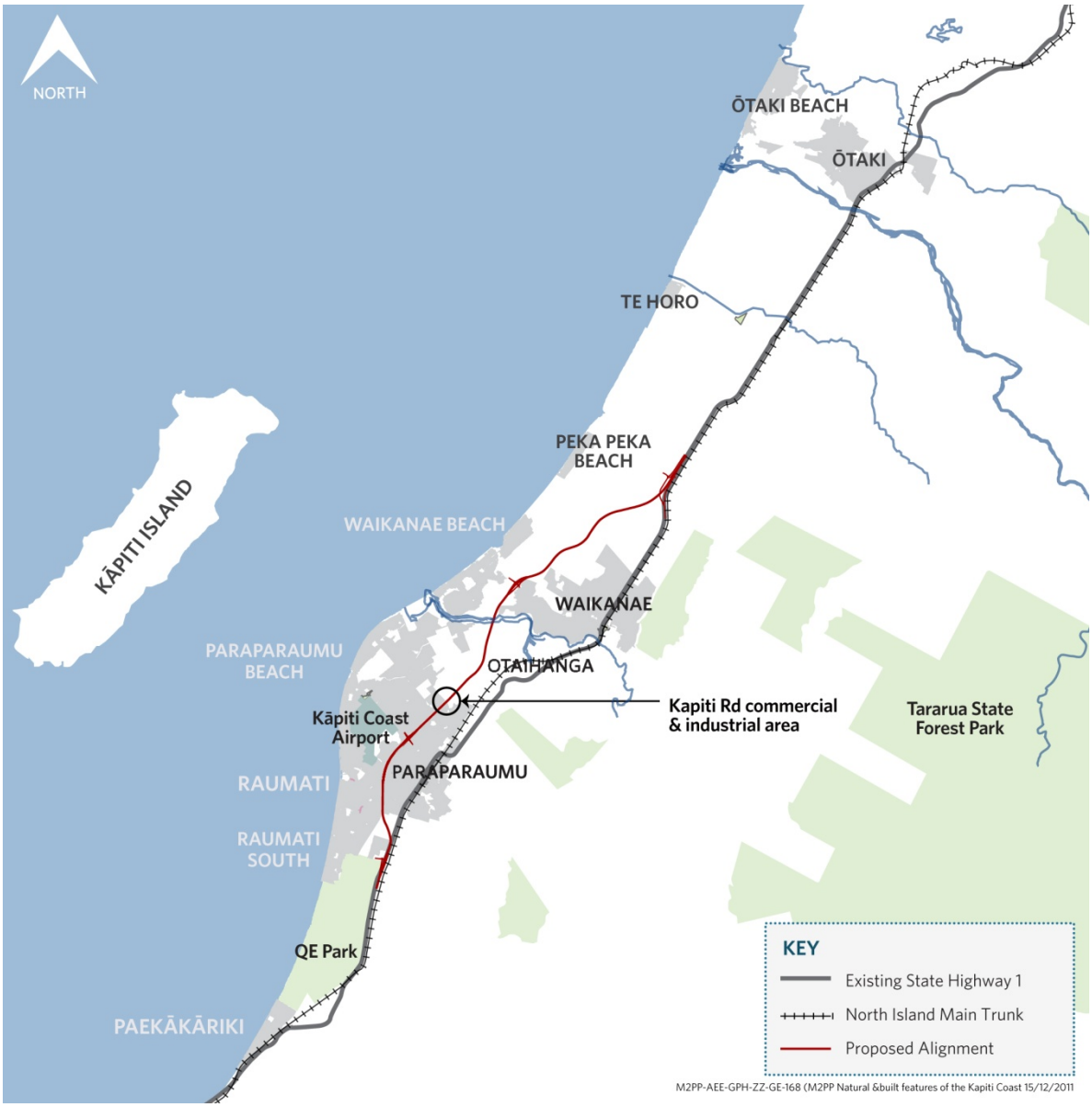

Figure 6.1: Built Features of the Kāpiti Coast

6.2.1 Topography and Landscape

The topography of the Kāpiti Coast District is characterised by a relatively narrow, flat, coastal plain largely comprising sand dunes and interdunal flat areas and wetlands, situated between the coastline to the west and the Tararua Ranges and their foothills to the east. Kāpiti Island is located 5.6km offshore at its closest point to the mainland (refer to Figure 6.2).

The Tararua Ranges and Kāpiti Island are two distinctive and defining landforms, which are well recognised and visible from many locations throughout the Kāpiti Coast District.

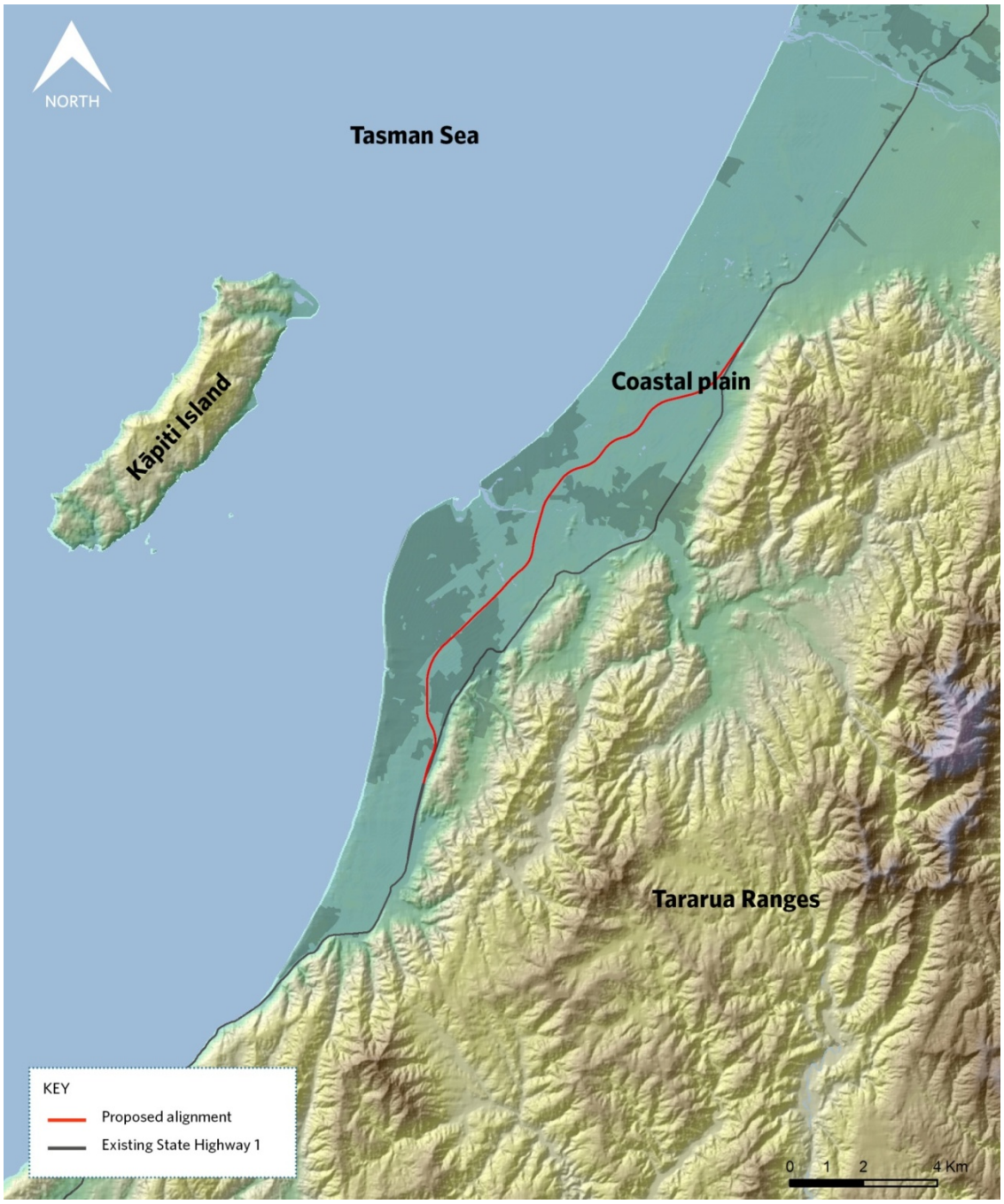

Figure 6.2: Kāpiti Coast Topography

The Kāpiti coastal plain is situated at the southern end of an extensive coastal sand country land system which extends from Paekakariki to Hawera. This system has been significantly modified through draining and vegetation clearance, originally for farming purposes but subsequently for the development of residential or rural-residential uses, coastal settlements and horticulture.

When considered at a regional level, the proposed Expressway appears to be located within a relatively flat topography. However, at a local scale, the remaining dunelands and waterbodies are significant features of the local landscape. With the exception of the alluvial deposits on the Waikanae River flood

plain, the sand country includes a complex of old sand dunes, interdunal hollows, sandy plains, peatlands and drained swamplands.

In the more urban part of the Project area, the little that remains of the original and unmodified dunes is generally found within the proposed Designation. Since 1956, a mid-line proclamation or designation has largely prevented development, although sections of the alignment have been and remain as farmland.

The elevation of dunes within the Project area varies with the highest dunes generally being those situated furthest inland. The proposed Expressway will traverse the full range of elevations, from low points at watercourse crossings (including the Wharemauku Stream and the Waikanae River) through areas of high dunes (approximately 30m amsl).

6.2.2 Geology

The geology of the Kāpiti Coast district has been dominated by tectonic activity, glacial and fluvial processes, in combination with changes in sea level. Tectonic activity in the area has resulted in a vertical uplift of the greywacke basement rocks, forming the hilly terrain of the Tararua Ranges in the east. Horizontal shifts of these hills have occurred along faults such as the Ohariu Fault and associated splinter faults.

The hill slopes have been dissected by glacial and fluvial processes that have eroded the greywacke, creating large amounts of material that has been transported by rivers to the coast and deposited either as sandy gravelly alluvium, or as sand which, through the process of long-shore drift, has formed the large coastal plains.

Over time, the rivers and streams have deposited gravels, sands and silts to form alluvial fans, with finer materials (silts and clays) deposited further away from the river channels. Away from the influence of rivers, areas of peat developed in the low lying poorly drained areas between dunes. Over time, many of the dunes have migrated under the prevalent north-northwest winds, resulting in many areas of peat being overlain with dunes.

The presence of peat deposits is a fundamental geotechnical consideration for the construction of this Project. The peat soils are prevalent beneath and between dunes, as well as in urban areas, where the landforms have been graded as part of their development. The peat is variable in nature, ranging from amorphous organic silt and clay through to fibrous woody peat. Generally, the peat is more fibrous towards the northern end of the alignment, whilst amorphous peat is more dominant at the southern end of the alignment, although both types are present in some areas. The peat depths vary within the Project area from 0-6m. Peat is particularly thick in the southern extent of the Project area.

Figure 6.3: Geology within the Project Area

6.2.3 Natural Hazards

Earthquakes and storms are the two main types of potential natural hazards that have been identified in the Project area.

6.2.3.1 Earthquakes

There are a number of hazards associated with earthquakes. The type of hazard depends on the strength of seismic activity, along with such factors as local topographic and built features, subsurface geology and groundwater.

The Kāpiti Coast is a highly seismic area. Known active faults are nearby and potentially cross the northern end of the alignment. The principal faultline within the Project area is the Ohariu Fault, which traverses the foothills to the east of the Project area. The potential for movement on this or other faultlines in the region create the possibility of earthquakes. Earthquake hazards within the Project area are detailed and addressed within Technical Report 36, Volume 3.

A moderate or significant seismic event in the Project area could result in:

- fault rupture;
    - Surface rupture of a fault occurs when a large slip event starts kilometres deep within the earth, breaking along the fault and upwards through the earth's surface, releasing seismic energy (an earthquake) and rupturing/deforming the ground surface.
- ground shaking;
    - Any structure on the ground in the vicinity of the fault can be shaken and subject to local ground deformations.
- earthquake induced landslides and/or slope instability;
    - Landslides are an abrupt movement of geological materials downhill in response to gravity. Landslides can be triggered by an earthquake.
- earthquake induced liquefaction;
    - Liquefaction refers to the loss of soil strength as a result of an increase in pore pressure due to ground motion. Liquefaction can lead to subsidence and lateral spreading.
- tsunami;
    - Tsunamis are long wavelength oceanic waves generated by the sudden displacement of seawater by a shallow earthquake.

Figure 6.4: Principal Faultline within the Project Area

6.2.3.1 Storms

Storms are high rainfall events that have the potential to create a number of hazards within the Project area, namely:

- storm induced slope instability;
    - Storms have the potential to cause slopes to become unstable or trigger landslides where there are weak soils along the route, which can be weakened further when saturated or eroded by precipitation.
- debris flows;
    - A debris flow is a fast moving, liquefied landslide of unconsolidated, saturated debris. These can occur on slopes during periods of heavy rainfall.
- flooding;
    - A flood is an overflow of an expanse of water that submerges land. Flooding occurs in rivers when the flow of water exceeds the capacity of the river channel to contain it. Flood events, with the potential to cause damage to properties, have been known to occur in the flood plains of the Wharemauku Stream, Waikanae River and Waimeha Stream as shown in Photo 6.1.

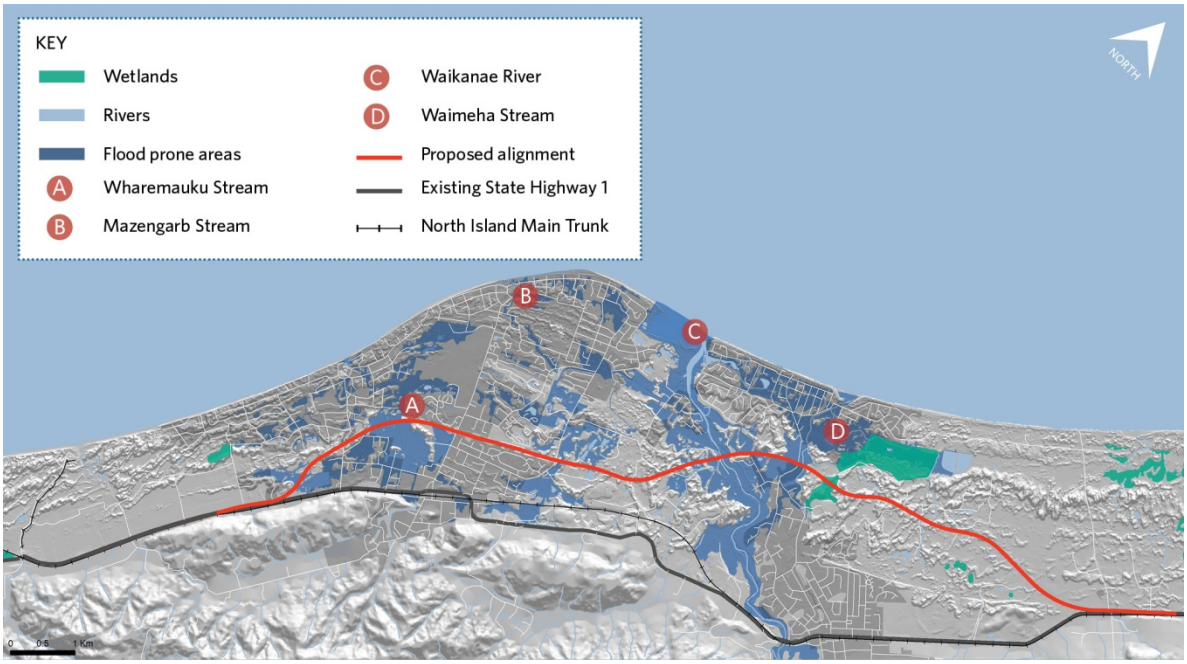

Figure 6.5: Principal Floodplains within the Project Area

Photo 6.1: Waikanae River flooding at Otaihanga, 28th October 1998[31]

6.2.4 Climate

The climate on the Kāpiti Coast is relatively temperate and does not typically experience extremes of temperature[32]. The most settled weather occurs during summer and early autumn. Summers are warm, with daytime maximum temperatures generally ranging from 19°C to 24°C and seldom exceeding 30°C. Winters are normally the most unsettled time of the year, with daytime maximum temperatures generally ranging from 10°C to 14°C.

Prevailing winds vary across the seasons, with northerly winds dominant during the summer and northwesterlies in the winter. Annual sunshine hours average approximately 2000 hours and annual rainfall levels average approximately 1311mm[33].

[31] Sourced from Greater Wellington Regional Council: http://www.gw.govt.nz/assets/Emergencies--Hazards/flooding_hazard_kapiti_factsheet.pdf.

[32] Sourced from the Ministry for the Environment: http://www.mfe.govt.nz/issues/climate/about/climate-change-affect-regions/wellington-kapiti-wairarapa.html (20 March 2008).

[33] Annual rainfall calculated from GWRC monitoring records over the period 2000 to 2010.

6.2.5 Hydrology

The drainage of the Project area comprises rivers, streams (often channelised), wetlands, flood plains, ponding areas, constructed drains and high groundwater. The Kāpiti Coast has a long history of land drainage, at first to facilitate pastoral farming and then later to enable urbanisation and reduce flood risks.

Despite the extensive hydrological modification, surface flooding is frequent in places because of the relatively high water table common in many parts of the low lying coastal plains. Many of the larger, low lying areas act as either flood water storage areas (in that they hold water in high rainfall events before it discharges to the constrained drains) or secondary flow paths (in that they channel water to the coast if rivers overtop their banks), especially in the vicinity of the Waikanae River and Wharemauku Stream.

6.2.5.1 Watercourses and Catchments

The Project crosses through seven main hydrological catchments and 12 main watercourses, all of which discharge to the Tasman Sea (refer to Figure 6.6 below).

The Project involves works within the following catchments:

- The Whareroa catchment: includes a number of smaller tributaries and discharges to the sea south of Raumati South. The total watershed area is 15.4km2;
- The Wharemauku catchment: includes the Wharemauku Stream and Drain 7 and discharges to the coast at Paraparaumu. The total watershed area of this catchment is 14.9km2;
- The Waikanae Catchment: includes the Waikanae River, Mazengarb Drain, Wastewater Treatment Plant Drain and the Muaupoko Stream. This catchment has a total watershed area of 149.7km2 and discharges to the sea via the Waikanae Estuary;
- The Ngarara Catchment: includes the Waimeha Stream, Ngarara Stream, Ngarara Creek, Kakariki Steam, Smithfield Drain and Paetawa Drain. This catchment has a total watershed of 21.2km2 and discharges to the sea at Waikanae Beach; and,
- The Hadfield Drain/Te Kowhai Stream Catchment: includes Hadfield Drain/Te Kowhai Stream. This catchment has a total watershed of 10.2km2 and discharges to the sea at Peka Peka Beach.

A full description of all main watercourses within the Project area is provided within Technical Report 22, Volume 3. A description of hydrological catchments is provided within Section 2.2 and 2.4 of Technical Report 22, Volume 3 and Section 2.1 of Technical Report 24, Volume 3. The main watercourse systems are illustrated on drawings CV-SW-10 and 11, Technical Report Appendices, Report 22, Volume 5.

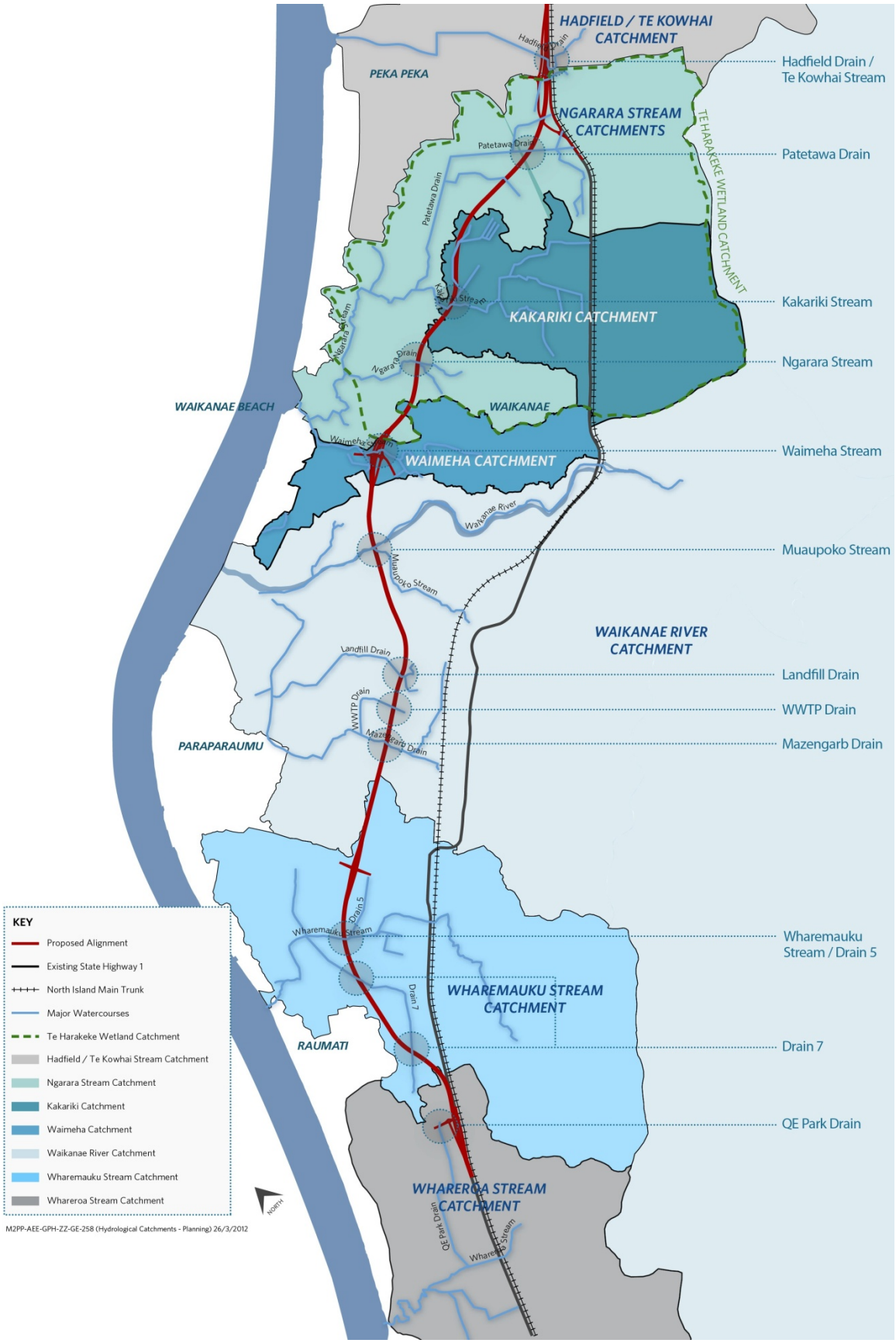

Figure 6.6: Hydrological Catchments

6.2.5.2 Groundwater

The key aquifers within the Project area include the deep Waimea Aquifer (approximately 5-40m deep) and Parata Aquifer (approximately 10-40m deep), from which the KCDC production wells abstract water for public water supply. Domestic wells generally abstract water from the shallow Pleistocene (approximately 5-40m) and Holocene Sands (approximately 5-30m deep) Aquifers.

The main groundwater flow direction is roughly west north-west, from the foothills in the east towards the coast in the west.

Under average conditions, the groundwater level is very close to (< 0.3 m below ground level) or at the surface in a number of areas, resulting in natural wetlands. High groundwater levels also result in areas prone to surface flooding during significant rainfall events.

The groundwater gradient is approximately 1:500 along the southern and central sectors of the Project area. Near the northern end, there is a steeper gradient of approximately 1:250.

Further information on Groundwater can be found within Technical Report 21, Volume 3.

6.2.6 Ecology

The Project area falls within the Foxton Ecological District, which includes extensive sand dunes, several estuaries, wetlands, dune lagoons and a few coastal swamp forest remnants that contain nikau, pukatea and kahikatea.

Further information on the existing ecological environment refer to Technical Reports 26 to 31, Volume 3.

6.2.6.1 Vegetation and Wetlands

The vegetation communities within the Project area (shown in Figure 6.7) range from pasture and blackberry/gorse scrub that typically have low ecological values, through to more ecologically valuable regenerating mahoe shrublands and manuka wetlands.

There is little remnant indigenous vegetation remaining on the Kāpiti Coast and the ecological areas that exist are predominantly highly modified by historical land clearance, swamp drainage and residential development. Several small remnants of lowland forest and scattered groups of trees and wetlands remain, particularly to the north of Waikanae where there is a lower intensity of urban development. Small areas of regenerating indigenous vegetation are also present, such as the prominent stand of semi-mature kanuka on the dunes at the southern end of the proposed Expressway alignment, and groups of kanuka at various other locations. There is generally a lack of connectivity between the fragmented indigenous plant communities.

Figure 6.7: Principal Vegetation Types in the Project Area

The Wellington region overall has lost approximately 97.5% of the wetlands that existed prior to 1840: many of these were on the Kāpiti Coast. The historic designations and existing WLR designation along much of the proposed Expressway alignment have generally protected wetlands from development pressures faced in the remainder of the Kāpiti Coast. The wetlands that remain, irrespective of their state of modification, are generally considered to be ecologically significant for this reason.

Wetland vegetation ranges from remnant primary lowland swamp forest dominated by kahikatea through to modified wet dune depressions dominated by *Juncus* and wet pasture species. Most wetlands within or near the alignment are ephemeral; that is, they have standing water in winter but are generally dry in summer. Based on known ecological patterns present in the wetlands nearby the Expressway alignment, it is suggested that the water table has dropped by about 0.5m from historical levels as a result of artificial swamp drainage and local water abstraction. The vegetation present within wetland areas is typically species that tolerate water table changes including Manuka, Sphagnum and Rushes (refer to Figure 9, Technical Report 27, Volume 3 for maps showing vegetation in proximity to wetlands).

While the process of selecting the proposed Expressway alignment ensured that the majority of the highly valued ecological areas have been avoided, many of these wetlands will be in close proximity to the Project.

A number of water bodies (including drains, streams and rivers) located along the Kāpiti Coast are known for their high ecological values, and provide habitat for rare or threatened freshwater fish species, including giant kokopu, brown mudfish and long-finned eel (refer to Technical Report 26 and 30, Volume 3 for further information).

Estuarine systems located downstream of the Project area include (from south to north) the Whareroa Stream Mouth, Wharemauku Stream Mouth, Waikanae Estuary Scientific Reserve, Waimanu Lagoons and

the Waimeha Stream Mouth. These estuaries vary considerably in their ecological value, particularly with regard to providing habitat for resident and visiting shorebirds.

6.2.6.2 Avian and Herpetofauna

While the ecological landscape is highly fragmented in terms of providing feeding and nesting resources, the Kāpiti coastal area is home to a number of indigenous bird species, some of which are nationally threatened (refer to Chapter 21 of this AEE Report and Technical Reports 26 and 29, Volume 3 for further information). Collectively, in conjunction with smaller pockets of remnant vegetation, Kāpiti Island, the large Hemi Matenga Scenic Reserve and the Tararua Forest Park provide for the east-west movement of bird species in the area.

Isolated stands of regenerating manuka, kanuka and mahoe along the Kāpiti Coast provide habitat for lizards. The herpetofauna survey carried out as part of ecological investigations for this Project did not find any geckos and or gecko skin sloughs. However, one species of common skink was abundant in most or all dense grasslands across the proposed Expressway alignment. This habitat type is prevalent throughout the Expressway alignment, particularly in the southern two thirds of the Project area. Native frogs are extremely unlikely to occur in the vicinity of the proposed Expressway alignment due to the absence of a suitable habitat. No herpetofauna species of conservation concern were found during the survey undertaken for the Project.

6.3 Built and human environment

6.3.1 Land Use and Built Form

Within the Project area, the main town centres are located at Paraparaumu and Waikanae, which developed from the original townships that grew next to the NIMT railway. The main residential areas are located at Raumati, Paraparaumu and Waikanae, with smaller settlements at Otaihanga and Peka Peka.

Other than areas of farmland and some residential development, most of the land within the proposed Expressway alignment has largely remained free from development since the 1950s and, as such, the natural character of the alignment has been preserved to a greater extent than the land surrounding it. The undeveloped nature of the alignment is particularly evident in the vicinity of urban areas, where the historic designations and existing WLR designation have protected several dune systems, inter-dune wetlands and peat areas. Outside the urban areas, the alignment is largely pastoral farmland.

6.3.2 Social Environment

According to the latest census data, the population of the local communities between MacKays Crossing and Peka Peka in 2006was 35,742, which is about 77% of the total population of the Kāpiti Coast District of 46,197. The Kāpiti Coast District, where the Project is located, has experienced strong and steady growth since 1996 (10.0% between 1996 and 2001, and 8.8% between 2001 and 2006).

The majority of the population resides within Waikanae and the contiguous urban areas of Raumati and Paraparaumu. The Kāpiti Coast's principal commercial area and service centre is located in Paraparaumu,

containing a number of significant industrial/commercial areas, local businesses and shops. There is a smaller town centre at Waikanae, as well as retail centres at Raumati and Paraparaumu Beach.

A number of communities are located within the Project area. From south to north, these include:

- Raumati which includes Raumati Beach and Raumati South;
- Paraparaumu which includes Paraparaumu North, Otaihanga, Paraparaumu South and Paraparaumu Central;
- Waikanae which includes Waikanae Beach, Waikanae East, Waikanae Park and Waikanae West; and
- Peka Peka.

There are many 'retirement villages', as well as people of retirement age living independently in the District. The lifestyle of the area and relatively affordable housing has also attracted young families.

A wide range of services and facilities provide for the residents of the local communities, including, but not limited to, education facilities, healthcare services and places of worship. A network of open space exists through these local communities and includes recreational areas and reserves.

Descriptions of community demographics and an overview of the range of community services and facilities within the Project area are detailed within Technical Report 20, Volume 3.

6.3.3 Archaeology

The Kāpiti Coast has always been a highly desirable place to live. It is likely that there has been human settlement on the Kāpiti Coast since the arrival of the first Polynesian settlers, sometime after the 12th century AD.

Despite the fact that relatively little strategic archaeological investigation has been undertaken on the Kāpiti Coast, enough is known of the history and environment, and enough sites have been recorded within the Project area, to give a good indication of pre-European Māori and early European settlement patterns and lifestyles.

Pre-European Māori used the rich natural resources of this area: the coast and estuaries would have provided fish and shellfish, the forested dunes would have provided birds, rats and plant species, and the swamp areas would have yielded birds, eels and yet more plant species. Specifically, the area around Waikanae River is important and the history of use and occupation of this area by Māori has left a legacy of physical evidence and remains, as well as strong associations with the place and its cultural values.

European settlement developed in the region from the 1840s, based in part on the flax industry and on farming. As a result of European settlement, Māori now had access to new crops, horticultural tools and techniques, which increased the range of food available. Mills for water, flour and flax were also built in the District.

The physical environment of the Kāpiti Coast is a major influence on archaeology, both in terms of the types of sites present, and where they are found. Archaeological work to date shows that, due to the

dynamic nature of the unstable dunes, sites can be found several metres below the ground surface. Middens especially are prone to becoming inundated by windblown sand. In contrast to the dunes are the sites found in the foothills behind the coastal dune area. Here the types of sites recorded include pā, pits and terraces, as a result of the more stable soils and geology.

Sufficient data has been gathered to create a predictive model on archaeology[34]. This model postulates likely site occurrence, distribution, nature and relationships with the underlying geomorphology. Based on this model, sites are extremely likely on areas of sand dunes, particularly middens. Other likely site types are ovens and burials. Earthworks sites (including pits, terraces, and platforms) have been recorded in greater numbers north of the Waikanae River.

Refer to Technical Reports 5, 9, 11 and 12, Volume 3, for further details on the history of the Kāpiti Coast District and archaeological environment.

6.3.4 Māori History and Cultural Values

Te Runanga o Ati Awa ki Whakarongotai Inc is the iwi authority representing the tribal interests of Ngati Awa hapu on the Kāpiti Coast. The rohe of this iwi extends from the Whareroa Stream at the southern end of Queen Elizabeth Park to the Kukutauaki Stream north of Peka Peka Road. Within this large rohe, the Takamore Trust has mandated responsibility for the area of significant cultural values between the Waikanae River and Te Moana Road (referred to as the Takamore cultural heritage precinct). This area is regarded by Māori as containing a number of wāhi tapu, and includes an urupā that is contained within wāhi tapu area registered with the New Zealand Historic Places Trust. At the time of writing, the extent of the registered wāhi tapu is proposed to be extended.

Ngāti Toa also has interests in Queen Elizabeth Park, while Ngāti Raukawa and Muaupoko have a long association with the Kāpiti area.

The history of Māori settlement on the Kāpiti Coast is detailed within Technical Reports 9, 11 and 12, Volume 3.

The cultural landscape of the Kāpiti Coast is characterised by a number of important factors that incorporate tangible and intangible values. For Te Ati Awa ki Whakarongotai, the cultural landscape embodies the stories, myths and legends of its communities. Landscape features such as mountains, rivers, wetlands and the life forms they support provide the medium for which the stories that bind people to their surroundings have been conveyed throughout the generations.

The Cultural Impact Assessments undertaken for this Project by Te Ati Awa ki Whakarongotai and the Takamore Trust (Technical Reports 11 and 12, Volume 3) identify specific areas and landscape features within the Project area that have particular cultural significance, characterised by a range of interconnected cultural values. These areas include, but are not limited to, the Takamore cultural heritage precinct, waterbodies, Māori owned land blocks and Queen Elizabeth Park.

[34] For details on the Predictive Model Refer to Technical Report 9, Volume 3

In May 2011, the Takamore Trust, with assistance from the Project team, prepared a number of constraints maps[35] to identify sites of cultural importance within the Takamore cultural heritage precinct. These sites include the Maketu tree, the Takamore urupā, the former Tuku Rakau Village and the registered wāhi tapu area.

6.3.5 Heritage

Currently, there are two buildings located near the Project area that have been listed on the Heritage Register of the Kāpiti Coast District Plan (registered as No.s B72 and B41).

The Greenaway Homestead (B72) is a rare example of a still extant building dating from Waikanae's early 20th century history, located on the corner of Kauri and Puriri Roads, Waikanae. The Homestead's original setting has changed considerably over time, with its original role as a farm homestead ending over 60 years ago. The residential development surrounding the Greenaway Homestead, which began in 1954, has grown into a place with its own identity and character. An assessment of this building and its context can be found within Technical Report 10, Volume 3.

In the same vicinity as the Greenaway Homestead, but slightly further away from the proposed Expressway, is an old church building located within the grounds of the El Rancho Christian Holiday Camp (No.B41[36]). This building, locally referred to as the Apiti Chapel, was constructed in 1896 and relocated from Apiti (about 50km northeast of Palmerston North) to its current location within the Holiday Camp, off Kauri Road, Waikanae.

There are no other registered European buildings of historic heritage value within the Project area.

6.3.6 Noise

Between April and May 2011, a pre-construction noise level survey[37] was undertaken as part of the Project.

Ambient noise measurements demonstrate a range of current noise levels from 40 to 68 dB $L_{Aeq(24h)}$[38]. The range of existing noise levels is due to the relative proximity of sites to existing roads, with noise levels at the lower end representing positions located away from the existing roading network and at the higher end representing positions close to existing major roads (such as the existing SH1, Kāpiti and Te Moana Roads).

---

[35] Constraints Maps for the Takamore Cultural Heritage Precinct are contained within Technical Report 11, Volume 3.

[36] Refer to Technical Report 10, Volume 3

[37] Refer to Technical Report 17, Volume 3

[38] Ambient Noise is the all-encompassing noise associated with any given environment and is usually a composite of sounds from many sources near and far.

The existing ambient noise level for most of the Expressway alignment is not controlled by current road traffic noise. For new roads, noise sources controlling the environment are generally natural sounds that do not vary considerably from one area to the next along the alignment. This is the case for the Expressway, where large extents of the road will traverse areas of rural and rural residential character.

Technical Reports 15 to 17, Volume 3 relate to noise.

6.3.7 Air Quality

The Project area is within the Kāpiti Coast airshed, as defined by the GWRC[39]. In terms of air quality within the Project area, vehicle emissions and domestic solid heating from the residential areas are the biggest contributors to air contaminants; namely particulate matter (PM_{10}), nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), carbon monoxide (CO) and benzene. Vehicle emissions in this area predominantly arise from vehicles on the existing SH1 and suburban streets, which contribute to background levels of PM_{10}, NO_2, NO_x, CO and benzene. Contaminants arising from solid fuel heating at Raumati, Paraparaumu, Waikanae and other residential areas are also contributors of background levels of PM_{10} and CO within the environment.

The estimated background concentration levels, based on air quality monitoring undertaken near Raumati Road, are all below the relevant thresholds in the Air Quality National Environmental Standard, indicating a good overall level of existing air quality in most of the area. Air quality in rural settings is likely to be considerably better than the worst-case levels estimated for the more urban settings.

Further details on air quality can be found within Technical Reports 13 and 14, Volume 3.

6.3.8 Services

A range of major services supporting the urban environment are located within the Project area, and include transmission and distribution lines for gas, electricity, and telecommunications, and reticulated networks for water supply and wastewater disposal. Major service providers within the Project area include KCDC, Vector Gas, Electra, Telstra, Telecom and FX Network.

In general, services are located in the area between Poplar Avenue (Raumati South) and Te Moana Road Waikanae), and at Peka Peka Road. These services are described below in Table 6.1.

Table 6.1: Service Networks within the Project Area

Type of service	Service providers	General locations	Typical construction
Water supply network	KCDC	Leinster Avenue to Ngarara Road	100mm / 200mm/ 250mm / 300mm diameter asbestos cement water mains 50mm/ 100mm/ 300mm diameter PVC water mains Water supply bore

[39] http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Raumati-South-Air-Quality-Investigation-Report-Screen-Version-indd.pdf

			hydrants/ valves
Stormwater network	KCDC	MacKays Crossing to Peka Peka Road	Refer Assessment of Stormwater Effects
Wastewater network	KCDC	Leinster Avenue to Smithfield Road	100mm/ 150mm/ 450mm/ 525mm diameter asbestos cement gravity mains 100mm/ 150mm diameter PVC gravity pipes 525mm diameter RCRRJ gravity main 100mm / 450mm diameter asbestos cement rising mains 350mm diameter PE rising main Pump Station Manholes
Electricity distribution	Electra	MacKays Crossing to Peka Peka Road	400V / 11kV / 33kV Buried cables and overhead lines (and poles) Streetlighting / transformers
Gas distribution	Vector	Raumati Road to Te Moana Road	32mm/ 50mm/ 100mm PE pipes
Telecommunication, including fibre optic cables	Telecom	Leinster Avenue to Peka Peka Road	Buried cables (telephone and fibre optic) Telecom cabinets and manholes
	Telstra Clear	MacKays Crossing to Te Moana Road	Buried and overhead cables (telephone and fibre optic)
	FX Network	Kāpiti Road to Mazengarb Road	Buried cables (fibre optic)

In addition to these, the Vector Gas Transmission Pipeline Corridor and the Transpower Bunnythorpe to Haywards A and B Transmission Lines cross the proposed Expressway alignment.

6.3.9 Transport Facilities

There are a number of existing transport networks within the Project area, including the existing SH1, the local road network, Kāpiti Coast Airport, the NIMT railway, bus networks, walkways, cycleways and bridleways.

6.3.9.1 State Highway Network

The existing SH1 connects Wellington to the Kāpiti Coast and further northwards to the central and upper North Island. The Consultation Draft of the NZTA's State highway classifications identifies the existing SH1 in the Wellington Region as a 'national strategic' State Highway[40], signifying its high importance in terms of strategic connections for freight traffic and other vehicles to Wellington City, CentrePort, the interisland ferries, and Wellington International Airport. Through the Project area, the existing SH1 is the primary north-south route, providing the only road crossing of the Waikanae River

[40] State highway classification: Consultation Draft, NZTA, February 2011

and accommodating both local and inter-regional traffic movements. Between MacKays Crossing and Peka Peka, the highway is generally located parallel to the NIMT, and is typically two laned except for several overtaking sections and for the section south of Poplar Avenue. The various communities of the District are accessed by a combination of the existing SH1 and/or secondary local roads.

6.3.9.2 Local Road Network

There are a number of major local arterial roads that connect to the existing SH1 within the Project area or that perform a significant function in the local road network. The existing east-west local roads and arterials which will either cross under or over the Expressway, and/or that will provide connections to the Expressway include (from south to north):

- Poplar Avenue;
- Raumati Road;
- Kāpiti Road;
- Mazengarb Road;
- Otaihanga Road;
- Te Moana Road;
- Ngarara Road;
- Smithfield Road; and
- Peka Peka Road.

Local roads, including those listed above, are typically two-laned. In the vicinity of the proposed Expressway, local roads have a speed limit of 50km/h, except for Otaihanga Road which has a speed limit of 80km/h.

Figure 6.8: Road Hierarchy Plan

6.3.9.3 Kāpiti Coast Airport

The Kāpiti Coast Airport is one of the few privately owned regional airports in New Zealand and is strategically significant as a second airport for the Wellington Region. Located off Kāpiti Road in Paraparaumu, the Airport has about 40,000 aircraft movements each year, predominantly light aircraft. The Airport has recently been upgraded to become a regional airport, with scheduled flights to various centres (recently including Auckland), with more options for national air travel to other major centres. In conjunction, a recent plan change (to the Kāpiti Coast District Plan) has provided for significant business development to occur adjoining the airport, which is expected to generate increased business and employment opportunities locally and is likely to result in additional traffic (freight and private vehicles) movements on local roads, particularly Kāpiti Road and the proposed future Ihakara Street extension.

6.3.9.4 Public Transport

The Kāpiti Coast District is well serviced by public transport with rail and bus services as shown in Figure 6.9.

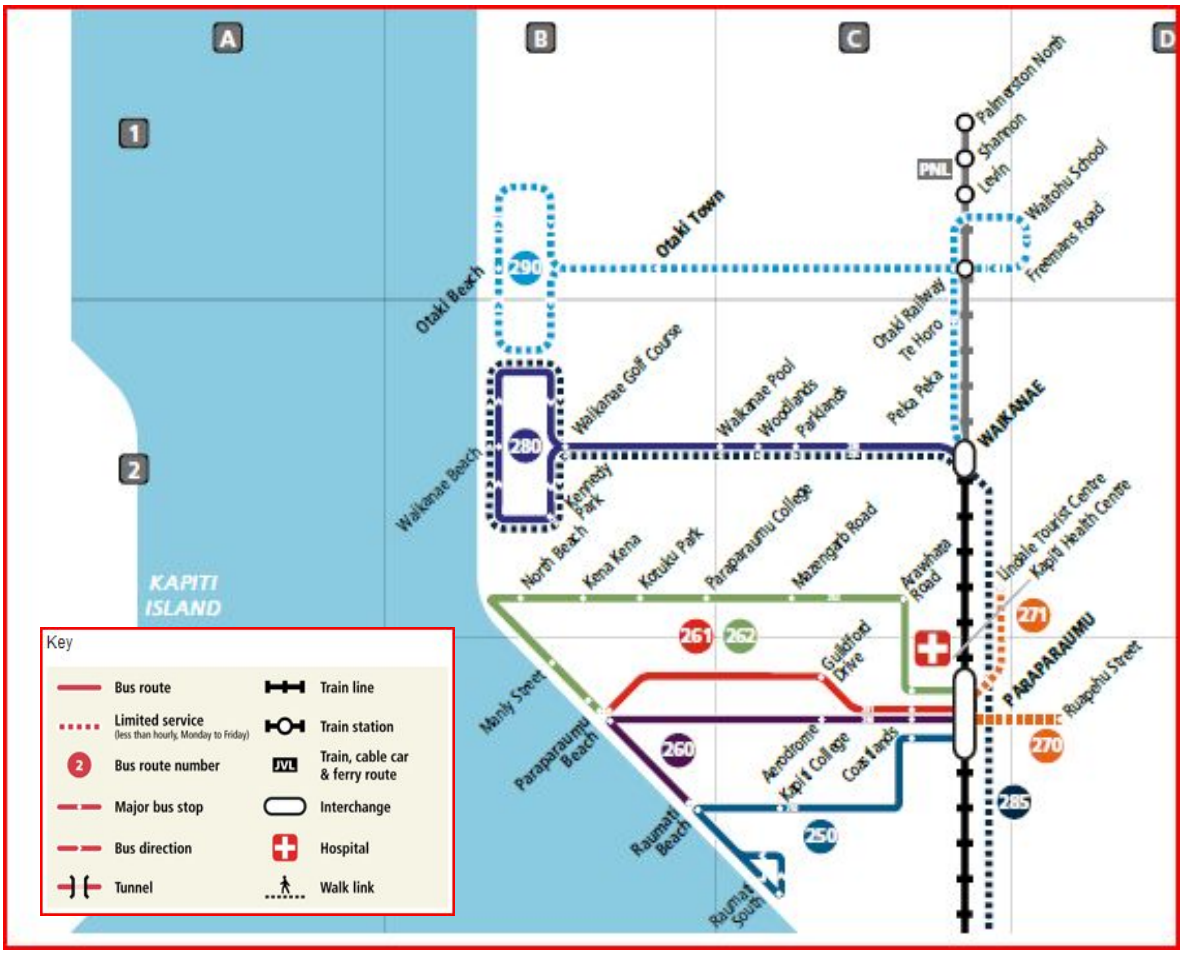

Figure 6.9: Project Area Public Transport Network Map

The NIMT rail line runs north-south through the Kāpiti Coast District. The NIMT carries approximately ten freight trains daily in each direction, while commuter trains operate between Wellington and Waikanae approximately every 30 minutes during peak times. In addition, it also carries a small number of longer distance services. Within the Project area, there are rail stations located in Paraparaumu and Waikanae.

As illustrated in Figure 6.9 there is a network of bus services on the Kāpiti Coast.

The bus network and schedule of operations within the Project area is primarily orientated towards providing connectivity between residential communities and the Paraparaumu and Waikanae Rail Stations. School bus services include services to and from Kāpiti and Paraparaumu Colleges along with Kāpiti Coast primary schools.

6.3.9.5 Walkways, Cycleways and Bridleways

The current provision for walking, cycling and horse riding through the District is by a mix of on-road facilities, footpaths and cycle lanes, as well as paths that traverse open spaces or cut through parks and between streets as lanes. The Wharemauku Trail and Waikanae River Trail are well used areas provided for recreational walking, cycling and horse-riding. Many of these accessways also provide for school traffic.

Both the existing SH1 and the Kāpiti Coast Cycle Route are part of the regional cycling network as shown within Figure 6.10. The16km Kāpiti Coastal Cycle Route runs from Paekakariki through to Peka Peka beach, generally along residential streets, as well as Queen Elizabeth Park and along the Waikanae River. There are currently no cycle lanes on the existing SH1 between MacKay's Crossing and Peka Peka: cyclists ride in the shoulder, where available. The Paraparaumu rail overbridge and the Waikanae River Bridge are very narrow and cyclists are effectively forced to ride in the traffic lane in both of these locations.

A local movement survey was carried out as part of the Project investigations; the survey results are detailed and mapped within Technical Report 5, Volume 3.

Figure 6.10: Kāpiti Coast District Coastal Cycleway[41]

[41] Source: Kāpiti Coast District Coastal Cycleway Guide, Kāpiti Coast District Council, 2011

6.4 Sector 1 – Raumati South

The Project has been divided into four geographic sectors as illustrated and described within Chapter 7 of this AEE Report.

The Project area within Sector 1 is located from just south of Poplar Avenue (chainage 1900m) to just north of Raumati Road (chainage 4500m).

6.4.1 Natural Environment

6.4.1.1 Topography and Landscape

Queen Elizabeth Park comprises an area of continuous and mostly unmodified dunes between the coast and the foothills of the Tararua Ranges. A line of high, relatively intact dunes extends from the centre of the Park to north of Poplar Avenue. To the west of these is a complex field of intact dunes, which extend towards the coast. The eastern part of the Park is relatively flat, low lying and traversed by several drains.

Between Poplar Avenue and Raumati Road is a line of relatively high dunes, some of which are over 20m amsl. There are also some dune formations adjacent to the existing SH1, including at Leinster Avenue. Between the dunes are several areas of low-lying damp ground and wetlands.

6.4.1.2 Geology

A large area of relatively thick peat (ranging between 4m and 6m) is present from the edge of the foothills across Queen Elizabeth Park. Peat is also present north of Poplar Avenue between the foothills and the sand dunes within the existing WLR designation. The area is generally underlain by alluvial sand and gravel deposits.

6.4.1.3 Hydrology

The waterbodies which cross the proposed Expressway alignment within Sector 1 include (from south to north):

- Whareroa Stream tributaries; and
- Drain 7 (tributary of the Wharemauku Stream).

6.4.1.4 Ecology

There are three known wetlands with moderate ecological values for wetland vegetation and habitat for indigenous fauna within the Project area within this Sector. The key areas of identified ecological importance are described below:

- The *Poplar Avenue wetlands* are located south of the Poplar Avenue/Matai Road intersection, within Queen Elizabeth Park. Although highly modified, these wetlands are part of a major joint community restoration programme being undertaken by GWRC, KCDC, DOC and community groups. An area surrounding the original wetland has been planted as part of this initiative.

- The *Raumati South Peatlands*, located north of Poplar Avenue, to the west of Leinster Avenue/Sydney Crescent. Although highly modified and fragmented, this large area of wetland vegetation is dominated by manuka, kanuka and a range of exotic species.
- The *Raumati manuka wetland*, located inland of 200 Main Road, Raumati. This area is currently in a highly modified state.

6.4.2 Built and Human Environment

6.4.2.1 Land Use and Built Form

As shown in Figure 6.11 below, the Project area within Sector 1 consists of a mix of low to medium density urban residential areas and large areas of open space (primarily Queen Elizabeth Park and the undeveloped areas within the existing designated alignment).

The local communities through the Project area of Sector 1 include Raumati South and Raumati Beach.

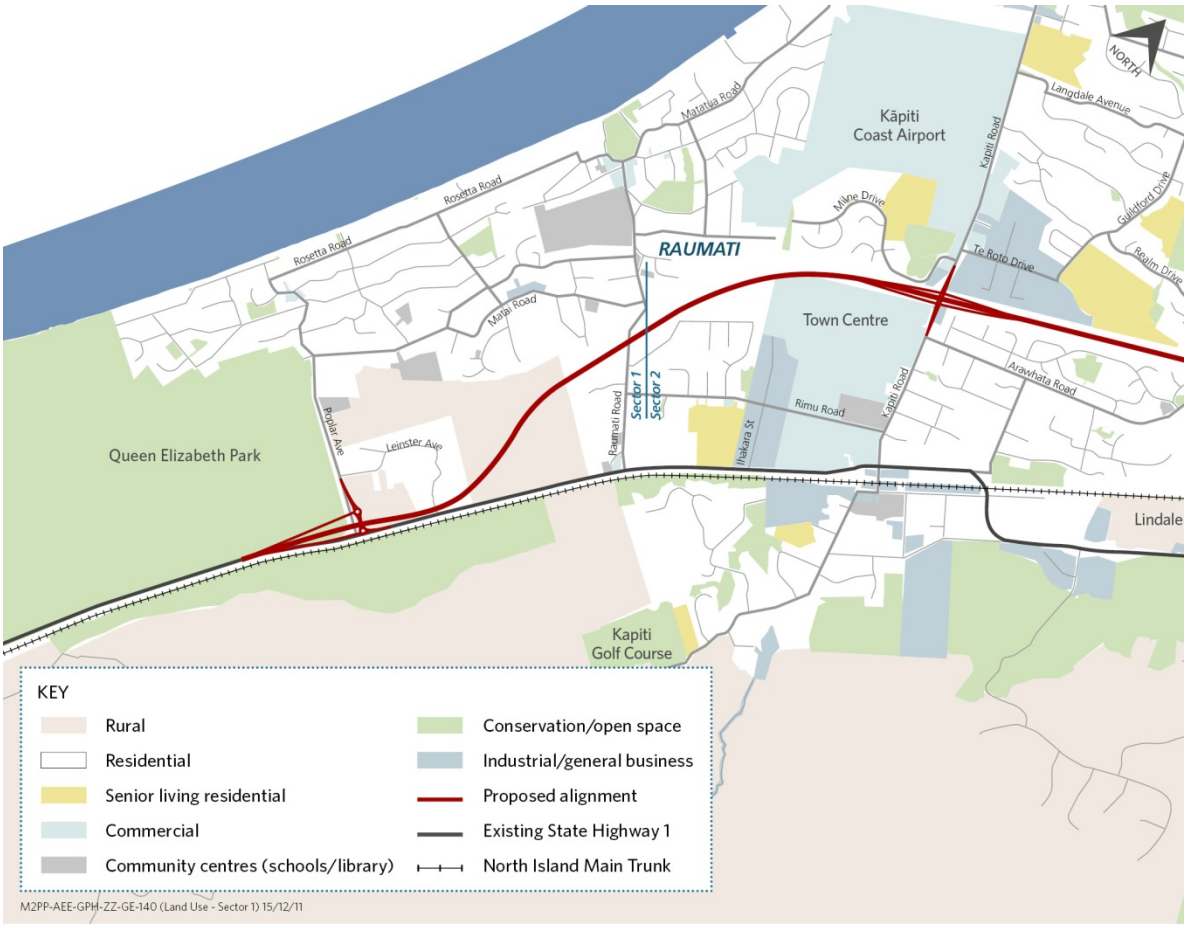

Figure 6.11: Land Use within Sector 1

Photo 6.2: Sector 1 (Facing South)

As described above, in this Sector the land within the existing designated alignment has largely been left free from development since the 1950s. The existing WLR designation protects a wide (at least 100m) area from development, which contributes to the informal open space environment within Sector 1. Much of the designated land is regenerating native and/or exotic scrub, with ephemeral and permanent wetlands.

Urban development in this Sector has terminated at the existing WLR designation boundaries, with no east-west connectivity between the two residential area, north of Poplar Ave and south of Raumati Road. The designated alignment is, however, criss-crossed with informal walking connections. While part of the Raumati community, the residential neighbourhood of Leinster Avenue/Sydney Crescent is separated from the remainder of the Raumati area by the existing WLR designation.

South of Poplar Avenue

Poplar Avenue marks a distinct change in the landscape character within Sector 1. To the south of Poplar Avenue is Queen Elizabeth Park, a Wellington Regional Park comprising 650 hectares, classified as a Recreation Reserve under the Reserves Act 1977[42]. The Park is zoned Open Space and designated under the Kāpiti Coast District Plan (D0401) for recreation and reserve purposes.

[42] Queen Elizabeth Park is classified as a recreation reserve under the Reserves Act 1977. The Wellington Regional Council was appointed by the Minister of Conservation to control and manage Queen Elizabeth Park as a reserve for recreation purposes, pursuant to Section 28 of the Reserves Act 1977.

Queen Elizabeth Park provides a number of recreation facilities, including the Wellington Tramway Museum and picnic areas. Inland of the foredunes, the Park is largely grazed open pastoral land, leased for farming operations, including that part of the Park adjacent to existing SH1 along the Raumati Straight. The core of the Park's facilities and activities occur to the south of the Project area, accessed from the MacKays Crossing interchange. While parts of the Park have been modified, the basic system of coastal and inland dunes, backed by wetlands, remains intact and thus represents an example of the coastal plain prior to urbanisation. The history of Queen Elizabeth Park includes a long history of Māori occupation and its use in World War II as a base for a 20,000 strong US marine camp.

North of Poplar Avenue

Sector 1 north of Poplar Avenue consists of a mixture of low to medium density suburban development to the west and east of the existing designated alignment. The community contains two schools: the Raumati South (State) Primary School on Matai Road and the Te Ra Waldorf Primary School on Poplar Avenue (the latter also containing the Te Rawhiti Waldorf Kindergarten).

The residential communities to the west of the designated alignment and in the vicinity of Leinster Avenue are medium density neighbourhoods, with the roads and pattern of housing generally following the local dune topography. On the existing SH1, between the residential neighbourhoods at Leinster Avenue and Raumati Road is a pocket of low density larger residential properties, with access off the existing SH1.

6.4.2.2 Community Facilities

As well as permanent homes and holiday baches, the Raumati community is served by a local shopping village, recreational amenities and educational facilities. The shopping village is located at Raumati Beach, on the corner of Raumati and Rosetta Roads opposite the Marine Gardens and includes part of Margaret Street. There is also a small commercial centre at the beach end of Poplar Avenue and small industrial area on Matai Road.

6.4.2.3 Archaeology and Maori History

Queen Elizabeth Park is located partly within a historic Ngati Toa Rangatira reserve (extending from Paremata to Wainui) that was set aside by the Crown as part of the purchase of Porirua in 1847. The Park includes areas of early Ngati Toa Rangatira settlement, and contains a number of important wāhi tapu, including urupā, and pā sites at the mouths of the Whareroa and Wainui Streams. These were traditionally used for fishing and still retain important cultural associations. The Whareroa Stream is the traditional tribal boundary between Ngati Toa and Te Ati Awa.

6.4.2.4 Noise

The noise environment of this Sector varies from relatively elevated ambient noise levels in areas close to the existing SH1 (for example, at Leinster Avenue) and local main roads to relatively quiet in areas removed from main roads. As part of investigations for this Project, noise levels were measured at 12

locations, including two long duration noise level surveys[43]. Noise levels were found to vary from 42 to 70 dB $L_{Aeq(24h)}$, generally dependent on the location of the sites to road noise.

6.4.2.5 Services

The most significant network utility in this Sector is the wastewater pump station located on Leinster Avenue, near its intersection with Poplar Avenue. The pump station is in proximity to the proposed Expressway.

6.4.2.6 Local Road Network

The beach community of Raumati South is accessed from the existing SH1 via Poplar Avenue and is connected to Raumati Beach via Rosetta Road and Matai Road/Hillcrest Road. These road corridors are classified as Secondary Arterials in the District Plan. The residential enclave around Leinster Avenue is accessed either directly off the existing SH1 or via Poplar Avenue.

Raumati Beach is accessed off the existing SH1 via Raumati Road and connected to Paraparaumu Beach through Matatua Road/Wharemauku Road/Marine Parade. Raumati Beach is connected to Paraparaumu town centre by Rimu Road. Both these road connections are classified as Secondary Arterials in the District Plan.

6.4.2.7 Walkways, Cycleways and Bridleways

The formal and informal walkways and cycleways throughout Raumati are widely used. These include those through Queen Elizabeth Park and the Kāpiti Coastal Cycle Route along Rosetta Road. Informal tracks include access between Leinster Avenue and Raumati South School. The Kāpiti Pony Club and other horse riders use tracks in the dune areas off Raumati Road and circuits to the beach.

6.5 Sector 2 – Raumati/Paraparaumu

The Project area within Sector 2 is located north of Raumati Road (chainage 4500m) through to north of Mazengarb Road (chainage 8300m).

6.5.1 Natural Environment

6.5.1.1 Topography and Landscape

The topography of Sector 2 consists of unmodified dunes (ranging up to approximately 20m amsl) interspersed with low lying interdunal sand plains. The Sector is bisected by the Wharemauku Stream.

The southern half of this Sector includes dune landforms ranging between 10-20m amsl, with a low lying flat interdunal area located between the Wharemauku Stream and Kāpiti Road. The dunes through

[43] Refer to Technical Report 15, Volume 3.

the northern part of Sector 2 remain largely intact and unmodified due to the long history of its protection for roading purposes. However, the surrounding development has significantly modified the adjacent dune landforms up to the existing WLR designation boundaries. Generally, the surrounding land is at the same elevation as the proposed Expressway alignment, except for the residential areas near Mazengarb Road and off Milne Drive, which are slightly elevated above the alignment.

6.5.1.2 Geology

From Raumati Road to north of Mazengarb Road, peat is present in isolated depressions between the sand dunes. Near the Wharemauku Stream, the peat deposits are interbedded with alluvial deposits to a depth of 6m.

The near surface geology from Raumati Road to Mazengarb Road consists of recent dune sand (Himatangi Group), with inter-dunal deposits (peat) between the sand dunes. The dunes comprise fine to medium sand that is of loose to medium density, with occasional thin beds of silt and clay. The sand is fresh to slightly weathered, and is dry at the ground surface.

The inter-dunal deposits between Raumati Road and Kāpiti Road comprise organic silty clay and amorphous and fibrous peat with minor components of woody peat. In places, the peat is inter-layered with dune sand. These organic soils are generally soft with high water content. These soils are generally 0.5m to 2m thick, and occasionally can range up to 3m to 4m thick.

The inter-dunal deposits along the Kāpiti Road to Mazengarb Road section comprise organic silt and soft peaty sand, with minor components of amorphous peat. These organic soils are generally soft with high water content. The soils are up to 3 metres thick and are underlain by sand of the Himatangi Group.

6.5.1.3 Hydrology

The waterbodies which are proposed to be crossed by the Expressway alignment within Sector 2 from south to north include:

- Wharemauku Stream; and
- Mazengarb Stream.

6.5.1.4 Ecology

Within this Sector, there are four wetland areas and three streams or smaller tributaries with known ecological values. These wetlands primarily consist of low-lying wet dune depressions with low botanical values (dominated by exotic wet pasture species). Ecological values are considered low and are primarily valued for their provision of a seasonal habitat for a range of waterbirds.

The wetlands of identified ecological significance in this Sector include Andrew's Pond, located off Milne Drive, and Crown Hill Manuka Bush, located off Sovereign Drive.

The Wharemauku Stream and the associated 'Drain 7' provide known habitat for a number of threatened species (including Giant kokopu and Longfin eel) and at-risk species. The Wharemauku Stream is listed in the Wellington Regional Policy Statement as having regionally important ecological values and is the subject of a community restoration plan[44].

The Mazengarb Drain/Stream to the north of Mazengarb Road is also known to provide habitat for a number of native freshwater fish species, some of which are likely to be threatened.

An ephemeral wet area is located to the south of the Wharemauku stream, adjacent to the residential properties as shown in Photo 6.3.

Photo 6.3: Ephemeral wet area to the south of the Wharemauku Stream

6.5.2 Built and Human Environment

6.5.2.1 Land Use and Built Form

As shown in Figure 6.12, the predominant land use within Sector 2 is predominantly urban residential, with some commercial and industrial uses on Kāpiti Road, and rural residential development to the north of Mazengarb Road.

[44] The Wharemauku Stream Community Freshwater Plan (2005) is the outcome of a process involving Kāpiti Coast District Council, Greater Wellington (the Regional Council), the Department of Conservation, Te Ati Awa ki Whakarongotai, Forest & Bird, local consultancy Aurecon, and the community at large.

The communities of Raumati Beach, Paraparaumu Central and Otaihanga are immediately adjacent to the Project route in this Sector, while the Paraparaumu Beach North and Paraparaumu Beach South communities are located in the wider surrounding area. Most of the proposed Expressway alignment in this Sector has been protected by various roading mid line proclamations or designations since the mid-1950s, with urban development occurring to the west and east.

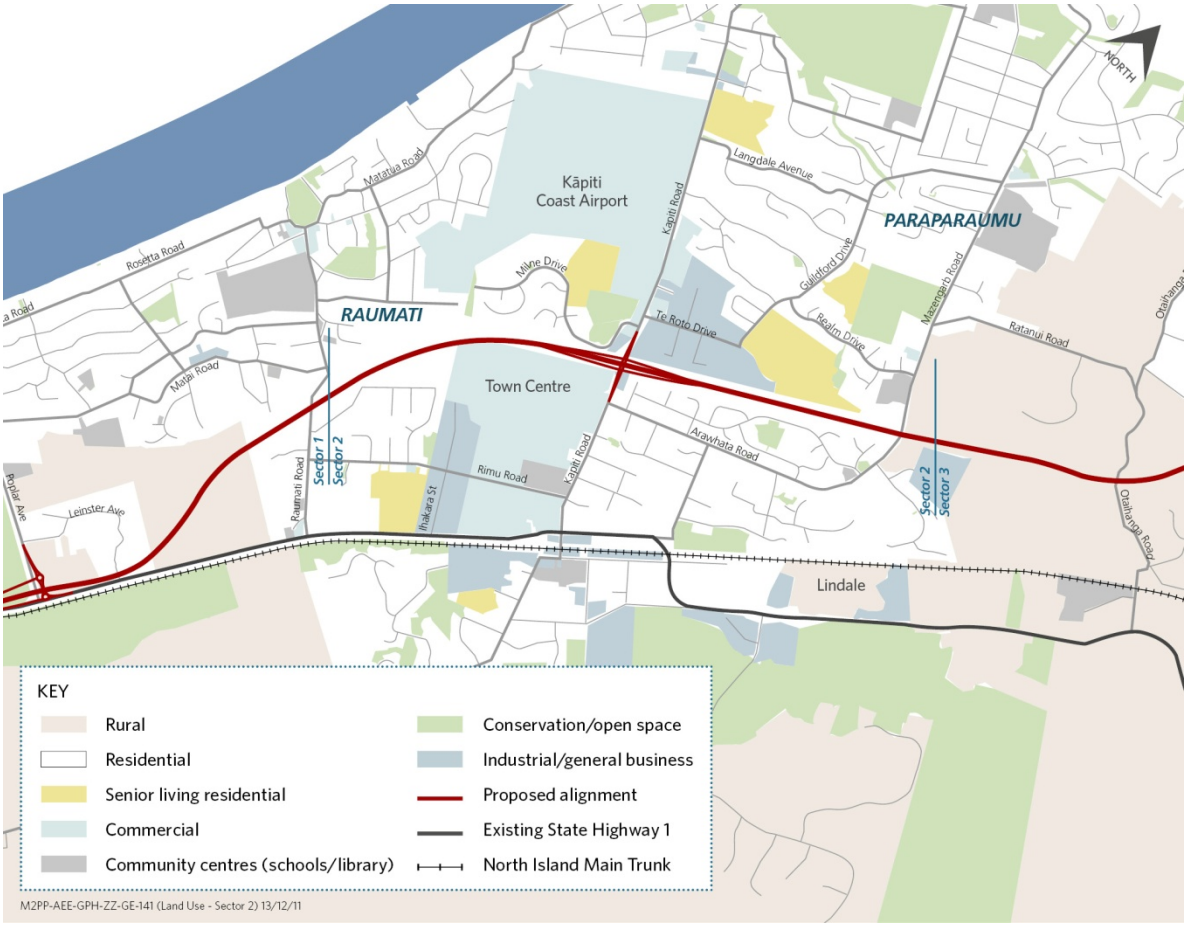

Figure 6.12: Land Use within Sector 2

Photo 6.4: Sector 2 (Facing South)

Raumati Road to Wharemauku Stream

At the southern end of this Sector, Raumati Road connects the beachside community of Raumati Beach with the existing SH1. Raumati Road services an established residential neighbourhood, with at its western end a small shopping centre, Kāpiti College and Raumati Beach Primary School.

The area north of Raumati Road to Wharemauku Stream consists predominantly of medium density residential areas. The open space is largely located within the existing WLR designation, part of which (north of Raumati Road) is leased by the NZTA, under delegated authority from the Crown, for use as a pony club.

Wharemauku Stream to Kāpiti Road

Between the Wharemauku Stream and Kāpiti Road is a large expanse of open undeveloped land, partly contained within the existing WLR designation and partly within an area long identified for the expansion of the Paraparaumu town centre. Alongside the Wharemauku Stream is an existing wetland, as well as the Wharemauku Trail, a walkway popular with pedestrians and cyclists. This Sector also contains a system of unmodified dunes that generally range between 10 and 20m amsl in elevation. The Midlands subdivision, located between the Kāpiti Coast Airport and the existing WLR designation, is the most recent area of residential housing development. The more established residential area of Kiwi Road occupies lower lying land to the south of the Wharemauku Stream.

The Paraparaumu town centre is located to the east of the proposed Expressway, between Rimu Road and the existing SH1, and is the principal commercial business centre for the Kāpiti Coast, containing a

range of civic, retail, service, and office activities. There is a large area of commercial vacant land to the west of Rimu Road which is currently zoned for future "Town Centre" development.

Further to the west of the proposed Expressway is the Kāpiti Coast Airport, a long established centre for light aircraft activity, which is planned to grow substantially as a regional commercial base.

Along Kāpiti Road is a significant area of business activity west of the proposed Expressway, comprising a mix of light industry, general business and large format retail activities. Kāpiti Road has high traffic volumes and is one of the key local arterial roads (along with Te Moana Road) within the Project area.

Kāpiti Road to Mazengarb Road

Between Kāpiti Road and Mazengarb Road, urban development has built up to the edges of the existing WLR designation. To the west of the existing WLR designation is an established area of industrial development in the Te Roto Drive/Kāpiti Road vicinity, with retirement housing and medium density residential development located further north. To the east of the existing WLR designation is an established area of residential development. To the north of Mazengarb Road is largely rural-residential land use.

6.5.2.2 Community Facilities

As Kāpiti Coast's principal commercial centre, there is a particularly large and varied range of social services provided within Paraparaumu[45].

The Coastlands and Kāpiti Road vicinities contain a number of medical facilities, including the Paraparaumu Medical Centre and the Kāpiti Health Centre. The Paraparaumu Police Station is located on the corner of Rimu Road and Kāpiti Road, while the local fire station is on Te Roto Drive. There is a small ambulance base at the Paraparaumu Medical Centre.

6.5.2.3 Noise

Apart from areas immediately adjacent to the local main roads (Kāpiti, Mazengarb and Raumati Roads), the ambient noise environment is considered to be low for a suburban area. As part of investigations undertaken for this Project, noise levels were measured at 19 locations, including two long duration surveys[46]. Noise levels varied from 42 to 55 dB $L_{Aeq(24h)}$.

6.5.2.4 Services

Kāpiti Road includes a number of major urban services, including water supply, electricity and gas reticulation. There is a critical watermain (300-600 mm diameter) in Kāpiti Road that crosses beneath the proposed Expressway alignment.

---

[45] A detailed overview of the social environment is provided within Technical Report 20, Volume 3.

[46] Refer to Technical Report 15, Volume 3

6.5.2.5 Local Road Network

Paraparaumu is centred on the existing SH1, with a number of important local roads intersecting with the highway. The main intersections are at Ihakara Street, Coastlands Parade, and Kāpiti Road, the latter controlled by traffic signals. Unsignalised intersections are at Kāpiti Lights, Amohia Street, Hinemoa Street, Buckley Grove, Rimutaka Street and Ruahine Street. The principal connection for the community of Paraparaumu to the east of the existing SH1 is Ruapehu Street. A large number of properties also have direct access to and from the existing SH1. Arawhata Road, which connects to Kāpiti Road, is an important link to Paraparaumu Beach North and Otaihanga.

Paraparaumu Beach is accessed via Kāpiti Road. The loop comprising Kāpiti Road, Manly Street, Ngapotiki Street, Te Kupe Road, Mazengarb Road and Arawhata Road provides an alternative link between the beach community and the Paraparaumu town centre. This loop is identified as a Secondary Arterial in the District Plan. A grid of interconnected streets provides numerous connections between Kāpiti Road and Mazengarb Road.

6.5.2.6 Walkways and Cycleways

There is a network of widely used formal and informal walkways and cycleways in Paraparaumu. The Wharemauku Trail follows the Wharemauku Stream, providing a popular pedestrian and cycle route between Raumati Village and Rimu Road in Paraparaumu. There is evidence of informal walking tracks across the existing WLR designation between Kāpiti Road and Mazengarb Road. Other walkways include the 22 kilometre section of Te Araroa walkway between Paekakariki and the Waikanae River Bridge.

6.6 Sector 3 – Otaihanga/Waikanae

The Project area within Sector 3 is located from just north of Mazengarb Road (chainage 8300m) to north of Te Moana Road (chainage 12,400m).

6.6.1 Natural Environment

6.6.1.1 Topography and Landscape

The topography of Sector 3 includes moderately high rolling duneland south of the Waikanae River, with lower lying flood plains along either side of the River which become progressively wider toward the estuary. North of the Waikanae River are a series of moderate to high meandering rolling dunes interspersed with low-lying interdunal hollows and wetlands. A narrow alluvial floodplain contains the Waimeha Stream, which was once a northern outlet of the Waikanae River.

6.6.1.2 Geology

In the interdunal hollows in this Sector are small areas of permanent and ephemeral wetlands and water bodies. Peat deposits across this Sector are expected to be relatively shallow.

In the centre of this Sector, the Waikanae River flows east-west, with associated low-lying alluvial terraces on either side. Underlying alluvium typically becomes very dense at depths of around 10m below ground.

6.6.1.3 Hydrology

The waterways crossing the proposed Expressway alignment within Sector 3 include (from south to north):

- Unnamed drain from Wastewater Treatment Plant
- Unnamed drain from former Landfill
- Muaupoko Stream, at its confluence with the Waikanae River
- Waikanae River, and
- Waimeha Stream.

Both the Waikanae River and the Waimeha Stream are listed in the Regional Policy Statement as regionally important waterbodies.

6.6.1.4 Ecology

This Sector has the greatest concentration of ecologically significant sites on the route. These sites include a number of wetlands of high value, the Waikanae River and its associated values, and other smaller streams (including the Waimeha Stream, just north of Te Moana Road); the smaller streams are key connectors between wetland remnants. Wetlands of identified ecological value are:

- The *El Rancho wetlands* situated within the El Rancho Holiday Camp north of the Waikanae River. These wetlands are made up of three to four distinct areas of manuka dominated wetland vegetation with areas of open water. Although highly modified from their original extent, the El Rancho wetland complex is home to a number of rare or threatened plant species. These wetlands are also likely to provide habitat for native bird, freshwater fish and lizard species.
- The two *Osborne's Swamp* wetlands located just to the south of Te Moana Road. While similar to the El Rancho wetlands, the Osborne's swamp complex is considered to be more modified and thus less representative of its original extent. However, the wetlands are suspected to contain rare or threatened plant species and are also likely to provide habitat for native bird, freshwater fish and lizard species.
- The *Otaihanga Landfill wetlands* and bush remnant, located within the Otaihanga Landfill. Although degraded by invasive weed species and the close proximity of the landfill, these three distinct areas of ecological value support indigenous plant species and are likely to provide habitat for freshwater fish, lizards and avifauna.

Although downstream and outside the Project area, the mouth of the Waikanae River (including the Waikanae estuary) is of recognised national ecological significance. The Waimeha Stream just north of Te Moana Road is a DOC administered Stewardship Reserve.

6.6.2 Built and Human Environment

6.6.2.1 Land Use and Built Form

As shown in Figure 6.13, the overall predominant land use and landscape character within Sector 3 is rural-residential.

However, Sector 3 of the Project area includes or is near the communities of Paraparaumu Central (northern part), Otaihanga, Waikanae Beach and Waikanae Park. The Waikanae West and Waikanae East communities are within the wider surrounding area.

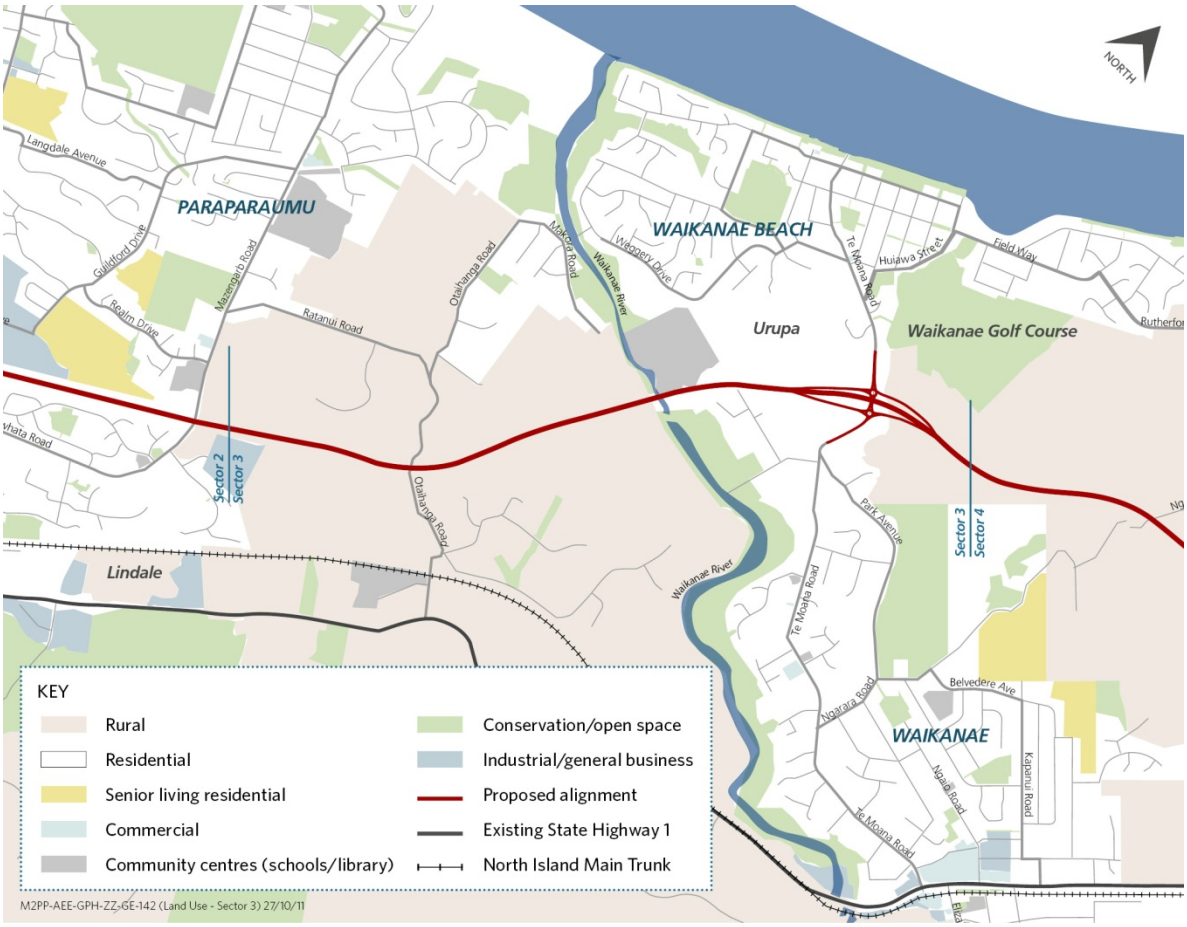

Figure 6.13: Land Use within Sector 3

Photo 6.5: Sector 3 (Facing North)

South of the Waikanae River

Between Mazengarb Road and Otaihanga Road, land uses consist of a mix of farmland, pine plantations, rural residential lots and infrastructure facilities, including the former landfill (now closed) and the Paraparaumu Wastewater Treatment Plant.

The area from Mazengarb Road to the Waikanae River is rural in character, with the Otaihanga residential area located to the west, on the southern banks of the Waikanae River. The rural residential area accessed from Greendale Drive adjoins the existing WLR designation boundary near Otaihanga Road. Small and medium sized rural blocks, with grazed pasture, small wood lots and shelter belts occupy most of the area.

Waikanae River Corridor

The Waikanae River Corridor includes the River, its margins and the floodway. The corridor provides an important lineal area of open space linking the coast and the foothills of the Tararua Ranges. The Waikanae River Corridor is identified as an outstanding natural landscape in the KCDC District Plan. The corridor contains a walkway, cycleway and bridleway on either side of the River, which is used both for commuting locally (primarily school students) and for recreation. There are two pedestrian/cycle bridges across the Waikanae River: one at Otaihanga Domain, and another near Jim Cooke Park. The vegetation of the river corridor is dominated by willow and poplar trees planted for flood and erosion control, although long continuous stretches of the bank have been planted with well-established native species.

North of the Waikanae River

To the north of the Waikanae River, in the immediate vicinity of the Project, is a mixture of open space and large residential lots with a semi-urban character. There are also a number of rural residential properties and small rural holdings and horticultural activities. Further east of the Project area is a well-established residential area along Te Moana Road, with a small residential enclave on Puriri, Kauri, and Greenaway Roads. Greenaway Homestead, the original farmstead in the area, is located on the corner of Puriri and Kauri Roads.

To the immediate west of the Project area, on the northern bank of the Waikanae River is the El Rancho Christian Holiday Camp, which has its principal vehicle access off Kauri Road. North of the camp is an area of undeveloped wetland and duneland, located within land long protected from development by the historic mid line Proclamation and subsequent designations, including the existing WLR designation. The Takamore urupā is located on a dune immediately west of the Project area. West of the wetlands is the Waikanae Beach residential area.

Te Moana Road links Waikanae Beach with the urban area of Waikanae, which has developed on both sides of State Highway 1 and the NIMT railway. Waikanae Town Centre is about 3km to the west of the Project area, and contains a mix of small retail and commercial activities. A small area of large format activities, general business and light industry is located to the north of the town centre.

6.6.2.2 Community Facilities

The Waikanae town centre is located between existing SH1, Marae Lane and Mahara Place. The centre contains a range of shops, businesses and services, as well as gardens and a small children's playground. The local police station, information centre and library services are also located there. Specialist medical services are provided nearby at the Waikanae Health Centre in Marae Lane. Other shops and services run in parallel to the west of existing SH1.

Waikanae is divided by the existing SH1 and the NIMT railway; the area east of the NIMT and the existing SH1 contains the War Memorial Hall and several businesses and services.

While there are no secondary schools within Waikanae, there are a number of other educational facilities.

6.6.2.3 Archaeology and Culture

Recorded archaeological sites within or near to the proposed Expressway in this Sector include middens, pits and terraces. This part of the Project area is of high cultural and archaeological significance to iwi, particularly that part between the Waikanae River and Te Moana Road which is referred to as the Takamore cultural heritage precinct[47] which has a long history of settlement. In this area are several

[47] Refer to Technical Report 11, Volume 3

recorded sites, including urupā, a village, middens and ovens, terraces and pits. The presence of unmodified dunes increases the likelihood of as yet unknown archaeological sites[48].

6.6.2.4 Noise

The character of Sector 3 is generally rural or rural-residential, with occasional dwellings located adjacent to the proposed Expressway alignment. Areas of denser residential activity include the Kauri Road area and Te Moana Road. Ambient noise levels were relatively low for most of the survey locations in this Sector. Noise levels were measured at nine locations, including three long duration noise level surveys[49]. Noise levels varied from 42 to 53 dB $L_{Aeq(24h)}$.

6.6.2.5 Services

The principal network utility within this Sector is the Vector Gas transmission pipeline, which transports gas from Kāpuni to Wellington. The pipeline corridor crosses the proposed Expressway alignment several times in a 1.6km stretch immediately north of the Waikanae River. There are two pipelines in the corridor, being 200 and 300mm in diameter, assumed to be buried 1200mm below the surface.

On the gas pipeline in this Sector is a Delivery Point Station located adjacent to the El Rancho Holiday Camp, by the Waikanae River. This facility comprises filtration, pressure reduction and metering equipment. The station is situated underground in a 20m by 15m compound enclosed by security fencing.

6.6.2.6 Local Road Network

South of the Waikanae River, the main local road is Otaihanga Road, which provides access to State Highway 1 for residents of Otaihanga and (via Mazengarb and Ratanui Roads) Paraparaumu North. Both Otaihanga Road and Ratanui Road are classified as Secondary Arterials in the District Plan. There is currently no legal road connection between Otaihanga and Paraparaumu Beach.

Waikanae, like Paraparaumu, is centred on the existing SH1 and is served by a number of local road connections. Many properties also have direct access onto the existing SH1. The location of the railway line parallel to the highway limits roading access to the eastern part of Waikanae to a single crossing point at Elizabeth Street, which has a signalised intersection with the existing SH1. The other main intersection with the existing SH1 in this Sector is Te Moana Road which has traffic signals.

Te Moana Road provides the main local road access between Waikanae and Waikanae Beach; however, a secondary route to the existing SH1 is available from Waikanae Beach via Rauparaha Street/Huiawa Street/Field Way/William Street/Rutherford Drive/Paetawa Road. This link to Peka Peka is classified as a Secondary Arterial in the District Plan.

There are no direct local road connections between Waikanae Beach and Paraparaumu Beach or Otaihanga; all local traffic has to use State Highway 1 via Te Moana Road. Consequently, there are

[48] Refer to Technical Report 9, Volume 3

[49] Refer to Technical Report 15, Volume 3

significant levels of vehicular traffic movement on the existing SH1 between the communities of Waikanae and Paraparaumu because of the relative location of schools, services and retail facilities.

6.7 Sector 4 – Waikanae North

The Project area within Sector 4 is located north of Te Moana Road (chainage 12,400) to Peka Peka (at approximate chainage 18,050m).

6.7.1 Natural Environment

6.7.1.1 Topography and Landscape

The topography of Sector 4 is undulating with small to moderate scale dunelands which reduce to gently rolling and almost flat farmland in the north.

An area of intact complex dunelands is located between Te Moana Road and Smithfield Road, with dune sequences up to 30m amsl or 20m higher than the surrounding ground in places.

6.7.1.2 Geology

The geology of the Sector generally comprises dune sands, with some peat in low lying areas, underlain by marine/beach/estuarine deposits. A large area of peat is located to the north of Smithfield Road, which is expected to be in the order of two to three metres thick.

A splinter fault of the Ohariu Fault known as the Hatfield Fault has been identified at the northern extent of the Project area. This fault complex, including the associated level of uncertainty regarding its exact location, is indicated on the KCDC Fault Hazard Maps.

6.7.1.3 Hydrology

The waterways crossing the proposed Expressway alignment within Sector 4 from south to north include:

- Ngarara Creek
- Kakariki Stream (located at Nga Manu Wildlife Reserve)
- Smithfield Drain
- Paetawa Drain; and
- Hadfield/Te Kowhai Drain

6.7.1.4 Ecology

The Nga Manu Nature Reserve is located just north of the Waikanae Township. This area of 14 hectares was established as a reserve in 1974 and encompasses the largest single remaining remnant of coastal lowland swamp forest on the Kāpiti Coast.

Sector 4 contains the following wetlands and water bodies (it should be noted that the proposed Expressway alignment itself avoids all of the wetlands listed below):

- The Kawakahia wetland, being part of the 120ha Te Harakeke wetland complex, is located north of the Waikanae golf course and is the largest single remaining area of freshwater wetland complex on private land in the lower North Island. The majority of this wetland has been formally protected by a Queen Elizabeth II covenant and it has been recognised by both GWRC as of particular significance under the Key Native Ecosystems Programme and by DOC as a Wetland of Ecological and Representative Importance (ranking of 3) and as a moderate-high site of Special Wildlife Importance. The wetland contains a highly diverse mix of vegetation types including one of the few remaining examples of lowland podocarp forest on sandplains in the region. Te Harakeke wetland also provides habitat to a number of threatened bird species and given its large size (120ha) provides an important role in bird movement in the wider landscape.
- Unnamed regenerating wetland located to the east of Te Harakeke wetland. Although largely modified from its former extent, this wetland consists of large areas of regenerating vegetation and is likely to provide habitat for threatened bird species. The wetland is formally protected via a Queen Elizabeth II covenant.
- Unnamed regenerating wetland located east of Ngarara Road. This wetland is known to contain rare plants and provides potential habitat to threatened bird species.
- The Ngarara Stream and its associated waterbodies are known to contain threatened native freshwater fish species (including giant kokopu and long-finned eel). The Ngarara Stream provides important hydrological and habitat connections between the Nga Manu Nature Reserve and Te Harakeke wetland.

6.7.2 Built and Human Environment

6.7.2.1 Land Use and Built Form

Sector 4 has an open rural character for all of its length as illustrated in Figure 6.14 and Photo 6.6. The area is generally a mix of farmland and rural lifestyle blocks, and accordingly dwellings are scattered throughout the Sector, with a small residential hamlet at the intersection of Peka Peka Road and the existing SH1.

The local communities within the wider Project area in Sector 4 include the residential area at Waikanae Park, part of Waikanae West and the beachside settlements at Waikanae Beach and Peka Peka.

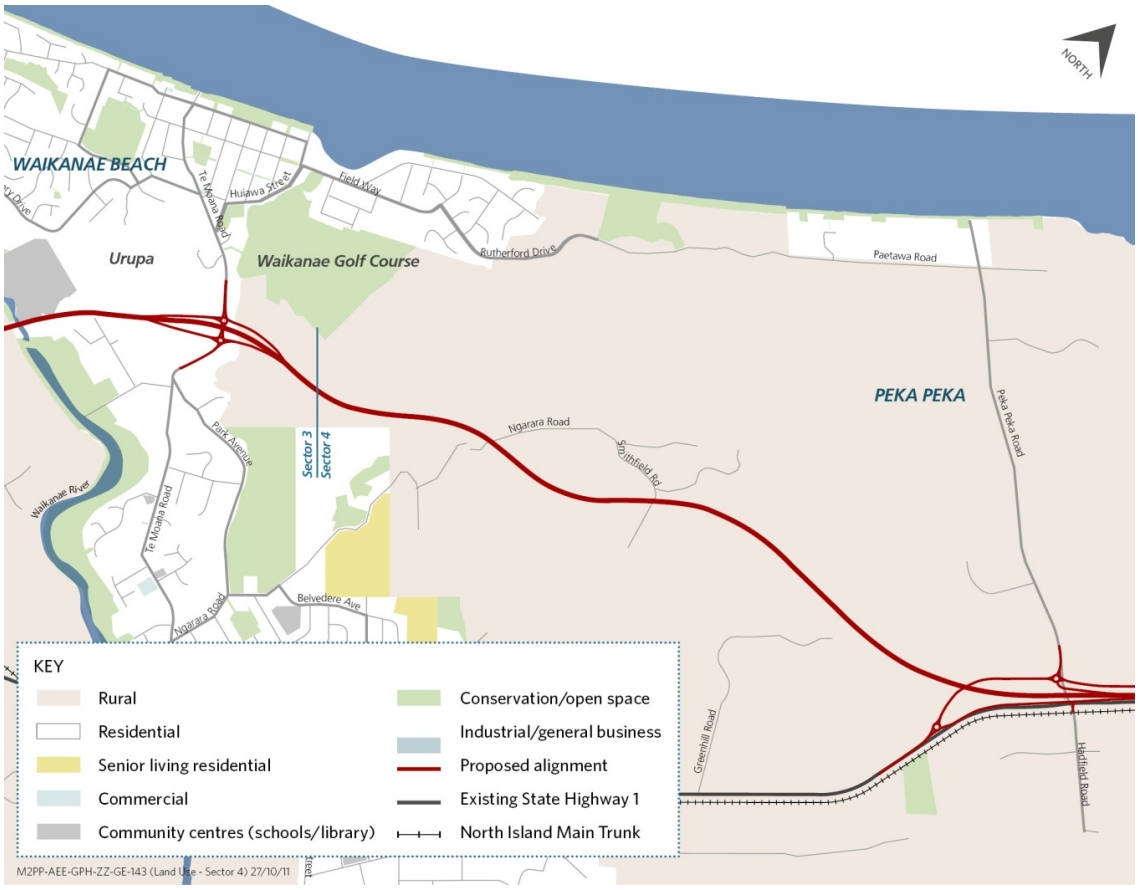

Figure 6.14: Land Use within Sector 4

Photo 6.6: Sector 4 (Facing South)

Te Moana Road to Smithfield Road

Land use between Te Moana Road and Smithfield Road is primarily pastoral farmland with some smaller rural residential and lifestyle blocks, and the partly occupied Ferndale residential subdivision off Ngarara Road.

Smithfield Road to Peka Peka

From Smithfield Road northward, the area consists of open rural land with small rural land holdings. Dwellings are located on the higher ground amongst the dunes and on the slopes of the foothills, with the lower damper ground being used as grazing land. A Garden Centre is located on Peka Peka Road near the existing SH1. There are rural lifestyle enclaves at Greenhill Road, Hadfield Road, Kensington Drive and Ngarara/End Farm Road.

In the north of the Sector, the existing SH1 and the NIMT, run along the toe of the Tararua foothills. The Tararua foothills are dominant element of the local landscape, providing a significant physical and visual backdrop to the east. The existing SH1 and the NIMT are located at the base of a small but distinctive coastal escarpment north of Hadfield Road.

Urban Growth Strategy

The Kāpiti Coast District Plan was recently changed (through Plan Changes 69, 79 and 80) to provide land area for future urban expansion in Waikanae North, within a new "urban fence" imposed from between the existing SH1 just south of Greenhill Road to the beach. The Waikanae North area is currently used for a mix of rural and rural lifestyle activities but has been rezoned to allow a range of residential densities and some limited commercial and community uses in the future. Plan Change 79, which introduced the urban fence, also provided for the development of small clusters of housing (eco-hamlets) north of the urban limit. Plan Change 69 rezoned an area of land adjoining the existing SH1 to a range of medium to high density housing (referred to as the Waikanae North development). Plan Change 80 resulted in the rezoning of land north of Te Moana Road to the urban fence (referred to as Ngarara), providing for a range of different residential neighbourhoods, separated by open space and protected wetlands. A limited amount of commercial development was proposed in the southernmost neighbourhood.

6.7.2.2 Community Facilities

Given the rural nature of Peka Peka, the only retail activity is a garden centre/café located on Peka Peka Road just west of existing SH1. There are no social services, educational facilities or recreational facilities.

6.7.2.3 Archaeology and Maori History

Recorded archaeological sites within or near to the proposed Expressway alignment in this Sector include middens, pits and terraces. The wetland areas of Te Harakeke and Kawakahia are of cultural importance to local iwi (Te Ati Awa ki Whakarongotai and Ngati Raukawa).

6.7.2.4 Noise

As part of investigations for this Project, noise levels have been measured at seven locations through Sector 4, including one long duration survey[50]. Noise levels varied from 44 to 55 dB $L_{Aeq(24h)}$. Overall, ambient noise levels along the proposed Expressway alignment are relatively low due to the absence of major local roads or industry in this area.

6.7.2.5 Services

The Transpower 220kV transmission lines, from Bunnythorpe to the Haywards power station, cross the Project area north of Waikanae. There are a number of transmission towers in close proximity to the proposed Expressway alignment, between Ngarara Road and Peka Peka Road.

Two of these towers are situated just north of Smithfield Road, within the proposed Designation, at approximate chainage 13,950m.

6.7.2.6 Local Road Network

Peka Peka is accessed off the existing SH1 via Peka Peka Road. As mentioned above, it is also linked to Waikanae Beach via a road running parallel to the coastline. Hadfield Road provides access to a small residential community on the hillside to the east.

There are few roads in this area currently, with Ngarara Road being the main route from Te Moana Road servicing the Waikanae North area. As discussed above, Waikanae North is the area where future urban growth is proposed, which includes provisions for the development of a series of local arterial roads to provide further north-south and east-west links. While some of these potential links would need to be reconfigured as a result of the proposed Expressway, there are a number of potential opportunities for east-west connections over the Expressway in this sector.

6.7.2.7 Walkways and Cycleways

The coastal route is widely used for recreational cyclists, and alongside as a walkway and bridleway. The proposed urban development for this area includes a network of walking and cycleways. As with future roading, the proposed Expressway will require a reconfiguration of possible walkways and cycleways in the area.

[50] Refer to Technical Report 15, Volume 3

PART D: DESCRIPTION OF THE PROJECT

7 Operation of the Project

Overview

This Chapter includes an outline of the design and form of the proposed Expressway Project.

'The Project' is defined as the design, construction, operation and maintenance of an Expressway for that section of SH1 between MacKays Crossing (chainage 1900m) and Peka Peka (approximate chainage 18050m), as well as for local roads as altered by the construction of the proposed Expressway. It would include the construction and use of a continuous cycleway/walkway and sections of bridleway, between Raumati South and Peka Peka. The Project would also include a range of landscaping, noise attenuation, stormwater management and other mitigation measures along the proposed Expressway corridor.

The information provided in this Chapter is intended to provide sufficient detail on the Project to assess the actual and potential environmental effects and to identify any necessary measures to avoid, remedy or mitigate these effects, where appropriate.

If any changes to the design are subsequently required, they would be be undertaken within the scope of any conditions which have been put in place to manage the environmental effects, In addition, an outline plan would also need to be lodged with KCDC with respect to the specific changes in design prior to construction commencing..

7.1 Introduction

The designation for the Project is proposed to generally follow the WLR designation, and extend a length of approximately 16km from just south of Poplar Ave (chainage 1900m) to just north of Peka Peka Road (approximately chainage 18050m).

Between MacKays Crossing (chainage 0m) and the southern end of the Project (chainage 1900m), the section of SH1 known as the 'Raumati Straight' will require maintenance work to remediate the current road condition. This maintenance work will be undertaken within the existing SH1 designation and is therefore not part of this Project.

The proposed Expressway would provide for two lanes of traffic in each direction, connections with local roads at four interchanges, construction of new local roads and access roads to maintain local connectivity and an additional crossing of the Waikanae River.

Once completed, the NZTA intends to request the Chief Executive of the Ministry of Transport to declare the proposed Expressway part of SH1.

The existing section of SH1 between MacKays Crossing and Peka Peka would likely become a local arterial road (subject to the Chief Executive at Ministry of Transport revoking its current State highway status).

The Project would include the following principal design features:

- A four lane median divided Expressway (two traffic lanes in each direction);
- Partial interchange at Poplar Avenue;
- Full interchange at Kāpiti Road;
- Four lane bridge over the Waikanae River;
- Full interchange at Te Moana Road;
- Partial interchange at Peka Peka Road;
- Grade separated overbridges and underbridges to cross some local roads and watercourses and parts of the proposed Expressway;
- Stormwater treatment and attenuation facilities;
- Provision of a shared cycleway/walkway, alongside but separate to the proposed Expressway; and
- Provision of a bridleway over sections of the corridor.

Where local roads are referred to in this Chapter, they are generally limited to sections of local road inside the proposed designation. This would in most instances include the sections of local roads that the proposed Expressway connects with and/or crosses.

Further technical information relating to the Project is provided within Part G of this AEE report, the relevant Technical Reports in Volume 3 and the Plan Set within Volume 5. These documents have been cross referenced throughout this Chapter.

7.1.1 Design Philosophy Statement

A Design Philosophy Statement (DPS) has been produced for key elements of the Project. This DPS covers the design philosophy for the proposed Expressway and for those sections of the local road network that are affected by the proposed Expressway construction. The DPS identifies the standards, guidelines and key criteria that will be used in the design of the Project. Where relevant, the DPS provides commentary on variations from standards and consideration of design alternatives.

The NZTA's Design Philosophy document can be found within Technical Report 1, Volume 3.

7.1.2 Urban and Landscape Design Framework

The purpose of the Urban and Landscape Design Framework (ULDF) for the Project is to:

- Demonstrate how the design of the Project supports the NZTA's strategic commitment to high quality urban design outcomes;

- Demonstrate alignment between the NZTA and KCDC in the planning, transport and urban design initiatives for the wider area;
- Seek to ensure that the urban and landscape design concepts for the Project are appropriately defined, developed and implemented;
- Promote a consistent design quality throughout the development and delivery of the Project;
- Promote integration of the Project with public aspirations and plans for land use and development in the surrounding area.

The ULDF focuses primarily on design aspects of the proposed Expressway, rather than an assessment of specific environmental effects. It includes an analysis of the existing landscape, and the consequential implications for the design of the proposed Expressway. A series of design principles were developed and these were taken into account in the selection of route options, refinement of the alignment and the development of design details. The ULDF report documents background detail of the existing environment and the design rationale that is relevant to, and has informed, this assessment.

The ULDF is contained in Technical Report 5, Volume5.

7.2 General project description

A general description of the proposed Expressway design is provided below. The Sector description within Section 7.3 of this Chapter details where the design would deviate from the general design. As a road controlling authority, the NZTA would have the ability to alter some of these measures in future if that was appropriate for the efficient or safe operation of the road and/or as technology and road management methodology evolves; for example, new forms of barriers might allow changes in the design and location of barriers and medians.

7.2.1 Road design

a. Proposed Expressway Design

The form of the proposed Expressway immediately following construction is shown in detail within the Scheme Plans contained within Volume 5, which should be read in conjunction with this section. Figure 7.1 and 7.2 below provide a generalised cross section view of the proposed Expressway.

The proposed Expressway Project has been designed to the following general specifications along its length:

- 2 x 3.5m wide traffic lanes in each direction;
- Nearside shoulder width of 2.5m;
- Offside shoulder width of 1.0m;
- Nearside and offside shoulder widths will be carried over bridge structures;
- Nearside shoulder to be widened to 3m if adjacent to barriers;

- A 4m wide median (edge line to edge line) at the southern end of the proposed Expressway, extending from the Project start point through to south of Raumati Road;
- A 6m wide median (edge line to edge line) from south of Raumati Road through to north of Mazengarb Road;
- A 4m wide median (edge line to edge line) from north of Mazengarb Road through to Peka Peka;
- A TL-4 wire rope median barrier[51] generally, with concrete median barriers at some bridges over local roads (i.e. the locations where there are twin bridges);
- Where structures (i.e. a bridge pier or retaining wall face) cannot practicably be located outside the clear zone[52], a TL-4 concrete barrier will be provided with 900mm minimum clearance behind the barrier;
- 9m wide trafficable clear zone, no steeper than 1V:4H at cut areas and low embankments;
- Steepened side slopes to 1V:3H with edge barriers, at higher embankments; and
- Additional edge barriers at locations with obstructions in the clear zone (e.g. drainage structures).

Figure 7.1: General Cross Section of the proposed Expressway through a Rural Area

[51] Flexible barrier systems, such as wire rope barriers, are generally more forgiving than other types because most of the impact energy is dissipated by deflection of the barrier and lower impact forces are imposed on the vehicle and its occupants. Wire rope barriers approved for use on State highways have different deflection characteristics for a given National Cooperative Highway Research Program Report 350 (NCHRP Report 350) test level (in this case the wire rope will meet Test Level 4). The primary criterion for the approval of a barrier system is that it must have been successfully crash tested and the results evaluated in accordance with the *Recommended Procedures for the Safety Performance of Highway Features (NCHRP Report 350).*

[52] A clear zone is a recovery zone in which a driver may regain the control of an errant vehicle. The clear zone must be free from hazards or objects and traversable by a vehicle.

Figure 7.2: General Cross Section of the proposed Expressway through an Urban Area

b. Local Roads

Sections of new or reconstructed local road located within the proposed designation would have a cross section and geometry which complies with relevant design standards for local roads, as agreed with KCDC.

7.2.2 Traffic volumes and flow

7.2.2.1 Traffic Volumes

By 2026, it is predicted that over 25,000 vehicles per day would use one or more sections of the proposed Expressway (refer to Technical Report 34, Volume 3).

With the Project in place, the traffic flows on the existing SH1 are expected to reduce by approximately 35% to 55%. The current delays experienced at priority-controlled intersections such as Poplar Avenue, Raumati Road, Ihakara Street, and Otaihanga Road are predicted to reduce significantly.

The Assessment of Transport Effects (Technical Report 32, Volume 3) details how the Project is predicted to impact on the wider transport network.

7.2.2.2 Design Speed

Given the general nature of the existing terrain (flat to rolling), it is proposed to use a design speed[53] of 110km/h across the length of the Project. Immediately following construction, the proposed Expressway is intended to have a posted speed limit[54] of 100km/h along its 16km length.

When compared with existing SH1, in the year 2026, the expected travel time savings between MacKays Crossing and Peka Peka resulting from this Project are predicted to be approximately seven minutes southbound in the AM peak and approximately ten minutes northbound in the PM peak. The results of

[53] Design Speed is the speed selected to establish specific minimum geometric design elements for a particular section of road. These design elements often include the horizontal and vertical alignments and sight stopping distance requirements.

[54] The posted speed limit is the speed which decision-makers say is the maximum permitted speed at which any vehicle may travel along the section of road.

the travel time analysis are detailed within Technical Report 34, Volume 3. The findings of the analysis indicate that the Project provides travel time savings for both through traffic on the proposed Expressway and local traffic movements.

The design speed along sections of local road which would be within the proposed designation would vary, depending on the site conditions. These limits have been discussed with KCDC and it is expected that existing posted speed limits would be maintained, unless the speed environment of the local road is altered as a result of the proposed Expressway. Any future changes to the local road speed management regime would be discussed with KCDC and adopted as appropriate.

7.2.3 Traffic services

Traffic services include features such as:

- permanent road signs;
- road lighting;
- road markings;
- barrier protection; and
- Intelligent Transport System and Advanced Traffic Management System infrastructure.

Traffic services for the proposed Expressway would be considered and finalised during the detailed design phase and would be designed in accordance with relevant standards. Again, these services may be altered in the future as appropriate for the efficient and safe operation of the proposed Expressway.

7.2.3.1 Permanent Road Signs and Markings

Design of all road signs and markings immediately following construction would be in accordance with the NZTA's manual of traffic signs and markings (MOTSAM) or any equivalent document which replaces that manual.

7.2.3.2 Lighting

All lighting for the proposed Expressway immediately following construction and for associated construction activities (including construction yards) would be designed in accordance with relevant lighting standards as detailed within Technical Report 1 and 8, Volume 3.

Lighting would be provided around interchange locations, but generally the proposed Expressway would be unlit between interchanges. Other lighting requirements would likely include underbridge lights, bridge uplighters at some locations, lighting of local road junctions and lighting along the urban section of the cycleway/walkway.

Lighting pole structures would have a height of approximately 12m on the proposed Expressway and approximately 10m on the local roads. The proposed locations of these lighting structures are shown on drawings CV-MF-104 to 132, Volume 5.

Detailed lighting design would consider the use of standard light fittings, flat screen low spill light fittings and low energy use lighting.

Technical Report 8, Volume 3 provides an assessment of lighting effects from the proposed Expressway traffic, interchanges, cycleway/walkway and construction activities (including the lighting of construction yards).

7.2.3.3 Barrier protection

All barrier protection installed as part of the construction of the Project would be designed in accordance with the latest versions of the following standards (or any equivalent documents replacing those standards which apply at the time of construction):

- NZTA M23 – Specification for Road Safety Barrier Systems;
- AS/NZS 3845 :1999 – Road Safety Barrier Systems; and
- Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers.

7.2.4 Interchanges and local connections

Interchanges are junctions with off-ramps and on-ramps connecting the proposed Expressway to the local road network. Off-ramps would link to local roads and on-ramps would allow local road traffic to merge with proposed Expressway traffic heading in the same direction.

Direct access to and from the proposed Expressway would only be provided at the four locations along the alignment. All interchanges (other than the northern partial interchange at Peka Peka Rd) would have the proposed Expressway crossing over local roads.

The Project proposes two full interchanges (at Kāpiti Road and Te Moana Road) and two partial interchanges (Poplar Avenue and Peka Peka Road). Each interchange and the relevant local road connections are described and illustrated within Section 3 of this Chapter.

7.2.5 Pavement and surfacing

The pavement design for the project would take into account the following:

- Subgrade differential settlement issues;
- Rehabilitation of existing pavements;
- Construction methodology and impact on existing traffic;
- Use of locally available materials and recycling of existing pavement materials; and
- Surfacing considerations, including noise mitigation and high vehicle stress areas.

7.2.5.1 Proposed Expressway Pavement

The general pavement philosophy for the construction of the Project is to use granular subbase and base layers with additives to improve the strength and durability of the pavement. This approach provides a flexible pavement that is suitable for the environment which the proposed Expressway would pass through, and allows for simple rehabilitation if this is required in the future.

7.2.5.2 Proposed Expressway Surfacing

The proposed Expressway would pass through parts of the Raumati, Paraparaumu and Waikanae residential areas. In these areas, the noise mitigation measures provided as part of the construction of the Project would likely incorporate the use of low traffic noise surfacing known as Open Graded Porous Asphalt (OGPA). This form of road surfacing is proposed to be used in the construction of the Project from north of Poplar Avenue to just north of the Te Moana interchange and then for a 1km section adjacent to existing houses on End Farm Road (approximately 2km south of Peka Peka Road). A further 1km section of OGPA is proposed near Peka Peka Road.

Chip seal is proposed to be used in the construction of the Project south of Poplar Avenue and from north of the houses on End Farm Road.

Stone Mastic Asphalt (SMA) is proposed for the construction of the Project in high stress (braking/turning) areas like on the on- and off-ramps where they connect to the local road.

7.2.5.3 Local Road Surfacing

It is proposed that all other locations will have chip seal to match the existing surfacing. SMA is proposed for the construction of high stress areas including roundabouts and approaches. OGPA would be used in construction works on Te Moana Road to mitigate noise effects (as detailed in Technical Report 15, Volume 5).

7.2.5.4 Cycleway/Walkway Surfacing

A fine chip seal is proposed to be used for the construction of the section of the cycleway/walkway from Poplar Avenue to Otaihanga Road and at the approaches to all local road junctions. An aggregate known as Kāpiti Blue would be used for the construction of the part of the cycleway/walkway north of Otaihanga Road.

7.2.6 Bridges and other key structures

A general description of the bridges and other key structures proposed for the Project are described below.

7.2.6.1 Bridges

There are 18 principal bridge structures proposed as part of the Project. These are summarised within Table 7.1. Further detail about the location and form of all the bridges is also contained within Technical Report 1, Volume 3 and Bridge Scheme Plan drawings ST-BR-150 to 970, Volume 5.

Bridges needed as part of the Project are required to cross over one or more of the following obstacles:

- access roads and local roads;
- watercourses; and
- the proposed Expressway.

7.2.6.2 Overbridges

Overbridges are those bridge structures that would be required to carry local roads and/or the cycleway/walkway over the proposed Expressway. Subject to detailed design, across the Project, these structures would generally have the following layout:

- A width of 15 to 17m; and
- A vertical clearance of 6m.

7.2.6.3 Underbridges

- Underbridges are those bridge structures that would be required to carry the proposed Expressway over local roads, the cycleway/walkway and watercourses. Subject to detailed design, across the Project, these structures would generally have the following layout:
- A width between 12m to 15m for twin bridges and approximately 12m to 28m for single bridges; and
- A vertical clearance ranging between 5m and 6m.

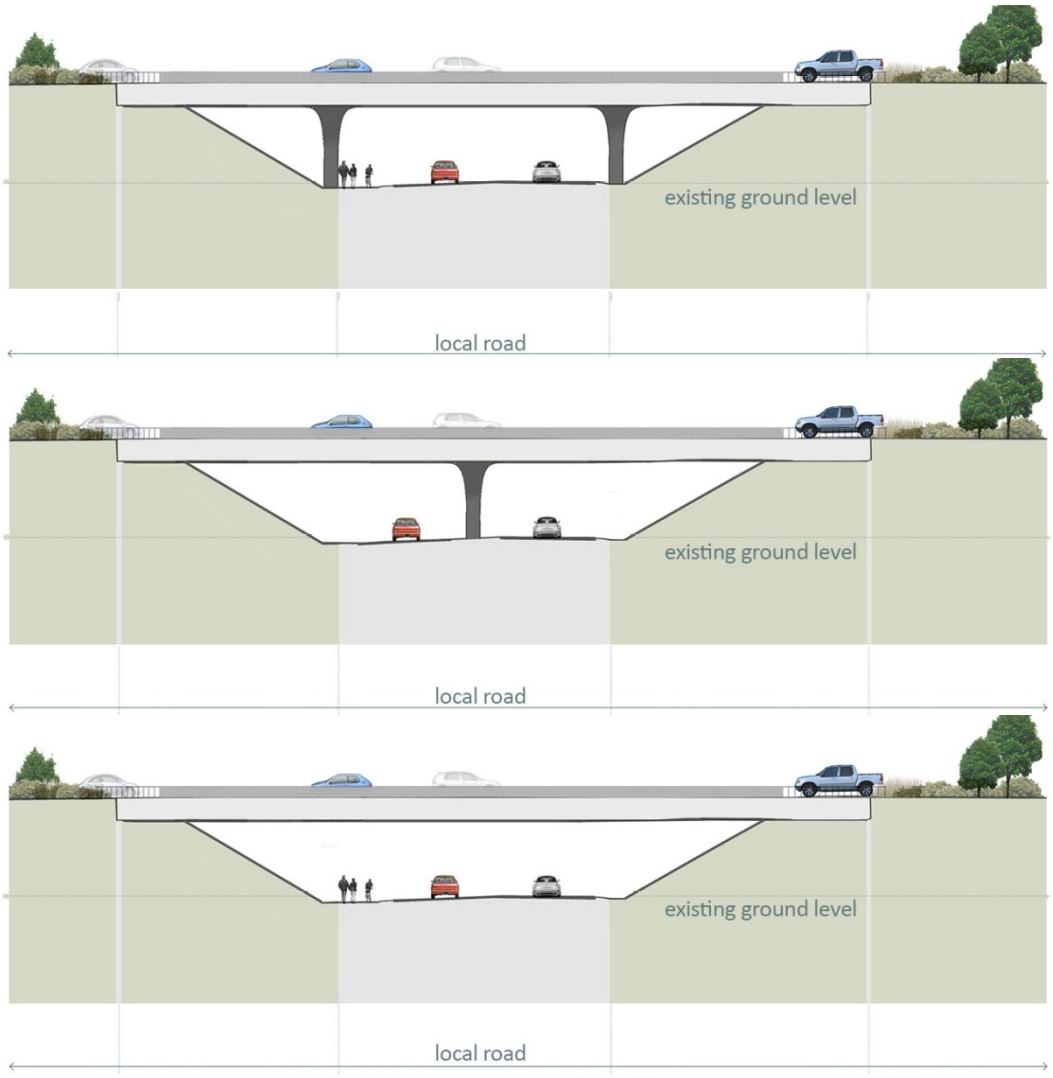

Figure 7.3: Cross sections of underbridges for local roads (indicative only)

7.2.6.4 Design of bridges

Architectural designs for the bridge structures have been developed and all of the bridges for the Project are intended to:

- Have a common soffit, pier, side barriers and abutment design;
- Be designed to achieve a simple and slender form; and
- Have profiles designed to maintain view shafts where practicable.

Tables 7.1, 7.2 and 7.3 show structures that require resource consent.

Table 7.1: Bridges (subject to detailed design)

Bridge over Watercourse Reference Number	Bridge Location	Sector	Bridge Type	Description of Structure		Approx. Dimensions (m)		Approx. Vertical Clearance (m)[55]	Object Crossed	Approximate Length of Watercourse Affected Including Rip Rap (m)
				No. of Bridges	No. of Spans	Approx. Length	Approx. Width			
	Poplar Avenue	1	Underbridge	1	3	57	25	5 to 6	Local road	N/A
	Leinster Avenue	1	Cycleway/Walkway Overbridge	1	3	58	4	6	Expressway	N/A
	Raumati Road	1	Underbridge	2	3	58	2 x 15	6	Local road	N/A
10.1	Drain 7	1	Cycleway/Walkway Bridge	1	1	10	3	N/A	Watercourse	N/A
11.1	Wharemauku Stream and Ihakara Road extension	2	Underbridge/ watercourse crossing	2	3	62	2 x 12	5 to 6	Watercourse and local road	32
	Between Kāpiti Road and Mazengarb Road	2	Cycleway/Walkway Overbridge	1	3	58	4	6	Expressway	N/A
	Kāpiti Road	2	Underbridge	2	2	52	2 x 12	5 to 6	Local road	N/A
	Mazengarb Road	2	Underbridge	2	1	27	2 x 12	5 to 6	Local road	N/A
	Otaihanga Road	3	Underbridge	1	1	27	25	5 to 6	Local road	N/A
23	Waikanae River	3	River bridge	1	5	182	28	7	River	55[56]
25.1	Te Moana Road Interchange	3	Underbridge/ watercourse crossing	1	6	142	25	5 to 6	Local road, watercourse and flood plain	32

[55] Excluding flood clearance/free board.

[56] Refers to the longest length of bank rip rapped (south bank). Overall river widening work covers a lineal distance of 250m of river.

Bridge over Watercourse Reference Number	Bridge Location	Sector	Bridge Type	Description of Structure		Approx. Dimensions (m)		Approx. Vertical Clearance (m)[55]	Object Crossed	Approximate Length of Watercourse Affected Including Rip Rap (m)
				No. of Bridges	No. of Spans	Approx. Length	Approx. Width			
25	Te Moana north on-ramp	3	Underbridge/ watercourse crossing	1	2	32	12	N/A	Watercourse	20[57]
25.2	Te Moana north off-ramp	3	Underbridge/ watercourse crossing	1	2	32	12	N/A	Watercourse	30
	Ngarara Road	4	Overbridge	1	3	73	15	6	Expressway	N/A
29	Kakariki Stream	4	Underbridge/ watercourse crossing	1	1	22	25	N/A	Watercourse	N/A[58]
29.1	Kakariki Stream	4	Cyleway/Walkway Bridge	1	1	20	3	N/A	Watercourse	N/A
	Smithfield Road (access road to Nga Manu)	4	Overbridge	1	3	70	16	6	Expressway	N/A
30.5	Smithfield Road(to Nga Manu,) over Kakariki Stream	4	Underbridge/ watercourse crossing	1	1	12	14	n/a	Watercourse	25
	Peka Peka Road	3	Overbridge	1	3	87	17	6	Expressway	N/A
36	Paetawa Drain	4	Watercourse bridge	1	1	14	25	N/A	Watercourse	30
38.5	Unnamed Tributary of Paetawa Drain	4	Cycleway/ Walkway Bridge	1	1	10	3	N/A	Watercourse	N/A
38.6	Unnamed Tributary of Paetawa Drain	4	Cycleway/ Walkway Bridge	1	1	10	3	N/A	Watercourse	N/A

[57] Longer than width of bridge due to skew of bridge to stream.

[58] Diverted stream to new alignment.

Table 7.2: Culverts (subject to detailed design)

Existing Culvert	Culvert ID	Watercourse	Approx. chainage location (m)	Landuse Consent Required	Water Permit Required? Temporary Diversion = T Permanent Diversion = P Temporary and Permanent = T and P	Dimensions of Pipe Culvert (mm)	Dimensions of Box Culvert	Length (m)	Length (m) (including Rip Rap)[59]
Whareroa Catchment									
Yes	8	QE Park Drain	2600	✓	T	1050	N/A	40	51
Wharemauku Catchment									
Yes	10	Drain 7	3700	✓	T	1500	N/A	60	70
No	11	Drain 7	4900	✓	T&P	N/A	3x2	100	120
Waikanae Catchment									
No	14	Mazengarb Drain	8000	✓	T	N/A	5x3	111	144
No	15	WWTP Drain	8500	✓	T	1500	N/A	60	74
No	17	Landfill Drain	8900	✓	T	1200	N/A	75	83
Yes	18	Otaihanga Drain	9100	✓	T	600	N/A	70	74
No	18.1	Otaihanga Drain	9100	✓	T	1050	N/A	10	21
No	22.1	Unnamed Muaopoko Tributary	10500	✓	T	750	N/A	65	74
Yes	22.2	Muaopoko	10300	✓	T	1050	N/A	10	19
Waimeha Catchment									
No	24.1	Market Garden Drain	11800	✓	T	1050	N/A	15	24

[59] This column does not include the length of temporary diversions required to construct culverts.

Existing Culvert	Culvert ID	Watercourse	Approx. chainage location (m)	Landuse Consent Required	Water Permit Required? Temporary Diversion = T Permanent Diversion = P Temporary and Permanent = T and P	Dimensions of Pipe Culvert (mm)	Dimensions of Box Culvert	Length (m)	Length (m) (including Rip Rap)[59]
No	24.3	Market Garden Drain	11700	✓	T	1050	N/A	15	22
Ngarara Catchment									
No	26	Ngarara Creek	13200	✓	T	N/A	3x2	70	90
No	30.1	Unnamed tributary of Kakariki stream	14400	✓	T	600	N/A	25	33
No	30.3	Unnamed tributary of Kakariki stream	14500	✓	T	1050	N/A	25	36
No	30.4	Smithfield drain	14300	✓	P	1200	N/A	90	102
No	33	Unnamed tributary of Paetawa drain	15600	✓	T&P	1050	N/A	65	76
No	34	Unnamed tributary of Paetawa drain	15775	✓	T	1500	N/A	50	64
No	35	Unnamed tributary of Paetawa drain	15900	✓	T and P	1500	N/A	48	62
No	38	Unnamed tributary of Paetawa drain	16800	✓	T and P	N/A	3x2	65	85
No	38.1	Unnamed tributary of Paetawa drain	16700	✓	T	N/A	3x2	30	50
Yes	38.2	Unnamed tributary of Paetawa drain	16800	✓	N/A	525	N/A	20	24

Existing Culvert	Culvert ID	Watercourse	Approx. chainage location (m)	Landuse Consent Required	Water Permit Required? Temporary Diversion = T Permanent Diversion = P Temporary and Permanent = T and P	Dimensions of Pipe Culvert (mm)	Dimensions of Box Culvert	Length (m)	Length (m) (including Rip Rap)[59]
No	38.4	Unnamed tributary of Paetawa drain	17150	✓	P	1800	N/A	25	37
No	39	Unnamed tributary of Paetawa drain	17250	✓	P	1500	N/A	25	35
Hadfield/Te Kowhai Catchment									
Yes	40	Hadfield/Te Kowhai Stream	17480	✓	P	N/A	3x2	20	40
No	40.1	Hadfield/Te Kowhai Stream	17300	✓	P	N/A	3x2	40	60
No	40.2	Hadfield/Te Kowhai Stream	17480	✓	P	N/A	3x2	20	40
No	40.3	Hadfield/Te Kowhai Stream	17480	✓	T	N/A	3x2	20	40

Table 7.3: Open Channels (subject to detailed design)

Open Channel ID	Watercourse Diversion	Approx. Chainage location (m)	Land Use Consent Required	Water Permit Consent Required New Watercourse – NW Temporary Diversion – T Permanent Diversion – P Temporary and Permanent Diversion – T and P	Existing Culvert	Approximate Length of new / permanently diverted watercourse (m)	Approximate Length of reclaimed watercourse (m, inc rip rap length)
Wharemauku Catchment							
OC10.2	Unnamed Drain 7 tributary	3700	✓	P	No	50	50
OC11.1	Drain 7	4950	✓	T&P	No	80	160
OC11.2	Unnamed Drain 7 tributary	4951	✓	P	No	20	50
OC11.3	Drain 7	5100	✓	P	No	280[60]	N/A
Waikanae Catchment							
OC23	Muaopoko Stream	10600	✓	P	No	30	30
OC23.1	Waikanae River	10650	✓	P	No	250[61]	N/A
Ngarara Catchment							
OC29	Kakariki Stream	14000	✓	P	No	110	125
OC29.1	Smithfield drain	14100	✓	T and P	Yes	1090	560
OC35.1	Unnamed tributary of Paetawa drain	15775	✓	P	N/A	40	50

[60] This measurement refers to the lineal length of drain covered by works.

[61] This measurement refers to the lineal length of river covered by works. The extent of works varies from north to south banks but all are within the overall 250m of river where works are required.

Open Channel ID	Watercourse Diversion	Approx. Chainage location (m)	Land Use Consent Required	Water Permit Consent Required New Watercourse – NW Temporary Diversion – T Permanent Diversion – P Temporary and Permanent Diversion – T and P	Existing Culvert	Approximate Length of new / permanently diverted watercourse (m)	Approximate Length of reclaimed watercourse (m, inc rip rap length)
OC36.1	Unnamed tributary of Paetawa drain	16400	✓	P	N/A	80	70
OC38	Unnamed tributary of Paetawa drain	16850	✓	P	Yes	390	40
OC38.1	Unnamed tributary of Paetawa drain	16700	✓	P	Yes	110	50
OC38.3	Unnamed tributary of Paetawa drain	17100	✓	P	No	400	230
Hadfield/Te Kowhai Catchment							
OC40.2	Hadfield/Te Kowhai Stream	17480	✓	P	Yes	190/470[62]	60

[62] If a new storage area south of the Te Moana Roundabout is constructed then the length will be 470m. If not the length will be 190m (refer to Technical Report 22, Volume 3 for further details).

7.2.6.5 Retaining walls

Mechanically Stabilised Earth (MSE) walls would generally be used in the areas of fill and Bore Piled (BP) walls would generally be used in the areas of cut.

Retaining walls would generally be used in the following situations:

- At the abutments of some bridges; and
- Around the ramps of some interchanges.

All retaining walls would be designed in accordance with the Transit New Zealand Bridge Manual.

Further design detail on retaining walls can be found within Technical Report 1, Volume 3.

7.2.6.6 Bridge abutments

Bridge abutments across the Project would either be spill through[63] with a 2H:1V slope, or vertical. Both abutment types would be reinforced with geogrid.

Further structural design detail on bridge abutments can be found within Technical Report 1, Volume 3.

The visual appearance and materials used on the face of abutments would be consistent with the ULDF (Technical Report 5, Volume 3).

7.2.7 Noise attenuation

The guiding approach for the acoustic design is to address the adverse effects of road-traffic noise on people.

Noise attenuation design would be carried out in accordance with:

- NZS 6806:2010 Acoustics – Road Traffic Noise – New and Altered Roads

Noise attenuation through design could be achieved through a number of measures, some of which may be required in combination with others:

- Low-noise generating road surfacing, (e.g. OGPA);
- Noise barriers (including noise bunds[64] and noise walls);

[63] Spill through bridges refer to an Expressway bridge with a gap between the two bridge decks to allow natural light to illuminate the local road below. Refer to the ULDF, Technical Report 5, Volume 3 for illustrations.

- Property boundary noise fences; and
- Where it would not be practicable to reduce external noise to the levels set out in NZS6806, acoustic insulation for the internal habitable spaces of buildings where noise sensitive activities are undertaken.

Details of likely noise attenuation measures are illustrated in the Scheme Plans within Volume 5. The assessment of noise effects and mitigation options are summarised in Part G, Chapter 19 of this AEE report and detailed within Technical Report 15, Volume 3.

7.2.8 Surface drainage, stormwater treatment and flood management

a. Watercourses

The proposed Expressway would cross the following watercourses along the route (from South to North):

- Wharemauku Stream and tributary drains;
- Mazengarb Drain;
- Wastewater Treatment Plant Drain;
- Landfill Drain;
- Muaupoko Stream;
- Waikanae River;
- Waimeha Stream;
- Ngarara Creek;
- Kakariki Stream (adjacent Ngā Manu Wildlife Reserve);
- Smithfield Drain;
- Paetawa Drain;
- Hadfield Drain/Te Kowhai Stream;
- Wetland areas (of varying sizes and environmental significance);
- Land drains & other smaller watercourses;
- Local KCDC drainage networks; and
- Floodplains and other flood storage areas and flow paths (including associated infrastructure such as stopbanks) associated with the above.

[64] Bunds are mounds of earth. In addition to shielding noise, a noise bund can be landscaped to enhance amenity.

b. Flood Management

Significant parts of the Project would traverse low-lying land that is prone to flooding. A key design principle is to achieve hydraulic neutrality; in other words, not to increase flooding through loss of floodplain storage or increased stormwater discharges. In achieving this outcome, the Project must recognise existing KCDC/GWRC flood management strategies.

The Project has also been designed to accommodate the passing of floodwater (via bridges and culverts) across the corridor. It would also be necessary in some locations to create additional flood storage areas to compensate for loss of existing floodplain storage as a result of being filled in by the proposed Expressway. These storage areas would generally be created in the form of low-lying areas of land, planted out with native vegetation or, if suitable, reinstated as pasture. To mitigate the increased peak runoff from the proposed Expressway pavement, attenuation would be provided to hold back stormwater, avoiding flooding downstream. This would be provided by constructing lengths of deep swales and several new wetlands.

Figure 7.4: Watercourses

c. Culverts and Bridges[65]

Existing watercourses would cross under the proposed Expressway either by way of a culvert or a bridge, generally depending on the size of the watercourse. The locations of proposed bridges are described in Table 7.1 above and the locations of proposed culverts are described in Technical Report 22, Volume 3. Provision will be made for fish passage where necessary, in accordance with GWRC guidelines.

c. Surface drainage

Runoff from the proposed Expressway would generally be allowed to flow down the grassed/planted slopes adjoining the carriageway and be collected in a swale at the toe of the slope. In some locations space would be constrained or barriers/walls would be along the edge of the proposed Expressway. In these locations sumps would collect the runoff and drain it to either pipes or swales.

Bridge deck drainage would generally be achieved by collecting runoff from the bridge deck and discharging into the adjacent drainage system at the ends of the bridge.

Runoff from the cycleway/walkway would flow directly to a watercourse untreated, unless it happens to be adjacent to a road swale or wetland.

For further details on the drainage methodology refer to Technical Report 22, Volume 3.

d. Stormwater treatment

Treatment of runoff from the proposed Expressway has been designed in accordance with NZTA's *Stormwater Treatment Standard for State highway Infrastructure.*

Treatment would be provided through a combination of deep swales along the edge of the proposed Expressway and/or wetlands. The swales would either be planted with native wet tolerant species in areas of peat or grassed in areas of sand. Where it is more topographically or ecologically appropriate, wetlands would be used. These will treat the runoff for gross debris, suspended sediment, heavy metals

65 There are some differences in the lengths of the watercourse that will be culverted and those that will also be diverted between the Assessment of Hydrology and Stormwater Effects (Technical Report 22, Volume 3) and the Ecological Impact Assessment (Technical Report 26, Volume 3). This is a consequence of the different types of watercourses present across the Project. The figures presented in Technical Report 22 describe the proposed works relating to watercourses in general without accounting for the various ecological values of each, while the figures presented in Technical Report 26 however, does take this into account. The ecological figures relate solely to whether the proposed works are within perennial or intermittent watercourses. Ephemeral watercourses are not included in the ecological figures as these typically comprise of farm drains and existing roadside depressions or swales that may carry runoff during storms but which have little to no aquatic habitat value and are largely stormwater conveyance systems. This assessment is based on our knowledge of each of these waterbodies gained from site visits and research into background information.

and hydrocarbons. All stormwater treatment systems would include safe access for maintenance. Typically, a 5m maintenance margin would be provided around wetlands with excavator access ramps also provided for cleaning out of the sediment forebay.

e. Wetlands

Wetlands throughout the Project area would take the form of either:

- Constructed stormwater wetlands specifically for the purpose of stormwater treatment and attenuation;
- Existing or constructed "natural" wetlands which in some instances become inundated during times of flood as they currently do; or
- New wetland areas created for ecological offsetting purposes.

All three types of wetlands have different functions and characteristics, as described within Technical Reports 22 and 26, Volume 3.

Some of the existing wet depressions in the land which would have once been wetlands would be restored to assist with stormwater management where they would be located in proximity to the proposed Expressway. "Natural" wetlands with high ecological value would not be utilised for stormwater treatment purposes. Where additional wetlands are required, they would be designed to replicate, as close as possible, the hydrological function/regime of a natural wetland.

7.2.9 Cycleway/walkway and bridleway

a. Cycleway/walkway

A shared cycleway/walkway would be provided for the length of the proposed Expressway, separated from the edge of the proposed Expressway shoulder. The separation distance between the cycleway/walkway and the proposed Expressway would vary in order to take advantage of landforms and landscape features and to avoid obstacles such as wetland areas.

The cycleway/walkway would generally be located on the west side of the proposed Expressway alignment; however, between Otaihanga Road (chainage 9200m) and Ngarara Road (chainage 13550m), where space on the western side is limited, it would be located on the eastern side of the proposed Expressway.

With a width of approximately 3m and a centreline marking, the cycleway/walkway would allow for two way cycle and pedestrian traffic. The 3m width of the cycleway/walkway would be appropriately formed, with a sealed surface in the urban areas and looser surface in rural areas.

Timber 3m wide cycleway/walkway overbridges may be used to cross a number of small local watercourses and, similarly, boardwalks are proposed to cross over some wetland areas.

Where practicable, the cycleway/walkway would connect at grade with local roads and existing cycle/walkway networks.

Two cycleway/walkway overbridges are proposed as an east/west connection across the proposed Expressway. One bridge is proposed at Leinster Avenue and the other is proposed between Kāpiti Road and Mazengarb Road. These bridges would generally be 4m wide with an overall bridge length of 58m. A vertical clearance of approximately 6m would be provided.

b. Bridleway

Alongside sections of the formed cycleway/walkway, an additional 1m of land would be levelled for use as a bridleway (refer to Technical Report 5, Volume 3 for details).

Unlike the cycleway/walkway, the proposed Bridleway would not form a continuous pathway and would be limited to some rural sections of the proposed designation.

7.2.10 Urban design and landscaping

a. Urban design considerations

Urban design considerations for the Project include:

- Road alignment;
- Interchange location, type and design;
- Earthworks and retaining walls;
- Bridges/underpasses placement and design;
- Noise barriers type (bund/wall), height and design;
- Pedestrian and cycle networks;
- Stormwater ponds and swales;
- Highway furniture (side and median barriers, lighting, signage); and
- Landscape treatment and planting.

Further detail on urban design considerations are provided within the ULDF, Technical Report 5, Volume 3.

b. Landscaping and visual design

Landscaping associated with the Project aims to achieve:

- Visual mitigation, visual amenity and maintenance of landscape character;
- Ecological mitigation;
- Buffering; and
- Assistance with stormwater treatment.

Planting would include hydroseeding and planting adjacent to the proposed Expressway and cycleway/walkway, interchanges, Expressway median, and wider proposed Expressway corridor as required, stormwater swales, wetlands, riparian margins, and flood storage areas as required.

Further details on landscaping and visual design are provided within Technical Report 7, Volume 3.

7.3 Sector specific project description

For the purpose of a detailed Project description, the alignment has been divided into four geographic sectors as outlined in Table 7.4 and illustrated in Figure 7.5 below.

The general locations of operational elements of the Project have been described by way of chainages. A chainage refers to the distance (measured in metres) along the proposed Expressway alignment, with chainage 1900m being the starting point of the Project in the South and chainage 18050m being the approximate end point of the Project in the North.

Where any reference is made to a particular chainage in the balance of this report, this is an approximation. Where any reference is made to a particular dimension or size, these are indicative.

Further detail on the operation of the Project can be found in the Scheme Plans contained in Volume 5. Immediately following construction, the Project would be constructed in general accordance with these Scheme Plans.

Table 7.4: Project Sectors

Sector number	Sector name	Description	Chainage (m)	Length (km)	Drawing Sheet No.
1	Raumati South	From just south of Poplar Ave to just north of Raumati Road	1900– 4500	2.6	CV-SP 104 to 107
2	Raumati/ Paraparaumu	From north of Raumati Road to north of Mazengarb Road	4500 – 8300	3.8	CV-SP 108 to 114
3	Otaihanga/ Waikanae	From north of Mazengarb Road to north of Te Moana Road	8300 – 12400	4.1	CV-SP 115 to 120
4	Waikanae North	From north of Te Moana Road to Peka Peka	12400 – 18050	5.7	CV-SP 121 to 132

Figure 7.5: Sector Diagram

7.3.1 Sector 1: Raumati South

Sector 1 commences just south of Poplar Ave at chainage 1900m to the north of Raumati Road at chainage 4500m. Figure 7.9 illustrates the proposed Expressway in this Sector.

a. General Project Description

This section provides an overview of the proposed Expressway alignment, bridges, interchange and local road connections in this Sector:

- The Project would commence just south of Poplar Ave on existing SH1 (chainage 1900m).
- At chainage 2055m the proposed Expressway would deviate from the current SH1 alignment toward the northwest.
- The proposed Expressway would cross over Poplar Ave at chainage 2640m. The bridge would cross between chainage 2600m and 2660m (the length of the bridge will be 57m, the bridge would also have a width of 25m and vertical clearance of 5 to 6m)
- Poplar Avenue itself would remain at grade but would be realigned to the north at its existing location.
- A partial interchange would be located at Poplar Avenue with on- and off-ramps which would:
    - allow vehicles to exit the proposed Expressway when heading north; and
    - allow vehicles to access the proposed Expressway when heading south.
- The north bound off-ramp would extend from chainage 2055m and connect to a roundabout at Poplar Ave (chainage 2640m)
- A south bound on-ramp would extend from the existing SH1 roundabout at chainage 2640m and join the proposed Expressway just south of Poplar Ave at chainage 2055m.
- The local roads (Poplar Avenue and existing SH1) would be connected to the proposed Expressway ramps by two roundabouts (chainage 2640m).
- At chainage 3030m the proposed Expressway would crosse the eastern end of Leinster Avenue. Leinster Avenue would be closed at this location to form a cul-de-sac. A new public road would be provided for properties north of Leinster Avenue that are currently accessed from the existing State Highway: this new road would link these properties to Leinster Avenue. The road would be separated from, but generally would be located parallel to the west of the proposed Expressway between chainage 3050m and 3600m.
- The proposed Expressway would continue to the northwest beyond Leinster Avenue where it would join the existing WLR designation (at chainage 4050m), adjacent to Conifer Court.
- The proposed Expressway would cross over Raumati Road (with twin bridges). The twin bridges would cross between chainage 4440m and 4510m (bridge length of 58m, width of 15m for both bridges and vertical clearance of 6m), a 3m wide cycle/pedestrian path would be constructed on the western side of this bridge.
- Raumati Road would remain at grade.

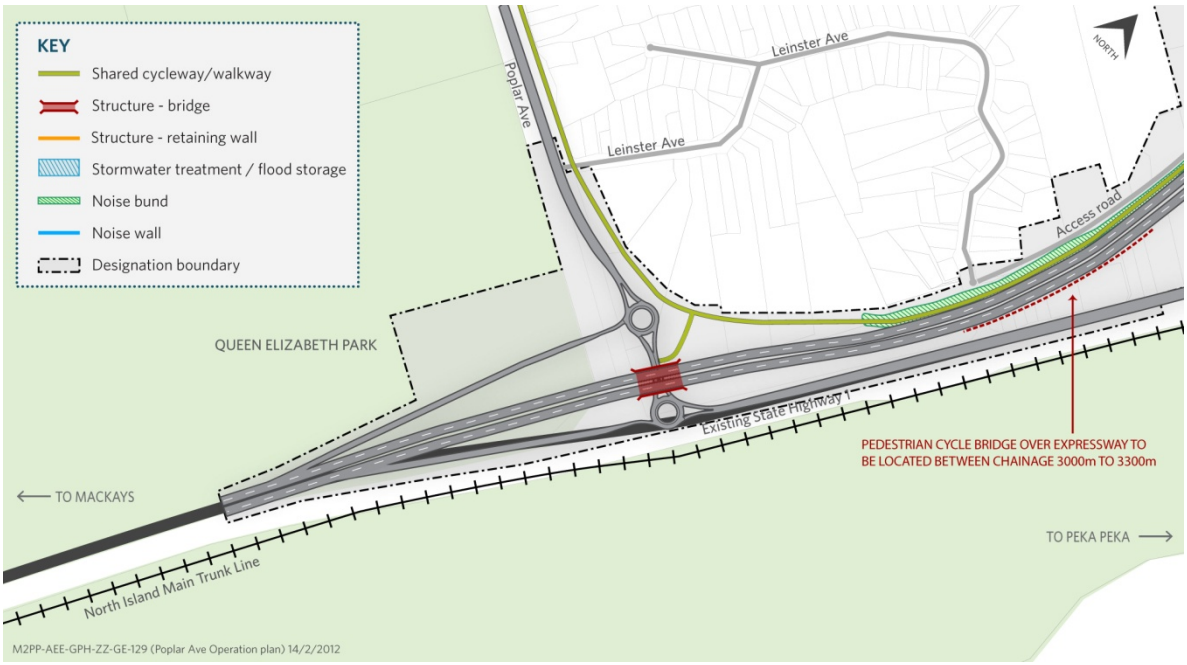

Figure 7.6: Sector 1 Poplar Interchange

b. Land Required

In this Sector, additional land has been identified as necessary for the provision of the construction, operation and ongoing maintenance of the proposed Expressway.

- 34 properties are required, including:
- 28 residential properties[66];
- 2 commercial properties[67]; and
- 4 other properties[68].

23 buildings are required within the above properties, including:

- 21 residential buildings; and
- 2 commercial building.

[66] Residential denotes privately owned residential property only (i.e. does not include KCDC or Crown owned residential land).

[67] Commercial denotes privately owned commercial property only (i.e. does not include KCDC or Crown owned commercial land).

[68] Other denotes land that is not privately owned (i.e. land held by KCDC, the Crown or GWRC) and includes parks, residential and commercial land uses.

Details on the specific properties required by the proposed Project designation within Sector 1 are outlined in the Land Requirement Plans, Volume 5.

c. Lighting

At the Poplar Avenue interchange, lighting would be low spill: for example, high-pressure sodium lamps (HPS), at the merge/diverge area, ramps, roundabouts and on Poplar Avenue.

Other lighting requirements for Sector 1 may include:

- Underbridge lights at Poplar Avenue and Raumati Road;
- Bridge uplighters at Poplar Avenue and Raumati Road;
- Flag lights at local road junctions;
- Flag lights at any junction of the cycleway/walkway with local roads; and
- Lighting of the cycleway/walkway from Raumati Road northward to Sector 2.

d. Noise Attenuation

The noise attenuation measures (with dimensions and locations approximated) proposed within Sector 1 are:

- A 2m high bund (with no barrier on top) extending 580m near the Leinster Avenue residential area, on the western side of the proposed Expressway; and
- An approximately 2m high noise barrier extending approximately 335m on the east side of the proposed Expressway, south of Raumati Road.

It is noted that:

- The surface of the proposed Expressway within Sector 1 is likely to be paved with low noise generating surfacing (e.g. OGPA) to provide additional mitigation of noise; and
- Concrete edge barriers would be provided on the proposed Expressway bridges crossing Poplar Avenue and Raumati Road.

Details of the dimensions and location of these likely noise attenuation measures are provided in Technical Report 15, Volume 3, with drawings contained within Volume 5.

e. Stormwater Treatment and Flood Management

Stormwater treatment within Sector 1 would be provided by a combination of wetlands and swales.

Flood management in Sector 1 would be achieved primarily by a combination of attenuation in swales and flood storage in the offset storage areas. The swales would be generally located on one or both sides of the proposed Expressway for the majority of Sector 1.

In addition to the swales, stormwater treatment, attenuation and storage would be provided by:

- A 2,740m^3 flood offset storage area 0B north of Drain 7, on the western side of the proposed Expressway, adjoining the existing Raumati wetland;
- A 4950m^2/4960m^3 stormwater treatment, attenuation and offset storage wetland 0A to the north of Drain 7, on the eastern side of the proposed Expressway; and
- A 8,292m^3 flood offset storage area 0C adjoining the northern side of wetland 0A.

Culverts would be provided at the watercourses that cross the proposed Expressway within Sector 1. A Tributary of Drain 7 will require a diversion in order to avoid a culvert. The culverts and watercourse diversion proposed are detailed further in Technical Report 22, Volume 3.

Further details on all aspects of stormwater and hydrology within Sector 1 are provided in Technical Report 22, Volume 3 and illustrated on drainage layout drawings CV-SW-104 to 107, Volume 5.

f. Cycleway/Walkway

An approximately 3m wide shared cycleway/walkway would be located on the western side of the proposed Expressway through most of this Sector.

Approximately 200m west of the proposed Poplar Avenue roundabout (chainage 2600m) the proposed new cycleway/walkway would join the existing Poplar Avenue cycleway. From the Poplar Avenue roundabout (chainage 2700m) the cycleway/walkway would continue northward, separate from but generally parallel to the western shoulder of the proposed Expressway alignment.

The cycleway/walkway network would be connected into the existing SH1 between the two proposed local road roundabouts at chainage 2630m.

A cycleway/walkway overbridge is proposed between chainage 3000 and 3300m (with a bridge length of 58m, bridge width of 4m and a vertical clearance of 6m) , to provide an east/west connection across the proposed Expressway. The exact location of this bridge has yet to be determined, and will be the subject of a later Outline Plan to be submitted to KCDC.

The Project ‘s cycleway/walkway would include an additional southern east/west link by extending the network from chainage 4130m back to Lorna Irene Drive.

This cycleway/walkway has been designed to be compatible with GWRC proposals to construct additional cycleway/walkway facilities through, QE Park some time in the future.

g. Other Features

It is noted that the Project does not preclude the potential for a future Raumati railway station and an associated car park.

7.3.2 Sector 2: Raumati/Paraparaumu

Sector 2 commences north of Raumati Road (chainage 4500m) to north of Mazengarb Road (chainage 8300m).

a. General Project Description

This section provides a general overview of the proposed Expressway alignment, bridges, interchange and local road connections within Sector 2:

- From chainage 4500m, the proposed Expressway alignment would generally follow the existing WLR designation toward Kāpiti Road.
- From chainage 5150m to 5400m, the proposed Expressway would be located slightly east of the existing WLR designation to retain the existing sand dune.
- The proposed Expressway would cross over the Wharemauku Stream on twin bridges. The twin bridges would cross between chainage 5380m and 5470m (bridge length of 76m, width of 12m for each bridge and vertical clearance of 5 to 6m). Sufficient space would be left beneath the twin bridges to allow for a future local road extension required by the Paraparaumu Airport Extension plan change.
- The proposed Expressway would cross over Kāpiti Road on twin bridges. The twin bridges would cross between chainage 6310m and 6380m (bridge length of 52m, width of 12m for each bridge and vertical clearance of 5 to 6m).
- A full diamond interchange would be constructed at Kāpiti Road. This would consist of north and south facing on- and off-ramps connecting to Kāpiti Road.
- Kāpiti Road would remain at grade with improvements made to the local road to allow the network to manage the Expressway traffic. These improvements would generally include:
    - Widening Kāpiti Road to 6 Lanes (approximately 193m west and 201m east when measured from the centre of the bridge); and
    - 2x traffic lanes in each direction.
- The intersection of the on- and off-ramps would be signalised to control traffic exiting the proposed Expressway onto Kāpiti Road and vice versa.
- From Kāpiti Road, the proposed Expressway would follow the existing WLR designation towards Mazengarb Road.
- The proposed Expressway would cross over Mazengarb Road on twin bridges at chainage 7930m. The twin bridges would cross between chainage 7920m and 7970m (bridge length 27m, width 12m for each bridge and vertical clearance of 5 to 6m).
- Mazengarb Road would be slightly lowered (by up to about 1 metre) to reduce the height of the proposed Expressway.

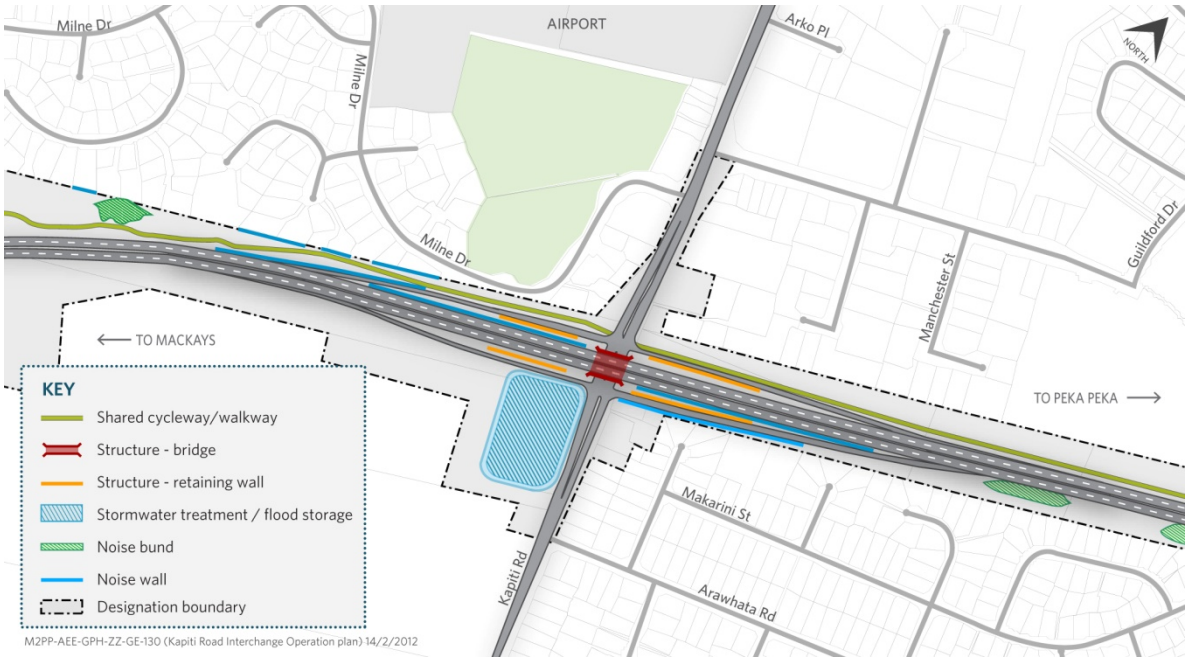

Figure 7.7: Sector 2 Kāpiti Interchange

b. Land Required

In this Sector, additional land has been identified as necessary for the provision of the construction, operation and ongoing maintenance of the proposed Expressway.

12 properties are required, including:

- 6 residential properties;
- 5 commercial properties; and
- 1 other property.

7 buildings are required within the above properties, including:

- 2 residential buildings;
- 4 commercial building; and
- 1 other building.

Details on the specific properties required by the proposed Project designation within Sector 2 are outlined in the Land Requirement Plans, Volume 5.

c. Lighting

Conventional HPS lighting would likely be used at the Kāpiti Road full interchange on the on- and off-ramps and on Kāpiti Road.

Other lighting requirements for Sector 2 would include:

- Underbridge lights at Kāpiti Road and Mazengarb Road;
- Bridge uplighters at Kāpiti Road and Mazengarb Road;
- Lighting of Kāpiti Road;
- Flag lights at any junction of the cycleway/walkway with local roads; and
- Lighting of the cycleway/walkway between Raumati Road and Mazengarb Road.

d. Retaining Walls

Due to space constraints, approximately four retaining walls would be required for the full interchange at Kāpiti Road. These would likely be Mechanically Stabilised Earth walls ranging from a height of approximately 3 to 4m.

e. Noise Attenuation

The noise attenuation measures (with dimensions and locations approximated) that would likely be located within Sector 2 are:

i. West of the proposed Expressway, Raumati Road

- A 2m high noise barrier extending 240m to the north of Raumati Road and west of the proposed Expressway

ii. West of the proposed Expressway – South of Kāpiti Road

- A line of 2m high noise barriers along the common property boundaries of several properties;
- Proposed dune fill-in at the southern end;
- A 3m high noise barrier along the proposed Expressway and ramp; and
- A 2m high barrier is located along the proposed Expressway towards the bridge over Kāpiti Road.

iii. East of proposed Expressway – Kāpiti Road to Mazengarb Road area

- A 1.1m high concrete safety barrier along the southbound off-ramp and the proposed Expressway edge;
- Bunds between 2m and 3m would be placed along the eastern side of the proposed Expressway, along the southern half of this section of road.
- Bunds filling in gaps in the dunes along the northern half of this section of road. The infill bunds would have heights up to 7m, matching the dunes already existing between the proposed Expressway and the residential sites.

iv. West of proposed Expressway – Cheltenham Drive

- A 4m bund extending 225m
- A 2.5m barrier extending 295m

It is noted that:

- The surface of the proposed Expressway would generally be paved with a low noise generating surface (for example, OGPA) throughout this Sector to provide additional noise mitigation;
- There would be dense asphalt on the Kāpiti Interchange ramps, and 1.1m concrete edge barriers on the proposed Expressway bridge over Kāpiti Road; and
- There would be 1.1 m high concrete edge barriers on the proposed Expressway bridge over Mazengarb Road.

Details of the dimensions and location of these likely noise attenuation measures are provided in Technical Report 15, Volume 3, with drawings contained within Volume 5.

f. Stormwater Treatment and Flood Management

Stormwater treatment in Sector 2 would be provided by a combination of wetlands and swales.

Flood management in Sector 2 would be achieved primarily by a combination of attenuation in swales and flood storage in the offset storage areas. The swales would be generally located on one or both sides of the proposed Expressway for the majority of Sector 2, except north of the Kāpiti Road interchange where stormwater would be collected by sumps and kerb and channel to be piped to the new wetland adjacent to Kāpiti Road.

In addition to the swales, stormwater treatment, attenuation and storage would be provided by:

- A 38,000m^3 flood offset storage area 3A on the southern side of the Wharemauku Stream, west of the proposed Expressway;
- A 38,000m^3 flood offset storage area 2 on the southern side of the Wharemauku Stream, east of the proposed Expressway;
- An 1800m^2/2600m^3 attenuation wetland (Wetland 3) located where the existing Kiwi Pond is currently sited on the southern side of the Wharemauku Stream, west of the proposed Expressway.
- A 9,384m^2/6,250m^3 treatment and attenuation wetland (Wetland 4) south of Kāpiti Road, east of the proposed Expressway;
- Wetland 4 has a treatment wetland at its core with an associated wider flood storage area positioned at a slightly higher level. This arrangement is common across many of the proposed wetlands where storage/attenuation is also required; and,
- A 6,000m^2/6,234m^3 treatment and attenuation wetland (Wetland 5) between Kāpiti Road and Mazengarb Road, west of the proposed Expressway. There is an alternative location for this wetland to the west on private land, as illustrated on drainage layout plan CV-SW-114, Volume 5. A private wetland is planned as part of a development and it may be beneficial to both parties if a single combined wetland were to be constructed.

Wharemauku Stream would be crossed with a bridge and the remaining watercourses crossed by culverts. The culverts are listed within the Culverts and Watercourse Diversion Schedule, Appendix B of Technical Report 22, Volume 3.

Further details on all aspects of stormwater and hydrology within Sector 2 are provided in the Assessment of Hydrology and Stormwater Effects, Technical Report 22, Volume 3 and illustrated on drainage layout drawings CV-SW-108 to 114, Volume 5.

g. Cycle/Walkway

The new cycleway/walkway would be located parallel to but separate from the western shoulder of the proposed Expressway throughout this Sector.

At chainage 4930m, an additional cycleway/walkway connection would be provided to connect back to the local road network in the vicinity of 58 Kiwi Road.

The cycleway/walkway would be bridged over the Wharemauku Stream (at chainage 5400m) to provide north-south continuity for this network. There would also be a link between this network and the existing cycleway/walkway that runs east/west alongside the southern side of the Wharemauku Stream. From this bridge northward, the cycleway/walkway would cross Kāpiti Road and Mazengarb Road.

A cycleway/walkway overbridge is proposed between Kāpiti Road and Mazengarb Road between chainage 6900m and 7400m to provide an east/west connection over the proposed Expressway.

7.3.3 Sector 3: Otaihanga/Waikanae

Sector 3 commences north of Mazengarb Road (chainage 8300m) and ends to the north of Te Moana Road (chainage 12400).

From chainage 8300m to the Waikanae River, the proposed Expressway would generally follow the existing WLR designation alignment. The proposed Expressway would be located east of the existing WLR designation from north of the Waikanae River (at chainage 11100m) to the end of this Sector (chainage 12400m).

a. General Project Description

This section provides a general overview of the proposed Expressway alignment, bridges, interchange and local road connections within this sector:

- From the beginning of Sector 3 to Otaihanga Road the proposed Expressway would be located to the west of the Paraparaumu Sewage Treatment Plant (Designation 1110 within the Operative KCDC District Plan) and the Otaihanga Landfill (Designation 1119 within the Operative KCDC District Plan).
- The proposed Expressway would cross over Otaihanga Road; the bridge would have a length of 27m, a width of 25m and a vertical clearance of 5 to 6m.
- Otaihanga Road would remain at grade in its current location.

- A new accessway would be provided for those properties on the eastern side of the proposed Expressway to the north of Otaihanga Road. This accessway would be located between Otaihanga Road at chainage 9200m and the existing paper road at chainage 9820m.
- The proposed Expressway would cross over the Waikanae River. The bridge would be approximately 182m long from a line of prominent sand dunes in the south to a constructed embankment in the north. The bridge would have four traffic lanes with a width of approximately 28m, a vertical clearance of approximately 7m and a cycleway/walkway "clipped[69]" on the eastern side.
- The Waikanae bridge would cross over a new access road from Kauri Road to the Waikanae Christian Holiday Camp (known as El Rancho) at chainage 10730m, located within the flood plain of the Waikanae River.
- The proposed Expressway would be located on the west side of the Maketu tree and to the east of the Takamore Urupā, both of which would be unaffected by the proposed Expressway.
- The proposed Expressway would follow the toe of the dune passing through the man-made ponds (at chainage 11250m), approximately 16m below the Takamore Urupā.
- Just beyond the location of the Takamore Urupā, the proposed Expressway would be cut through the dune which faces east before proceeding toward Te Moana Road.
- The proposed Expressway would cross over Te Moana Road and the Waimeha Stream between chainage 11760m and 11940m (bridge length of 142m, width of 25m and vertical clearance of 5 to 6m).
- A full diamond interchange would be located at Te Moana Road as shown in Figure 8. This would consist of north and south facing on- and off-ramps connecting to Te Moana Road, including separate bridges over the Waimeha Stream.
- Two roundabouts on Te Moana Road would be built to the east and the west of the proposed Expressway to provide access onto and off the proposed Expressway, without the need for signals[70]. Near the bridge, Te Moana Road would need to be widened. As part of the construction of the Project, temporary traffic signals would be provided at the termination of the on- and off-ramps at Te Moana Road.
- Te Moana Road would be raised by approximately 0.5m.
- A new accessway to the west of the proposed Expressway (between chainage 11420m and 11820m) would be provided for properties including the Urupā.
- The alignment would begin to curve eastward from the Te Moana interchange to the end of Sector 4 at chainage 12400m.

[69] The cycleway/walkway would not be detachable and would be an integral part of the Waikanae bridge structure.

[70] In liaison with KCDC, the NZTA may review whether traffic lights may be provided at the intersection of the on- and off-ramps with Te Moana Road rather than roundabouts. This change could be accommodated within the proposed designation.

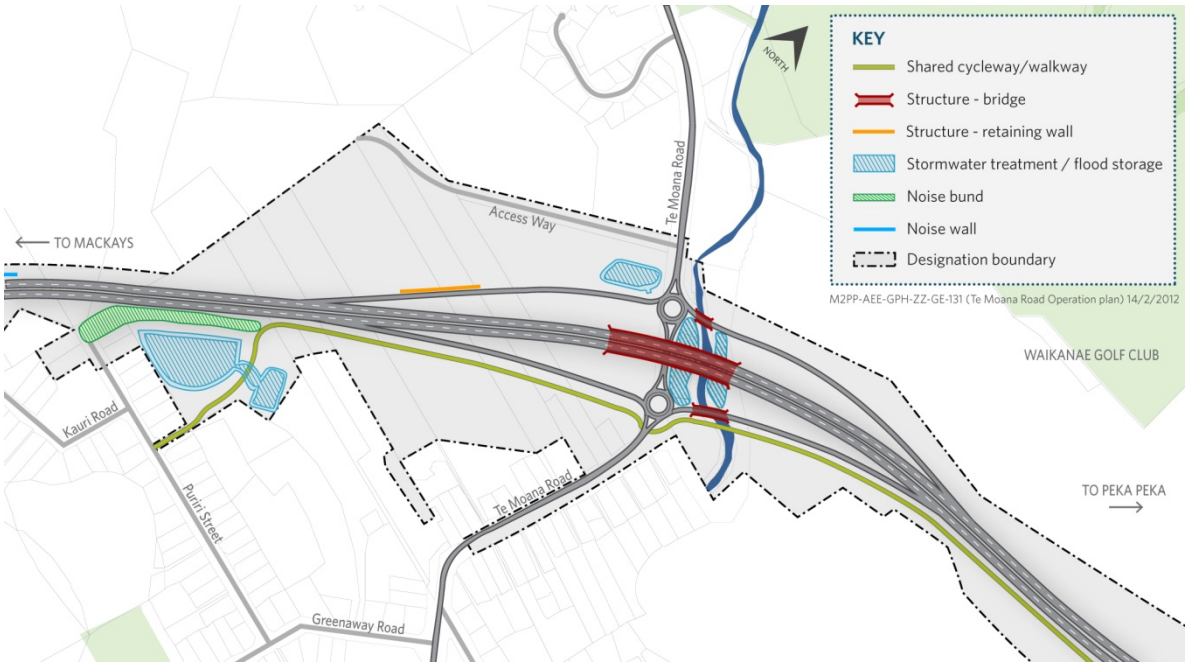

Figure 7.8: Sector 3 Te Moana Interchange

b. Land Required

In this Sector, additional land has been identified as necessary for the provision of the construction, operation and ongoing maintenance of the proposed Expressway.

23 properties are required, including:

- 17 residential properties
- 2 commercial properties

11 buildings are required within the above properties, including:

- 10 residential buildings; and
- 1 commercial building.

Details on the specific properties required by the proposed Project designation within Sector 3 are outlined in the Land Requirement Plans, Volume 5.

c. Lighting

Low spill lighting (such as HPS) would likely be used at the Te Moana Road full interchange on the on- and off-ramps and on Te Moana Road. No other lighting is proposed for the proposed Expressway through this Sector.

Other lighting proposed would include:

- Underbridge lights at Te Moana Road;
- Bridge uplighters at Te Moana Road;
- Flag lights at local road junctions; and
- Flag lights at any junction of the cycleway/walkway with local roads.

d. Retaining Walls

Approximately two retaining walls would be required for Mazengarb Road on the western approach to the underpass. These would likely be Bored Piled walls ranging from a height of approximately 5m – 6m.

e. Noise Attenuation

The noise attenuation measures (with dimensions and locations approximated) that would likely be located within Sector 3 are:

i. West of proposed Expressway – Mazengarb Road area

- A 2m high barrier immediately adjacent to the proposed Expressway, extending from the bridge across Mazengarb Road to chainage 8420.

ii. East of proposed Expressway – Mazengarb Road area

- A 2m high barrier extending from the bridge over Mazengarb Road past the dwellings.

iii. Otaihanga Road area

- Extension of the 1.1m high bridge barrier.

iv. East of proposed Expressway – Kauri Road area

- A 3m high bund extending for approximately 280m along the eastern side of the proposed Expressway.

v. West of proposed Expressway – South of Te Moana Road

- OGPA on Te Moana Road.

vi. West of proposed Expressway – North of Te Moana Road

- OGPA on Te Moana Road.

It is noted that:

- The surface of the proposed Expressway would generally be paved with low noise surfacing (such as OGPA) throughout this Sector to provide additional noise mitigation.

Details of the dimensions and location of these likely noise attenuation measures are provided in Technical Report 15, Volume 3, with drawings contained within Volume 5.

f. Stormwater Treatment and Flood Management

Stormwater treatment in Sector 3 would be provided by a combination of wetlands and swales.

Flood management in Sector 3 would be achieved primarily by a combination of attenuation in swales and flood storage in the offset storage areas. The swales would be generally located on one or both sides of the proposed Expressway for the majority of Sector 3. Where swales cannot be provided immediately, stormwater would drain to swales or wetlands nearby.

In addition to the swales, stormwater treatment, attenuation and storage would be provided by:

- A 4,854m^3 attenuation and offset storage wetland (Wetland 6), opposite the Waste Water Treatment Plant Drain, west of the proposed Expressway;
- A 1,790m^3 flood offset storage area 6A located at the landfill, to the east of the proposed Expressway;
- A 7,800m^2/1850m^3 treatment and attenuation wetland (Wetland 8) on the southern side of the Waikanae River, east of the proposed Expressway;
- A 1,613m^3 flood offset storage area 9A on the northern side of the Waikanae River, east of the proposed Expressway;
- A 4,832m^2 /6206m^3 treatment, attenuation and offset storage wetland (Wetland 9) north of Puriri Road, east of the proposed Expressway;
- A 750m^3 attenuation wetland (Wetland 10) to the south of Te Moana Road, west of the proposed Expressway; and
- A potential additional 5000m^3 flood offset storage area for the isolated catchment located near chainage 12100m, subject to property negotiations. The proposed Expressway designation has sufficient area to provide for the offset volume to be constructed if an agreement is not reached over this issue with the property owner (refer to Technical Report 22, Volume 3).

Culverts would be provided to cross some watercourses and provide for flood events within Sector 3. At its confluence with the Waikanae River, the Muaupoko Stream would require a diversion as a result of the Project. The culverts and watercourse diversion proposed are listed within the Culverts and Watercourse Diversion Schedule, Appendix B of Technical Report 22, Volume 3.

Extensive works would be required within the Waikanae River channel (in and around the location of the proposed Waikanae Bridge), as detailed within Technical Report 22, Volume 3.

Further details on all aspects of stormwater and hydrology are provided in the Assessment of Hydrology and Stormwater Effects, Technical Report 22, Volume 3 and illustrated on drainage layout drawings CV-SW-115 to 120, Volume 5.

g. Cycle/Walkway

The cycleway/walkway would continue parallel to, but separated from, the western boundary of the proposed Expressway from Mazengarb Road to Otaihanga Road. At Otaihanga Road, the cycleway/walkway would re-connect with this local road, following it east approximately 80m, where it would recommence in parallel to, but separated from, the eastern side of the proposed Expressway at chainage 9200m, and continues north.

Immediately south of the Waikanae River, the cycleway/walkway network would run parallel to the eastern boundary of the proposed Expressway. At chainage 10500m the cycleway/walkway would branch into two parts, one part crossing over the Waikanae River Bridge on a "clip-on" cycle/walkway bridge to the eastern shoulder of the proposed Expressway and the other part reconnecting to the existing east/west pathway along the southern banks of the Waikanae River.

At chainage 10800m, just north of the Waikanae Bridge, the cycleway/walkway would divert onto the local road network before emerging to the north of Puriri Road (at chainage 11200m) to continue adjacent to the eastern side of the proposed Expressway for the remainder of this Sector, crossing Te Moana Road at grade.

7.3.4 Sector 4: Waikanae North

Sector 4 commences north of Te Moana Road (chainage 12400m) and ends to the north of Peka Peka Road (chainage 18050m).

The alignment would pass to the east of the existing WLR designation between Te Moana Road and Ngarara Road, to avoid the QEII covenant ecological area, and then would generally continue within the existing WLR designation from chainage 13300m to a point just short of existing SH1 near Peka Peka Road at chainage 16000m. The proposed Expressway would digress northward from the existing WLR designation beyond chainage 16000m to either the existing SH1 network or the proposed Peka Peka to Ōtaki Expressway (depending on the compatibility of Project completion dates) at chainage 18050m.

a. General Project Description

This section provides a general overview of the proposed Expressway alignment, bridges, interchange and local road connections within this sector:

- Between chainage 12400m and 13550m the proposed Expressway would be located to the east of the large QEII covenanted area between Te Moana Road and Ngarara Road.
- The proposed Expressway would pass under Ngarara Road at chainage 13550m. Ngarara Road would become a bridge over the proposed Expressway and would require realignment (bridge length of 73m, width of 15m and vertical clearance of 6m).
- A new local road is proposed. This new local road would be bridged over the proposed Expressway at chainage 13950m to provide access to properties currently serviced by Smithfield Road and also the Nga Manu nature reserve on the eastern side of the alignment (bridge length of 70m, width of 16m and vertical clearance of 6m).

- On the western side of the proposed Expressway, the existing end of Smithfield Road would be retained up to the edge of the proposed designation boundary to allow for continued access to properties.
- On the eastern side of the proposed Expressway, the new local road would extend between chainage 13950m and 14600m to ensure continued access to properties.
- Two bridges over the Kakariki Stream would be required through this Sector, one for the proposed Expressway at chainage 14000m (bridge length of 20m and width of 25m) and one for the new local road at chainage 14100m, 200m to the east of the proposed Expressway shoulder (bridge length of 12m and width of 14m). Kakariki Stream would be diverted through the new proposed Expressway bridge location to minimise the bridge length.
- A bridge over the Paetawa Drain at chainage 16400m (bridge length of 14m, width of 25m).
- A partial interchange would be located at Peka Peka Road with on- and off-ramps which:
    - allow vehicles to exit the proposed Expressway when heading south; and
    - allow vehicles to access the proposed Expressway when heading north.
- A local connection from existing SH1 (chainage 16600m) heading north passes over the proposed Expressway south of Peka Peka Road at chainage 16800m (bridge length of 87m, width of 17m and vertical clearance of 6m) and connecting to a roundabout at grade at Peka Peka Road (chainage 17300m).
- A new roundabout between approximate chainage 17300m and 17400m would provide a local connection onto Peka Peka Road, a local connection northward as well as a northern on-ramp to the proposed Expressway.
- The at-grade Hadfield Road rail crossing would be retained (chainage 17430m).
- The proposed Expressway would either connect back into existing SH1 or to the beginning of the Peka Peka to Ōtaki Project in the vicinity of chainage 18050m (depending on the compatibility of Project completion dates).

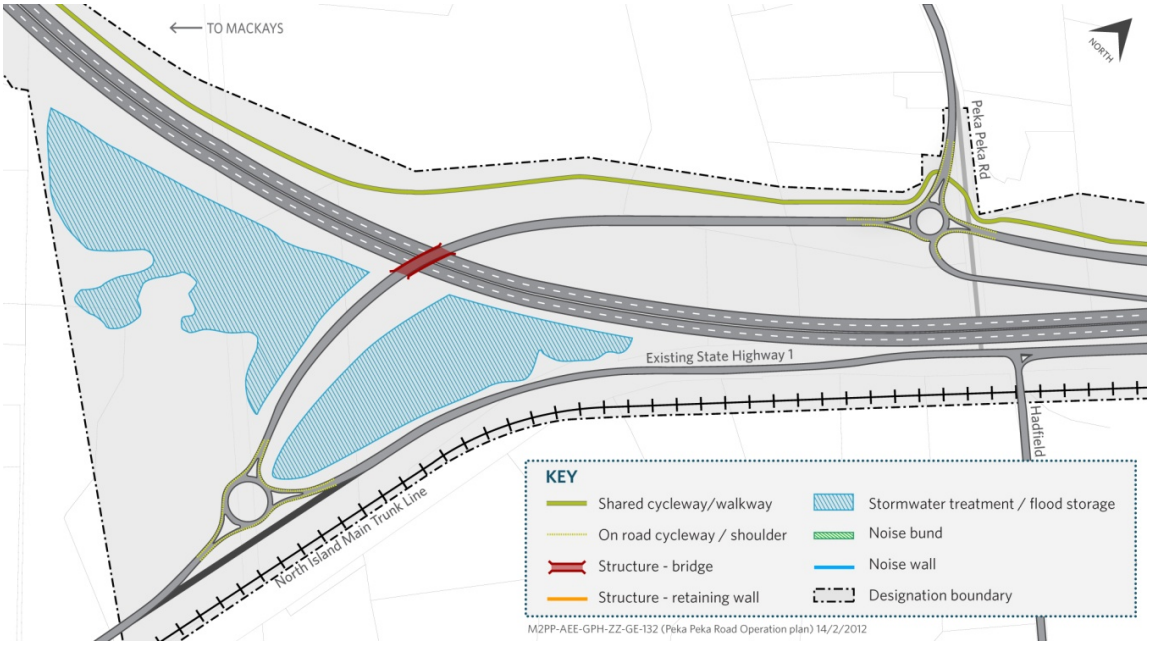

Figure 7.9: Sector 4 Peka Peka Interchange

b. Land Required

In this Sector, additional land has been identified as necessary for the construction, operation and ongoing maintenance of the proposed Expressway. 15 residential properties are required, within which 9 residential buildings are required.

- Details on the specific properties required by the proposed Project designation within Sector 4 are outlined in the Land Requirement Plans, Volume 5.

c. Lighting

Low spill e.g. HPS lighting would be used on the Peka Peka partial interchange merge/diverge area, ramps, roundabouts and approaches.

Other lighting requirements in Sector 4 would likely include:

- Flag lights at local road junctions; and
- Flag lights at any junction of the cycleway/walkway with local roads.

d. Retaining Walls

A retaining wall would be required for the proposed Nga Manu Access Road. This wall is expected to be a Bored Piled walls, approximately 1 to 2m high.

e. Noise Attenuation

The noise attenuation measures (with dimensions and locations approximated) that would likely be used within Sector 4 are:

i. East of proposed Expressway – End Farm Road

- Use of OGPA, continuing on from the new Smithfield Road bridge, extending from approximately chainage 14600m to chainage 15400m.

ii. West of proposed Expressway – Peka Peka Road

- Use of OGPA.

Details of the dimensions and location of these likely noise attenuation measures are provided in Technical Report 15, Volume 3, with drawings contained within Volume 5.

f. Stormwater Treatment and Flood Management

Stormwater treatment in Sector 4 would be provided by a combination of wetlands and swales.

Flood management in Sector 4 would be achieved primarily by a combination of attenuation in swales and flood storage in the offset storage areas. The swales would generally be located on one or both

sides of the proposed Expressway for the majority of Sector 4. Where swales cannot be provided immediately, stormwater would drain to swales or wetlands nearby.

In addition to the swales, stormwater treatment, attenuation and storage would be provided by:

- A 1,500m^3 flood offset storage area 10C near chainage 12900m, east of the proposed Expressway;
- A 450m^2 treatment wetland (Wetland 10A) north of Ngarara Creek, west of the proposed Expressway;
- A 1,020m^2 treatment wetland (Wetland 10B) south of Ngarara Creek , east of the proposed Expressway;
- A 500m^3 flood offset storage area 10D between Ngarara Creek and Ngarara Road, west of the proposed Expressway;
- A 200m^2 treatment wetland (Wetland 11A) to the south of the Kakariki Stream, east of the proposed Expressway;
- A 25,000m^3 flood offset storage area 11, to the north of the Kakariki Stream, east of the proposed Expressway;
- A 786m^2/782m^3 treatment and attenuation wetland (Wetland 12) between chainage 14200m and 14300m, east of the proposed Expressway;
- A 250m^2 treatment wetland (Wetland 11B) between chainage 14300 and 14400m, east of the proposed Expressway;
- A 6,000m^3 flood offset storage area 13, to the north of the Paetawa Drain, on the eastern side of the proposed Expressway; and
- A 30,000m^3 flood offset storage area 13A opposite area 13, split by the new local road and east of the proposed Expressway.

Culverts would be provided to cross some watercourses and provide for flood events within Sector 4. A number of watercourses within Sector 4 would require diversions as a result of the Project. The culverts and watercourse diversions proposed are listed within the Culverts and Watercourse Diversion Schedule, Appendix B of Technical Report 22, Volume 3.

Further details on all aspects of stormwater and hydrology within Sector 4 are provided in the Assessment of Hydrology and Stormwater Effects, Technical Report 22, Volume 3 and illustrated on drainage layout drawings CV-SW-120 to 132, Volume 5.

g. Cycle/Walkway

The cycleway/walkway would be located in parallel to, but separated from, the eastern side of the proposed Expressway before crossing over Ngarara Road (chainage 13550m) and continuing in parallel, but separated from, the western side of the proposed Expressway to Te Kowhai Road).

8 Construction of the Project

Overview

This Chapter provides an overview of the methodologies that are proposed to be used to construct the Project. This information is further detailed in the Construction Methodology (refer to Technical Report 4, Volume 3).

The construction methodology describes a number of techniques that will be used by the contractor to build the proposed Expressway. Inevitably these techniques have environmental effects that need to be assessed as part of this application; effects include those related to noise, vibration, dust, water and traffic (Part G of this Report). The Construction & Environmental Management Plan (CEMP, Volume 4) provides a framework for managing the potential and adverse effects arising from construction activities.

The construction of the Project will take approximately 4-5 years, and will be progressed on several fronts simultaneously, along the 16km length of the route. The construction methodology refers to a number of construction sections within a 'South zone' and a 'North zone' along the alignment.

The majority of construction traffic movements will make use of the proposed alignment and the existing SH1. The use of local roads by construction traffic is likely to be limited to movements in relation to the construction of the interchanges, bridges and service re-locations.

8.1 Introduction

The Project will be delivered by a multi-disciplinary Alliance (refer to Chapter 1). This Alliance is tasked with delivering the approvals stage of the Project (AEE & NoR lodgement to the EPA) and the construction stage. Fletchers Construction, Higgins Contractors and Goodmans (who are members of the Alliance) have been involved with the development of the construction methodology.

The Project construction methodology described within this Chapter has therefore been developed and refined as a realistic and feasible methodology by which the potential environmental effects of construction can be identified and assessed, and potential mitigation measures identified to avoid remedy or mitigate these effects as appropriate.

This Chapter provides an overview of the proposed construction methodology across the Project, followed by further information in regard to the nature, scale and duration of construction activities, within each of the four geographic Project Sectors. A general description of the following construction activities is provided in this Chapter:

- Construction sequencing;
- Construction traffic;
- Construction yards & site set-up;

- Water supply;
- Pre-load and dig-out methodologies;
- Erosion and sediment control;
- Works in streams and rivers;
- Bridges; and
- Network utilities.

Throughout this Chapter there will be cross referencing to relevant Technical Reports and Plans where further information about the Project can be obtained. In particular, a proposed Construction Environmental Management Plan (CEMP) is included within Volume 3 and the Construction Plans are included within Volume 5.

8.2 Pre- construction considerations

8.2.1 Construction environmental management

During construction, specific mitigation measures and environmental monitoring will be required to ensure that potential adverse effects on the environment are avoided, remedied or mitigated, as appropriate.

A Construction Environmental Management Plan (CEMP) has been prepared for the Project (refer to Volume 4). The CEMP outlines specific measures to be implemented by the contractor to manage the potential environmental effects of the Project during construction.

The principles and general approach to managing the environmental effects are set out in the main body of the CEMP. The management of specific construction effects (such as discharges to air, noise and vibration) is set out in more particular detail within the suite of environmental management plans (sub-plans) that form the appendices to the CEMP.

The CEMP is consistent with, and complements the recommended environmental management proposals of the AEE (and its technical reports), and has been developed in accordance with the anticipated designation/consent conditions.

The contractor will be required to undertake construction activities in accordance with the CEMP.

Once the conditions have been confirmed through the consenting process, the CEMP will be reviewed and updated (if required) and provided to the contractor prior to works commencing.

8.2.2 Erosion and sediment control

During construction, erosion and sediment control measures will be put in place to minimise potential adverse effects by utilising measures that meet industry best practice guidelines including:

- Greater Wellington Regional Council's *Erosion and Sediment Control Guidelines for the Wellington Region*, September 2002 (Wellington Guidelines); and
- *NZTA Erosion and Sediment Control Standard for State highway Infrastructure*, dated August 2010 (NZTA Draft Standard).

The Erosion and Sediment Control Plan (ESCP) provides an overview of the erosion and sediment management techniques and measures that will be used by the Project, and outlines methodologies and management techniques that will be applied to achieve the environmental outcomes sought by the Project. The ESCP also includes information on dust management techniques to be utilised within the Project.

Given the scale of this Project, it is expected that site and activity specific erosion and sediment control plans will be developed, which will follow the general principles of the ESCP and comply with any relevant consent conditions. These are referred to as Construction Erosion and Sediment Control Plans (CESCPs).

The installation of erosion and sediment control measures will be staged in co-ordination with earthworks, with site preparation measures being installed progressively, in advance of land disturbance activities. This methodology is critical to reducing sediment generation.

Once the erosion and sediment controls are in place, ongoing site monitoring will occur to check that the proposed erosion and sediment control measures have been installed correctly and are functioning effectively throughout the duration of the works.

Upon completion of the construction works, it is expected that the erosion and sediment controls will be removed and any rehabilitation undertaken as necessary.

Specific details of the erosion and sediment control that have been developed for the Project works can be found within the Erosion and Sediment Control Plan (CEMP Appendix H, Volume 4).

8.2.2.1 Devices for erosion and sediment control

The principal sediment control devices for the construction of the Project will include one or more of the following:

- Sediment Retention Ponds (SRP)

  SRPs operate by withholding sediment laden runoff which causes the sediment to fall out of suspension.

- Decanting Earth Bunds

  A decanting earth bund is a temporary berm or ridge of compacted soil constructed to create an impoundment area where ponding of runoff can occur and suspended material can settle before the runoff is discharged. They are smaller than sediment retention ponds and can therefore be used where insufficient space exists for ponds. They are likely to be used in a variety of locations in the Project but most commonly at the end of benches to capture runoff from the large benched cuts.

- Super Silt fences and Silt Fences

  Silt fences[71] may be used in areas where sediment retention devices (i.e. ponds and earth bunds) are not able to be used. This will typically be on particularly steep slopes. The fences are semi-permeable, meaning water is gradually discharged but the majority of sediment is retained. They can be installed down slope of land disturbance areas to capture runoff. Super silt fences[72] will be used in higher risk areas only which applies to those areas of work adjacent to, or in the immediate vicinity of, watercourses.

- Diversion Channels

  Dirty water diversion channels will be used to prevent uncontrolled runoff within the site boundaries. The channels will ensure that rainfall runoff is diverted to sediment control measures.

- Pumping

  Pumping of sediment laden runoff and groundwater during construction will be required at numerous periods during excavation works. These flows will be pumped either to SRPs, to grass buffer zones or to temporary sediment retention devices such as turkey nests (an enclosed ring of filter sock used to contain and filter discharges from pumped stormwater) to assist with retaining any sediment contained within the runoff. Further pumping will also be required with associated activities such as bridge construction. This pumping activity will also ensure discharges are to treatment devices.

[71] A Silt Fence is a temporary barrier of woven geotextile fabric used to intercept sediment laden runoff to reduce the velocity of the runoff, temporarily allow runoff to pool behind the fence and to impound any sediment that settles out of the water column.

[72] A Super Silt Fence is a temporary barrier of geotextile fabric layers backed with chain link fence, or other approved product, used to intercept sediment laden flows, to reduce the velocity of the runoff, to allow the runoff to pool behind the super silt fence and to impound any sediment that settles out of the water column.

- Chemical treatments

  Chemical treatments may be utilised to treat sediment laden water; however, this is likely to be on a limited basis as a risk management tool, and will be based around the use of polyacrylamide contained within flocculant[73] socks.

Drawings CV – CM 200 to230, Volume 5, illustrate the possible location and full range of devices that are likely to be utilised.

8.2.2.2 Temporary stormwater management

Works in and around urban areas will need to ensure that runoff from the Project construction site does not contaminate the existing stormwater system.

The erosion and sediment control measures detailed above will be utilised as and where required, but additional bunding and/or water diversions may be required to ensure stormwater systems are not contaminated.

Where construction works require the relocation of existing stormwater infrastructure, this will be undertaken in a manner that seeks to ensure that uncontrolled runoff is unable to enter the stormwater network.

The Project includes the installation of a number of operational stormwater treatment features as detailed within Chapter 7 (Project Description Operation). Wherever it is practicable, these features will be established early, and used to assist with the management of stormwater runoff during construction.

8.2.2.3 Site stabilisation

An essential aspect of the erosion and sediment control measures will be the stabilisation of disturbed land as soon as practicable. Some areas may require stabilisation on multiple occasions throughout the construction period.

The treatment options for site stabilisation include the use of top soil (where necessary), seed, mulch and geotextiles.

Stabilisation will apply particularly with respect to stockpiles and batter establishment, and will be designed for both erosion control and dust minimisation. Where dust generation is the predominant issue, water carts will be utilised as the initial treatment option.

[73] Flocculation is defined as the use of chemicals to help treat sediment-contaminated stormwater generated from earthworks sites. The chemical used will be dependent on site characteristics, including soils, with the chemical being used to enhance settlement of sediment from the water column.

In regard to preload activities, short-term batters (less than 6 months) will have a final layer of clean granular material or mulch (straw, hay or wood) applied over sand to limit any wind disturbance of the surface. Longer term batter slopes (greater than 6 months) will have topsoil and grass established. Stabilisation of final cut slopes will have topsoil and grass in place from the top of the slope as the cut progresses.

8.2.2.4 Stream works

Given the high risk of sedimentation and the sensitivity of the receiving environment, any works required within streams or rivers will be undertaken in a "dry" environment. This technique will be based on either the diversion of flows around the area of works or working directly above the stream with no formal stream diversion required. In determining the type of works, consideration will also be given to the fish spawning and migration periods, during which time instream works will be restricted.

Drawings CV – CM 246 to 247, Volume 5, illustrates and describes the proposed methodology.

8.2.3 Service relocations

Construction will affect a number of existing services, including transmission and distribution lines for gas, electricity, telecommunications, water, wastewater and stormwater (as described in Chapter 6). Services are generally (with a few exceptions) located in the roadways of the built-up areas and may require relocating or protecting, particularly at the locations of proposed crossings and intersections.

Protection and/or relocation of existing services will generally occur in conjunction with the Project's construction, prior to the bulk of the earthworks.

The contractors will continue to work closely with the relevant service providers to undertake the necessary protection and/or relocation works.

8.2.4 Temporary traffic management and access

Construction of the Project involves truck movements, lane and intersection closures and periods of lowered speed limits on some roads, all of which have the potential to cause inconvenience to road users and residents. A Construction Traffic Management Plan (CTMP) is included as Appendix O of the CEMP, Volume 4, detailing traffic management methodologies and mitigation measures to be adopted for the Project during construction.

The CTMP details the traffic control activities, the impacts on pedestrians, cyclists, residents, businesses, public transport, and general traffic and typical mitigation measures that will be considered in the development of Site Specific Traffic Management Plans and in the general management of Project construction.

8.2.5 Noise and vibration

Noise and Vibration will result from construction activities. The construction activities that are likely to generate noise and vibrations within each Project Sector are listed in Table 8.1 below. Other

construction machinery and activities, not specified in Table 8.1, will produce noise and ground vibration also, but generally to a lesser degree. Technical Report 16, Volume 3, provides an assessment of the construction noise effects, and Appendix F of the CEMP, Volume 4, outlines the Construction Noise and Vibration Management Plan.

Table 8.1: Noise and Vibration from Construction Activities

Sector	Noise generating activities	Vibration generating activities
1	Fill delivery for preload construction Excavation and fill Road basecourse and sealing works Bridge construction, including piling Road realignment and resurfacing	Vibratory rollers for road basecourse and sealing works Excavation plant Piling for bridge construction Vibratory rollers for road realignment and resurfacing
2	Excavation and fill Off-road fill transport Road basecourse and sealing works Bridge construction, including piling Road realignment and resurfacing	Vibratory rollers for road basecourse and sealing works Off-road fill transport Excavation plant Piling for bridge construction Vibratory rollers for road realignment and resurfacing
3	Fill delivery for preload construction Excavation and fill Off-road fill transport Road basecourse and sealing works Bridge construction, including piling Road realignment and resurfacing	Vibratory rollers for road basecourse and sealing works Excavation plant Off-road fill transport Piling for bridge construction Vibratory rollers for road realignment and resurfacing
4	Fill delivery for preload construction Excavation and fill Off-road fill transport Road basecourse and sealing works Bridge construction, including piling Road realignment and resurfacing	Vibratory rollers for road basecourse and sealing works Excavation plant Off-road fill transport Piling for bridge construction Vibratory rollers for road realignment and resurfacing

8.3 Construction programme

8.3.1 Construction duration

The Project is anticipated to take four to five years to construct. Construction works are programmed to commence Quarter 3 2013 (dependent on all required land and approvals being secured) and being complete by Quarter 3 2017.

Working hours will generally be between 7.00am and 6.00pm, unless specific arrangements are required due to road closure requirements.

8.3.2 Construction zones

For the purposes of programming and for effectively managing the physical works, the length of the proposed Expressway route will be split into two construction zones (North Zone & South Zone) and 16 individual construction sections. These zones and sections are illustrated within the Construction Zone Diagram (Drawing CV-CM-101, Construction, Zone Diagram and Stages, Volume 5, Folder 1 of 3).

SOUTH ZONE

POP: Poplar Avenue Interchange (Sector 1)

POP-RAU: Poplar Avenue – Raumati Road (Sector 1)

RAU-IHA: Raumati Road – Ihakara Street/Wharemauku Stream (Sector 2)

IHA-KAP: Ihakara Street/Wharemauku Stream – Kāpiti Road (Sector 2)

KAP: Kāpiti Road Interchange (Sector 2)

KAP-MAZ: Kāpiti Road – Mazengarb Road (Sector 2)

MAZ-OT: Mazengarb Road – Otaihanga Road (Sector 3)

NORTH ZONE

OT-WAI: Otaihanga Road – Waikanae River (Sector 3)

WAI-TEM: Waikanae River – Te Moana Road (Sector 3)

TEM: Te Moana Road Interchange (Sector 3)

TEM-NGA: Te Moana Road - Ngarara Road (Sector 4)

NGA: Ngarara Road Area (Sector 4)

SMI: Smithfield Road (Sector 4)

SMI-15400: Smithfield Road – CH.15400 (Sector 4)

15400-PP: CH.15400 – Peka Peka Interchange (Sector 4)

PP: Peka Peka Interchange (Sector 4)

8.3.3 Construction sequence

The likely sequence of construction to complete the works has been broken into six individual stages across the 4-5 year construction duration. These stages are illustrated within the Construction Sequence Drawings CV-CM-101 to 108; Construction, Zone Diagram and Stages, Volume 5, Folder 1 of 3) and described in detail within the Construction Methodology (Technical Report 4; Volume 3).

The Project will be undertaken on a number of fronts or work faces within each stage, such that different construction operations will be progressed across the 16 sections along the route.

Prior to any construction activities commencing on a particular site, a number of site establishment activities will be required, which will include site clearance, service relocations, establishment of erosion and sediment control measures and ground preparations.

A summary of the likely construction programme and sequencing is illustrated in Figure 8.1 below and indicates two main operations:

- Ground improvement works to peat areas:
    - Preload and settlement of peat areas.
- Proposed Expressway construction:
    - Further ground improvement, earthworks, drainage, bridge construction, pavements, landscaping and ancillary works.

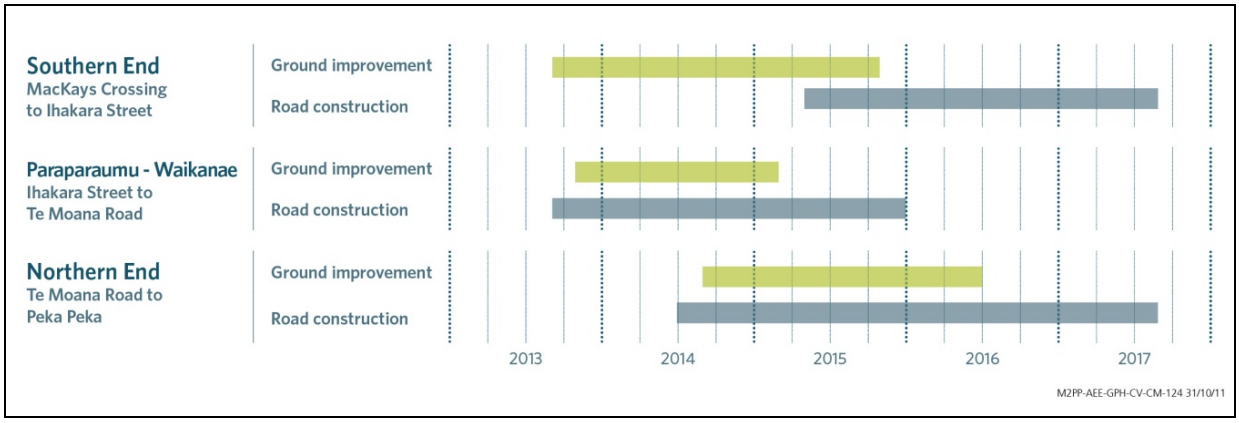

Figure 8.1: Construction Work Programme Summary

In addition to these operations, finishing works will also be required which will include landscaping. Finishing works are likely to commence at Otaihanga Road heading north and south concurrently with completion anticipated at Peka Peka and MacKays Crossing. Further details on the works are provided within Technical Report 4, Volume 3.

8.4 Construction establishment

8.4.1 Construction yards

Due to the physical length of the Project, approximately 11 construction yards will be required to accommodate and service the construction works for the duration of the construction period.

All yards will be fully fenced and made secure. Site establishment activities for construction yards will include site clearance, ground preparation, and establishing erosion and sediment control measures prior to any construction activities occurring. Upon completion of the works, the construction yards will be disestablished and the areas reinstated.

Table 8.2 below outlines the number, type and general location of the construction yards currently anticipated along the length of the project. A general description of the type of construction yard and the general activities to be undertaken in these is provided below.

Table 8.2: Type and General Location of Construction Yards Required for the Project

Construction Zone	Sector	Drawing No. CV-CM-	Location	Yard Type	Specific functions
SOUTH	1	401	Poplar Avenue	Intersection Yard	Poplar Avenue Interchange
	1	402	Raumati Road	Bridge Yard	Raumati Bridge
	2	403	Wharemauku Stream	Bridge Yard	Wharemauku Stream Bridge
	2	404	Kāpiti Road	Intersection Yard	Kāpiti Road Interchange
	2	405	Mazengarb Road	Bridge Yard	Mazengarb Bridge Mazengarb Road realignment
NORTH	3	406	Otaihanga Road	Project Yard	Main project centre Otaihanga Bridge Waikanae River Bridge (S)
	3	407	Waikanae River	Bridge Yard	Waikanae River Bridge Waikanae River Streamworks
	3	408	Te Moana Road	Intersection Yard	Te Moana Interchange Waikanae River Bridge (N)
	4	409	Ngarara Road	Bridge Yard	Ngarara Road Bridge Smithfield Road Bridges
	4	410	Smithfield Road	Bridge Yard	Smithfield Road Bridge Kakariki Stream Bridges
	4	411	Peka Peka Road	Intersection Yard	Peka Peka Interchange

8.4.1.1 Main construction yard

The main construction yard is proposed to be located at the Otaihanga Landfill site, off Otaihanga Road. This site is located adjacent to and close to the mid-point along the length of the proposed Expressway route, and is within one kilometre of existing SH1, with access off a rural local road.

The Otaihanga Project Yard will therefore be the central hub for all construction work and will provide for the:

- Main administrative centre & welfare facility for construction staff;
- Main plant/equipment storage and workshop;
- Pre-cast concrete yard;
- Main access to alignment;
- Main delivery point for materials; and
- Transfer & segregation of site and office waste.

The total area of the site is approximately 20,000m^2. A total area of approximately 12,000m^2 will be required for the precast yard, with approximately 10,500m^2 required for the site office set up as illustrated by Figure 8.2 below.

It is currently intended that each section of the proposed Expressway will be constructed consecutively and progressively away from Otaihanga. As each bridge and Section is completed, it will provide a passage through to the next Section. Materials can then be moved through the site, using the proposed Expressway corridor from Otaihanga Road as a haul route. This methodology would minimise both the volume of construction traffic on local roads and the amount of disturbed land area within the designation at any one time.

The main construction yard is expected to generate an estimated 480 daily round trips on Otaihanga Road at the peak of construction between 2014 and 2016 (refer to Technical Report 33, Volume 3).

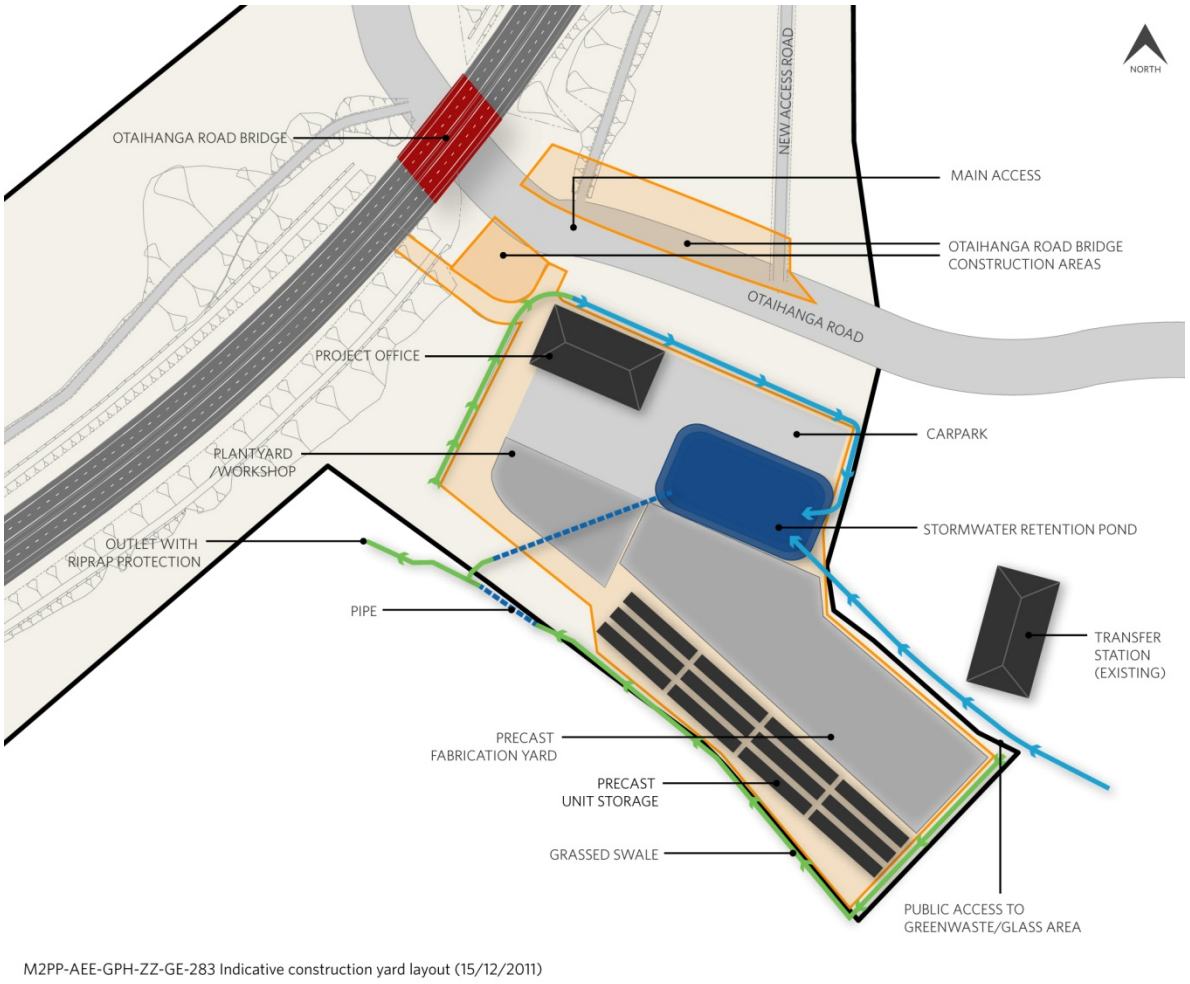

Figure 8.2: Indicative main construction yard layout

8.4.1.2 Interchange construction yards

At each interchange location, an interchange construction yard will be established as the administrative centre for works in that particular area. The purpose of each yard is to provide the following services:

- Administrative centre & welfare facility for all works in the vicinity of the interchange;
- Local plant/equipment storage;
- Local access to alignment;
- Delivery point for construction materials; and
- Collection of site waste.

8.4.1.3 Bridge construction yards

A small construction yard will also be set up at each bridge location. The purpose of each bridge yard will be to provide a small office and welfare facility specifically for the duration of the bridge construction works. Services provided will be:

- Welfare/small office facility;
- Local plant/equipment storage;
- Local access to alignment;
- Delivery point for bridge construction materials; and
- Collection of site waste.

8.4.2 Water required for construction

Water will be required to carry out a number of construction activities, including dust suppression, compaction of granular materials, ground improvements and structural work. It is proposed that this water be primarily sourced from deep-water bores.

Peak water demand is likely to occur during drier months and at peak construction periods in each bore location. The maximum supply of water will be 800 cubic metres (cum) per day, although the required volume is expected to reduce during periods of wet weather.

Where practicable, and to minimise the impact on water resources, water from sediment retention devices will be reused in construction operations. However, to ensure adequate supply of water, up to nine deep water bores will be positioned along the proposed Expressway route.

The proposed positions for deep water bores are generally dispersed across the route to minimise haulage. The positions are listed below and illustrated within Drawing CV-CM-400, Volume 5:

- Poplar Avenue;
- Raumati Road;
- Ihakara Street;
- Kāpiti Road;
- Mazengarb Road;
- Waikanae River;
- Te Moana Road;
- Ngarara Road; and
- Peka Peka Road.

Where necessary, these bores will also provide water supply to the office/welfare facility in the construction yards.

8.4.3 Materials required for construction

Embankments will largely be constructed using cut to fill material generated from the proposed Expressway alignment. However, there will be a requirement for imported fill to be used in the embankments. There are a number of local options for sourcing the imported fill, which include:

- Kāpiti Quarry, Paraparaumu;
- Otaihanga Sand Quarry;
- Waikanae Quarry; and
- Ōtaki Quarry.

The sourcing of material from each quarry will be carefully managed during construction to minimise both haul distances to each embankment and truck movements from each quarry. Should any additional consents be required for quarrying, these will be obtained and implemented by the contractor.

A precast yard will be established within the main construction yard at the Otaihanga Landfill site on Otaihanga Road. Within this yard, concrete elements such as bridge beams and concrete barriers will be manufactured.

Other required materials to be manufactured off-site and transported to site as required would generally include:

- Steel required for structural components;
- Surfacing materials (including bitumen);
- Road furniture;
- Stormwater treatment and erosion and sediment control devices; and
- Pipes and drainage materials.

8.4.4 Construction lighting

Lighting will be required in some construction areas to enable operations to proceed during the hours of darkness. Construction operations that are on or very near existing roads and are likely to cause disruption to traffic will generally take place at night.

Operations that are expected to be carried out during night time hours are:

- Erection of bridges at:
    - Raumati Road
    - Kāpiti Road
    - Mazengarb Road
    - Otaihanga Road
    - Te Moana Road
    - Ngarara Road
- The widening of Kapiti Road at the east and west ends of the Kāpiti Road intersection.
- Set-up, changes to and removal of General Traffic Management throughout the life of the contract (all Sectors).

At these locations, the site and adjacent construction yard will require full illumination during the night to complete the required operations. During the erection of the bridges at each of the above locations, the precast yard on Otaihanga Road will also be illuminated to enable loading of bridge units. Mobile lighting towers will be erected on a temporary basis for night works.

Each construction yard area will utilise temporary lighting to enable operations to proceed during the hours of darkness during the winter period. In addition, lighting will be provided to guide staff, plant and vehicles at the start and end of each shift during the winter months.

8.5 General construction activities

8.5.1 Ground improvements

The Project traverses dune sands and swamp deposits of the Kāpiti coastal lowlands. Peat deposits present in the low lying inter-dunal depressions are generally soft, with high organic contents. Groundwater is typically encountered at a shallow depth in the peat deposits.

Where peat deposits are present below the new road embankments, ground improvements are required to limit post-construction settlement of the proposed Expressway. The treatment approaches will vary along the proposed Expressway depending on the depth and extent of the peat expected to be encountered and the sensitivity of adjacent areas. Two peat treatment methods are proposed:

- Preload and Surcharge; and
- Excavate and Replace.

There are loose to medium dense sand deposits present along the proposed alignment that have the potential to liquefy under a moderate earthquake event. Ground improvements are required at the bridge abutments to mitigate this potential liquefaction, and subsequent instability. The treatment proposed is to install:

- stone columns below bridge abutments.

The ground improvements on each site will be undertaken prior to the bulk earthworks activity on that site.

Refer to the Assessment of Ground Settlement Effects (Technical Report 35, Volume 3) for further information.

8.5.1.1 Preload and surcharge

Sections of the proposed alignment will be preloaded and surcharged. This activity involves the placement of sand or granular material over the alignment (Refer to Drawing CV – CM – 244 and CV – CM – 260 to 270, Volume 5, Folder 3 of 3). This approach will generally be applied in locations where the peat is of greater depth or extent.

The preload and surcharge method involves constructing the road embankment over the peat deposits and allowing the majority of settlement to occur prior to pavement construction. Preload and surcharge fill is to be placed above the final design level of the proposed Expressway, during the settlement period to reduce long-term settlement. The depth of preload fill is equivalent to the expected settlement depth and the surcharge is the additional fill placed and removed at the end of the settlement period. Some on-going secondary and creep settlements are expected due to the nature of the underlying peat.

Prior to placement of the preload and surcharge material, the site is likely to be prepared as follows:

- Top soil will not be removed;
- A high strength geotextile will be placed directly on the existing ground surface; and
- The base 1.0m of the embankment will be constructed using a granular rock fill, and engineered bulk fill will be placed above this initial starter layer.

Erosion and sediment controls are expected to remain in place throughout the entire preload period. These controls can remain in place, with associated maintenance, once the preload is completed and road formation has commenced.

8.5.1.2 Excavation and replacement

Where peat replacement is the selected approach for construction, this process will be undertaken in a series of steps as detailed within Drawings CV – CM 240 to 243, Volume 5, Folder 3 of 3.

The methodology of this approach involves the excavation of peat with immediate sand backfilling. This is achieved with a combination of groundwater pumping and driving water ahead of the sand to keep the excavation dry.

Prior to excavation of the peat, each site (where excavation and replacement is used) will be prepared as follows:

1. Topsoil will be stripped and utilised to form a stabilised bund that will function as a clean water diversion for water from outside the alignment; it will also function as a dirty water diversion for the alignment works.

2. Removing peat from the site and stockpiling this material between the topsoil bund and the excavation area.

3. Sand will be placed within the excavation. This is expected to occur shortly following the excavation to minimise the length of time the excavation remains open for stability purposes and to reduce water ingress. The base of the excavation will be inspected by a geotechnical engineer prior to backfilling.

8.5.1.3 Stone columns

As part of the bridge establishment process, ground improvement of the soils below the bridge abutments and surrounding ground will be required. This can be achieved by numerous engineering

methodologies, with the currently preferred methodology for this Project involving reinforcement of the soils with densely compacted granular columns through the process of vibro-replacement (refer to Figure 8.3). These columns also provide vertical drainage. A vibrator is used to penetrate and displace the soil and to compact the clean stone in stages to form a dense column. Jetting water may be utilised to assist the penetration of the vibro probe. A drainage blanket would be constructed above the top of the stone columns. These stone columns would mitigate the liquefaction potential of the saturated sand deposits.

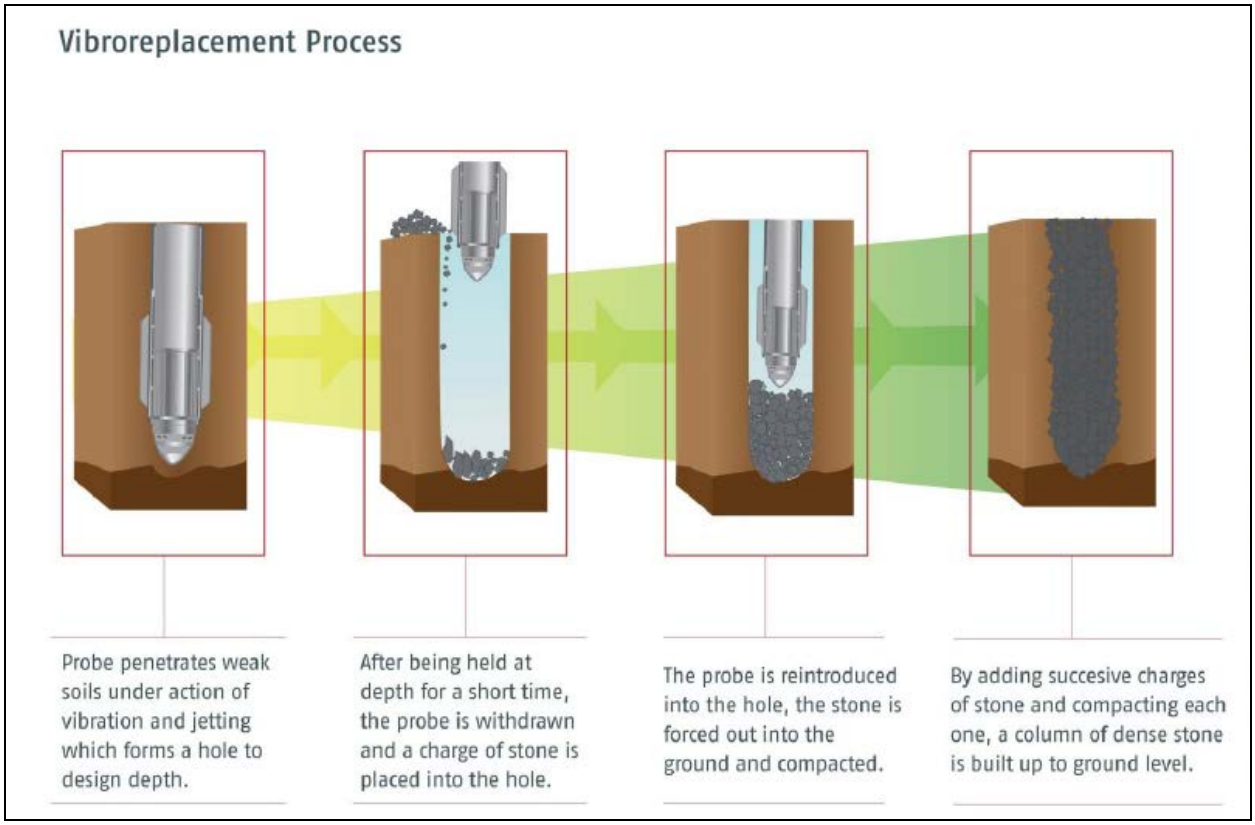

Figure 8.3: Vibro- replacement Process

8.5.1.4 Disposal of excavated peat

Initially, the peat will be stockpiled adjacent to the site and allowed to dry sufficiently to reduce haulage around and off the site. The peat material will be used as far as possible within the Project designation, including incorporating it into landscaping and the formation of acoustic barriers where practicable. Excess peat will then be removed from the site via the proposed Expressway corridor haul route, to consented dump sites. Possible dump sites could include:

- Bright's Cleanfill, Kāpiti Quarry, Paraparaumu, via on-road haul route exiting from Poplar Avenue;
- Former Waikanae Oxidation Ponds, Paetawa Road, to assist in the rehabilitation of this reserve (ref. Technical Report 26, Volume 3), via on-road haul route exiting from Te Moana Road; and
- Former Otaihanga Landfill, via off-road haul route exiting direct from the proposed Expressway corridor.

8.5.2 Earthworks

Generally the earthworks required for construction of the proposed Expressway will involve cut to fill of existing sand along the alignment.

The earthworks will comprise new embankments typically 2 to 3m high across low lying areas, cut slopes typically 10m and up to 25m high through sand dunes, and new approach embankments for structures. Embankments up to 7m high are required at local road crossings to provide sufficient height clearance.

- In some areas, particularly to the south of the Project, more fill may be required than is available locally. In these situations, sand fill will be transported to these areas from the cuts in the north of the route. Where insufficient material can be supplied from the alignment, imported fill will be brought in from nearby quarries.
- Sand dunes are particularly prone to wind and water erosion. Cuts and embankments will therefore need to be permanently stabilised by re-vegetation (refer to CEMP Appendix H, Volume 4).

Upon completion of cut to fill activities within each Construction Zone Section, any further earth-moving required between sections is likely to be carried out after completion of the bridge structures. Off-road dump trucks will utilise the completed proposed Expressway corridor and bridges as a haul route.

8.5.2.1 Site preparation for earthworks

Site preparation prior to earthworks commencing may require:

- Identification of the location of services. Services may require diversion outside the area of excavation;
- Clearing of vegetation and stripping of topsoil; and
- Installing erosion and sediment control measures (outlined within Appendix H, Volume 4).

8.5.2.2 Earthwork construction methods

The construction methods for earthworks include:

- Cut to fill within the section;
- Cut to fill using the haul road; and
- Import fill.

Compaction of fill material will take place in layers until it is at the required level and compaction to receive the road pavement layers.

8.5.3 Drainage

The installation of stormwater drainage along the proposed Expressway route will generally be completed during or prior to ground improvements and earthworks.

Wetland and flood offset storage areas will be formed at the time of earthworks and used for sediment control during construction wherever practicable.

Culvert installation or the extension of existing culverts (temporarily or permanently) will be required in a number of locations to allow for road construction. Culverts provide for a dry environment over which the construction activity can then occur. Where works are required within a stream channel to construct the culverts, two main methodologies will be used: either by pumping around the area of works or by creating a temporary stream diversion around the culvert footprint (refer to the CEMP Appendix H, Volume 4 for details on these methodologies).

8.5.4 Bridge construction

The construction of the bridges will be a significant part of the Project. Bridge construction works, at the ends of each Section, will be completed during earthworks activities. Bridges over or under the proposed Expressway would be constructed at various local road crossings.

As discussed in Chapter 7, 16 bridges will be built as part of the Project, with seven of these crossing watercourses; namely the Waikanae River, Wharemauku Stream, Kakariki Stream, Paetawa Stream and the three bridges over the Waimeha stream at the Te Moana Road interchange. Where works in and around streams are required, erosion and sediment control measures will be employed. Road bridges will have differing environmental controls to watercourse crossings (refer toCEMP Appendix H, Volume 4).

Bridge construction will typically involve piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position with the top slab cast in situ. Barriers will also be pre-cast and settlement slabs and wing walls cast in situ. The likely sequence of bridge construction is detailed within the Construction Methodology (Technical Report 4, Volume 3).

Concrete supply will be from a supplier local to Kāpiti Coast. Concrete deliveries will be to either the Otaihanga Yard for prefabrication activities or to the individual bridge sites. All sites will be accessed via SH1 and local roads.

At each bridge construction site, a small construction yard will be established to provide welfare facilities and material and plant storage.

The Construction Traffic Management Plan (CEMP Appendix O, Volume 4) details the proposals to control vehicular, pedestrian, cyclist and equestrian traffic during bridge construction.

8.5.5 Pavement and surfacing

Upon completion of the earthworks, drainage and bridges in each section, pavement materials will be laid. One carriageway of the proposed Expressway will be completed and sealed to enable immediate protection of the sub grade pavement layers and allow a progressive completion of the proposed Expressway. The other carriageway will be completed to subbase level to protect the sub grade and create the proposed Expressway corridor haul route for the bulk earthmoving activity and other construction traffic.

Upon completion of the required settlement periods for the preload areas, which on average are expected to be approximately 12 months, construction of the proposed Expressway in these areas will proceed. The preload surcharge will be removed and used as fill elsewhere along the proposed Expressway corridor, thus minimising the overall use of imported fill on the proposed Expressway. Pavement materials can then be placed on the remaining embankment to complete the road structure.

As the main carriageway is completed in each Section, the cycleway/walkway will also be completed. Once all works are complete within each carriageway section, traffic services, roadside furniture and landscaping, including acoustic barriers, will be able to be installed.

8.6 Sector specific construction activities

8.6.1 Sector 1

This Sector (between chainage 0m and 4500m) includes the following specific construction stages of the South Zone:

- Poplar Avenue (POP)
- Poplar Avenue-Raumati Road (POP-RAU)
- These sections are illustrated within the Construction Zone Diagram (Drawing CV-CM-101 to 108, Construction, Construction Zone Diagram and Stages, Volume 5, Folder 1 of 3).

8.6.1.1 Construction activity overview

Sector 1 includes the new partial interchange at Poplar Avenue, with a bridge constructed to take the proposed Expressway over Poplar Avenue. The proposed Expressway will then continue northwards from Poplar Avenue to Raumati Road.

Underbridge Construction – Poplar Avenue

Construction of the underbridge at Poplar Avenue will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the pre-cast concrete construction yard (within the main construction yard), transported to site and placed in position. Traffic on Poplar Avenue will diverted around the worksite during this process, to enable construction to proceed during the day.

Poplar Avenue- Raumati Road

Initially, preload fill will be brought into this section and allowed to settle. Imported fill and cut material from Sector 4 will be delivered by truck & trailer units and placed using bulldozers and compactors during daytime working hours. Following the preload settlement period, the new alignment will be constructed using earthmoving and road construction plant and equipment during the day.

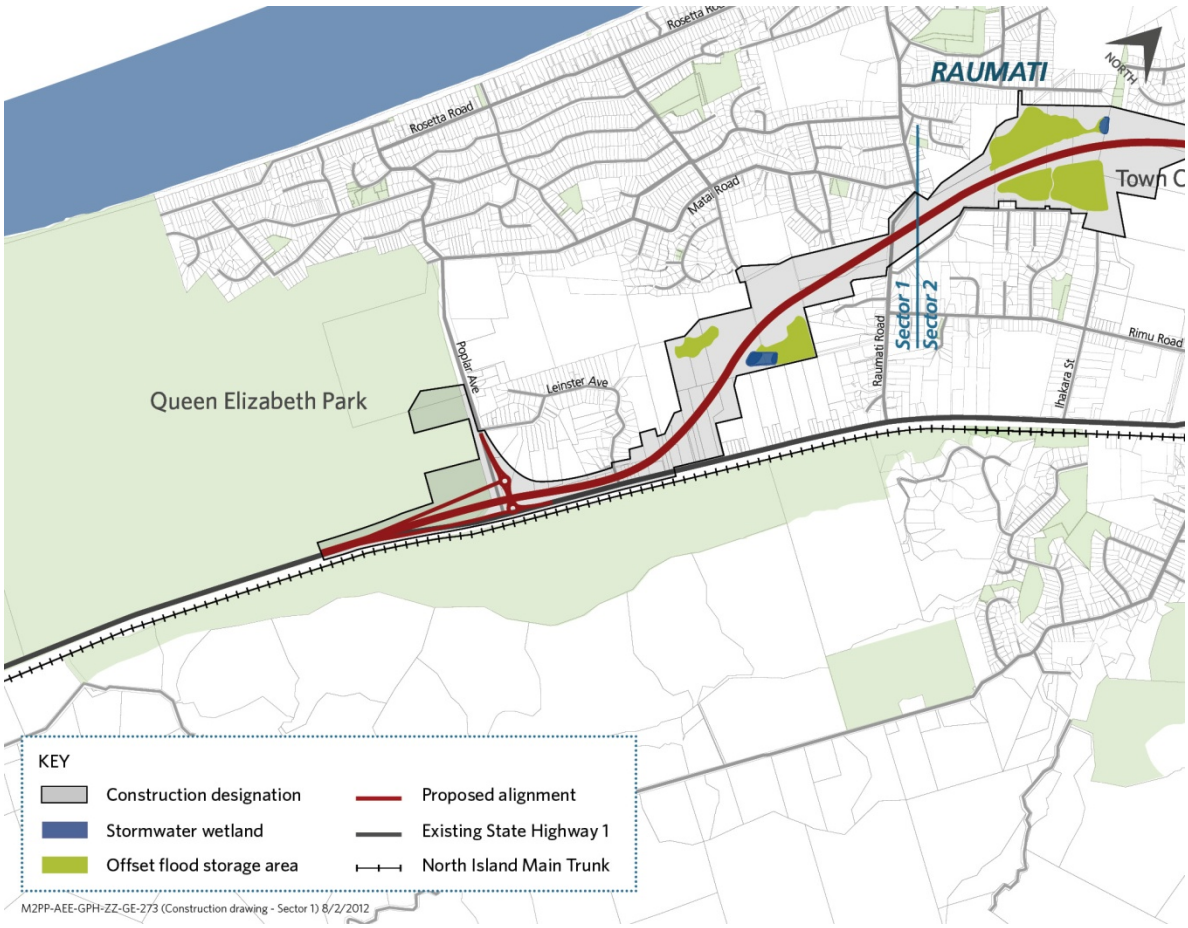

Figure 8.4: Extent of proposed construction designation in Sector 1

Poplar Avenue- Raumati Road

Initially, preload fill will be brought into this section and allowed to settle. Imported fill and cut material from Sector 4 will be delivered by truck & trailer units and placed using bulldozers and compactors during daytime working hours. Following the preload settlement period, the new alignment will be constructed using earthmoving and road construction plant and equipment during the day.

Stormwater Wetland Ponds

A stormwater wetland pond will be constructed either side of the proposed Expressway at approximate chainage 3800m. This will require a cut to waste activity, with any waste material being removed from site transported to an appropriate location.

8.6.1.2 Temporary traffic management

Poplar Avenue and the existing SH1/Poplar Avenue intersection are planned to be realigned in three phases to allow off-line construction of the Poplar Avenue interchange.

The NZTA will seek to have the SH1/Leinster Avenue intersection closed permanently.

8.6.1.3 Erosion and sediment control

Sector 1 is anticipated to include the following erosion and sediment control methods:

- SRP's (number 1 to 4)
- Dirty water diversion channels;
- Silt fences and super silt fences where required;
- Progressive stabilisation of batters; and
- Decanting earth/topsoil bunds.

These methods are detailed within CEMP Appendix H, Volume 4and illustrated on Drawing CV – CM 201 - 204, Volume 5, Folder 3 of 3.

8.6.1.4 Temporary stormwater management

Sector 1 is anticipated to include the following temporary stormwater methods:

- Drainage swales and associated rock filters (generally at approximately 50m intervals) are to be developed as part of the long term stormwater management;
- Long term stormwater wetlands and flood storage areas will act as a backup for managing sediment as necessary; and
- Culvert extensions

These methods are outlined within Technical Report 4, Volume 3 (Construction Methodology) and the CEMP Appendix H, Volume 4. The location for each method is illustrated on Drawings CV – CM 201 - 204, Volume 5, Folder 3 of 3.

8.6.1.5 Service relocations

A number of existing services will require relocation within Sector 1. These will include:

- A wastewater pumping station;
- Water mains and wastewater pipelines; and
- Telecom, Telstra and Electra cabling.

8.6.2 Sector 2

This Sector (chainage 4500m to 8300m) includes the following specific construction stages of the South Zone:

- Raumati Road-Wharemauku Stream/Ihakara Street (RAU-IHA);
- Ihakara Street/Wharemauku Stream-Kāpiti Road (IHA-KAP);
- Kāpiti Road-Mazengarb Road (KAP-MAZ); and
- Mazengarb Road-plus 300m (MAZ-OT).

These sections are illustrated within the Construction Zone Diagram (Drawings CV-CM-101 to 108, Volume 5, Folder 1 of 3).

8.6.2.1 Construction activity overview

Sector 2 includes the construction of the proposed Expressway from Raumati Road to 300m north of Mazengarb Road, through the predominantly urban environment of Paraparaumu. Underbridges will be constructed over local roads at Raumati Road and Mazengarb Road, along with an underbridge spanning the Wharemauku Stream.

A vertical realignment of Mazengarb Road will be required to accommodate the proposed Expressway bridge. Kāpiti Road will be widened as part of the construction of the new interchange. A bridge will be constructed over Kāpiti Road to carry the proposed Expressway, with on- and off-ramps in each direction.

Construction is likely to proceed in a north-south direction from Sector 3. This will enable the progressive completion of the bridges and earthworks to enable a haul route to be established along the new alignment and over the proposed bridges to transport fill material from Sector 4 to Sector 2.

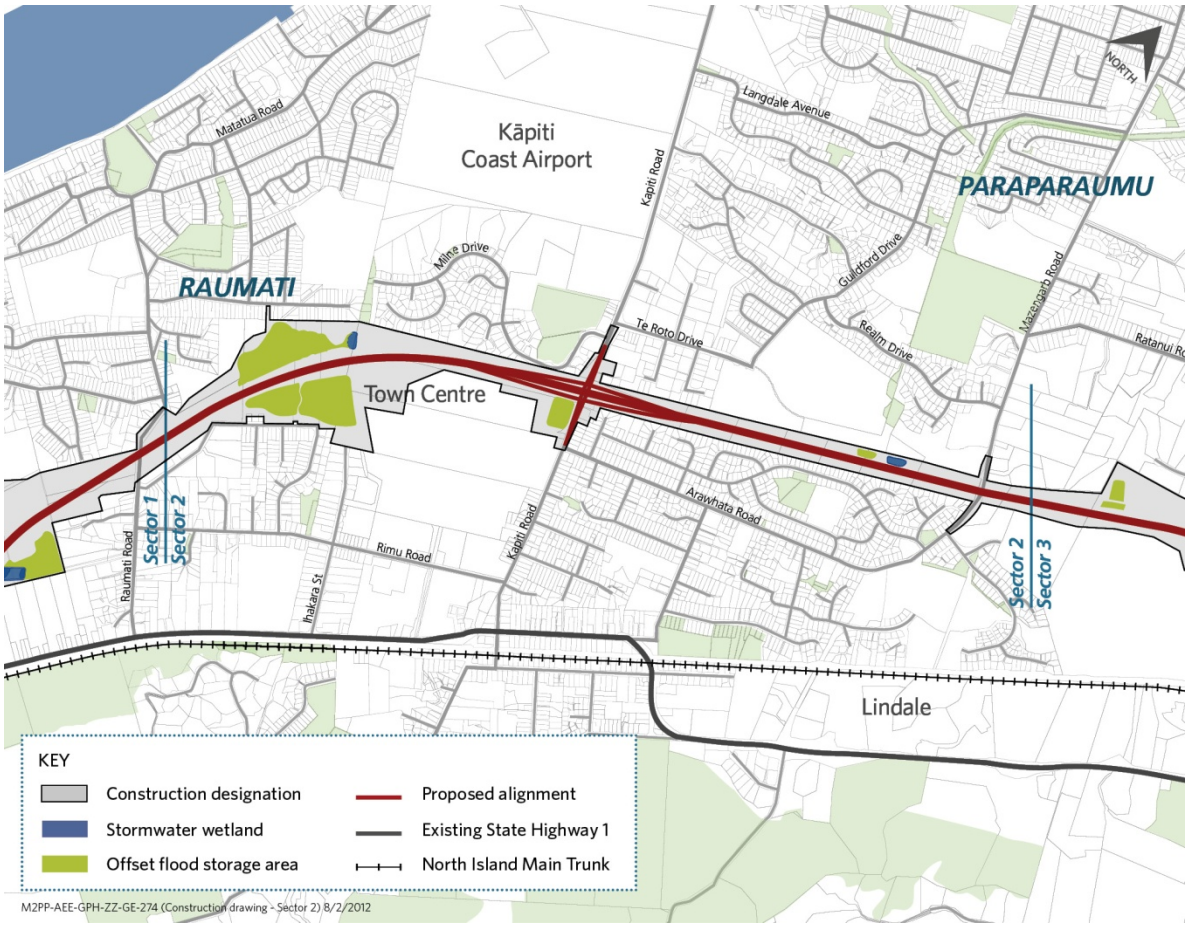

Figure 8.5: Extent of proposed construction designation in Sector 2

Underbridge Construction – Raumati Road

Construction of the underbridge at Raumati Road will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position. Due to traffic using Raumati Road during the placement of bridge beams, this operation is likely to proceed during the night with Raumati Road closed.

Raumati Road- Wharemauku Stream

Preload fill will be brought into this section and allowed to settle for up to six months. Imported fill will be initially delivered by truck & trailer units and placed using bulldozers and compactors. The embankments will be completed by moving cut material within the section using bulldozers and motor scrapers. Earthworks will occur during daytime working hours. Following the preload settlement period, the new alignment will be constructed using earthmoving and road construction plant and equipment during the day.

Underbridge Construction - Wharemauku Stream

Construction of the underbridge across the Wharemauku Stream will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead

construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position. The access to the bridge site will be via a temporary access track constructed from the end of the existing Ihakara Road. Construction will proceed during the day.

Wharemauku Stream- Kāpiti Road

Preload fill will be brought into this section and allowed to settle for up to one year. Imported fill will be initially delivered by truck & trailer units and placed using bulldozers and compactors. The embankments will be completed by moving cut material within the section using bulldozers and motor scrapers. Earthworks will occur during daytime working hours. Following the preload settlement period, the new alignment will be constructed during the day using earthmoving and road construction plant and equipment.

Widening of Kāpiti Road

The widening of Kāpiti Road will be carried out using standard road construction machinery. It is anticipated that the work will proceed using temporary traffic management arrangements during the day. However, some operations may be required at night due to significant daytime traffic volumes.

Underbridge Construction – Kāpiti Road

Construction of the underbridge at Kāpiti Road will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position. Due to the extent of traffic using Kāpiti Road, bridge beam placement is likely to proceed under night-time closures.

Kāpiti Road- Mazengarb Road

The earthworks phase of this section will involve scrapers moving material along the alignment between Kāpiti Road and Mazengarb Road. Upon completion of the earthworks activity, the proposed Expressway pavement will be completed using standard road construction machinery. One carriageway will be completed to subbase level only at first to provide a haul route through Sector 2. Following completion of all earthworks in Sector 2, the haul route will be paved and surfaced to completion. Work is likely to be carried out during the day.

Vertical realignment of Mazengarb Road

The vertical realignment of Mazengarb Road will be carried out using standard road construction machinery. Construction of the retaining walls will also occur in this area using piling machinery and earthmoving equipment. It is anticipated that the work will proceed under temporary traffic management arrangements during the day. However, some operations may be required at night due to high daytime traffic volumes.

Underbridge Construction – Mazengarb Road

Construction of the underbridge at Mazengarb Road will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position. Due to the traffic volumes on Mazengarb Road, bridge beam placement is likely **to proceed under night- time closures.**

Mazengarb Road + 300m

The earthworks phase of this section will involve scrapers moving material along the alignment between Kāpiti Road and Mazengarb Road. Upon completion of the earthworks activity, the proposed Expressway pavement will be completed using standard road construction machinery. One carriageway will be completed to subbase level only at first to provide a haul route through Sector 2. Following completion of all earthworks in Sector 2, the haul route will be paved and surfaced to completion. Work is likely to be carried out during the day.

8.6.2.2 Stormwater wetland ponds

Stormwater wetland ponds will be constructed at the following locations in Sector 2:

- either side of the proposed Expressway south of Wharemauku Stream
- south-east side of Kāpiti Road
- south-west side of Mazengarb Road

These ponds will require a cut to waste activity, with any waste material being removed from site transported to an appropriate location.

8.6.2.3 Temporary traffic management

The construction of overbridges on Raumati Road and Mazengarb Road and the lowering of Mazengarb Road are planned to be constructed under a staged process. The lanes and shoulder are proposed to be narrowed and realigned around the construction works. Bridge beams are planned to be lifted under a detour, most likely overnight. Pedestrians will be diverted to the opposite footpath to the construction area.

During the Wharemauku Stream Bridge construction, pedestrians and cyclists on the Wharemauku Stream trail will be temporarily diverted around the works or to the opposite bank via a temporary bridge and the permanent cycleway bridge.

The construction of the Kāpiti Interchange is planned to be constructed under three phases. Kāpiti Road is planned to be realigned in each phase around the construction area and will make use of the additional road width that will be constructed for the new interchange. Pedestrians will be diverted around the construction area or to the opposite footpath.

8.6.2.4 Erosion and sediment control

Sector 2 is anticipated to include the following erosion and sediment control methods:

- SRP's (number 5 to 9);
- Silt fences and super silt fences will be established where required;
- Decanting topsoil/earth bunds;
- Pumping;
- Progressive stabilisation of batter slopes; and
- Dirty water diversion channels.

Dust is anticipated to result from construction works between Kāpiti Road north to Mazengarb Road. Works during the winter period will be encouraged to take advantage of wetter conditions, while at other times, a programme of dust management using water carts will be used.

These methods are outlined within Technical Report 4, Volume 3 (Construction Methodology) and the CEMP Appendix H, Volume 4. The location for each method is illustrated on Drawings CV –CM - 204 to 211, Volume 5, Folder 3 of 3.

8.6.2.5 Temporary stormwater management

Sector 2 is anticipated to include the following temporary stormwater management methods:

- Four of the long-term stormwater wetlands will be utilized as SRP's (number 5, 6, 8 and 9);
- Drainage swales and associated rock filters which are to be developed as part of the long-term stormwater management; and
- Culvert extensions.

These methods are outlined within Technical Report 4, Volume 3 (Construction Methodology) and the CEMP Appendix H, Volume 4. The location for each method is illustrated on Drawings CV –CM - 204 to 211, Volume 5, Folder 3 of 3.

8.6.2.6 Service relocations

A number of existing services will require relocating in Sector 2. These will include:

- Gas supply pipelines;
- Water mains and wastewater pipelines; and
- Telecom, FX Networks and Electra cables.

8.6.3 Sector 3

This Sector (chainage 8300 to 12400m) includes the following specific construction stages of the North Zone:

- Mazengarb Road-plus 300m to-Otaihanga Road (MAZ-OT);
- Otaihanga Road-Waikanae River (OT-WAI);
- Waikanae River-Te Moana Road (WAI-TEM); and
- Te Moana Road-plus 600m (TEM-NGA).

These sections are illustrated within the Construction Zone Diagrams (CV-CM-101 to 108, Volume 5, Folder 1 of 3).

8.6.3.1 Construction activity overview

Sector 3 involves the construction of the proposed Expressway 300m north of Mazengarb Road to 600m north of Te Moana Road. An underbridge will be constructed at Otaihanga Road, along with a new, realigned accessway. Construction of a 170m bridge spanning the Waikanae River will also be constructed in this Sector. At Te Moana Road, the existing road will be realigned to incorporate two new roundabouts that will form the intersections with the proposed Expressway off and on ramps. An underbridge will be constructed to carry the proposed Expressway over Te Moana Road, with on- and off-ramps in each direction.

The main construction yard and project office will be established at the Otaihanga landfill site and transfer station on Otaihanga Road. This will become the main access onto and off the alignment for delivery of materials and movement of plant and vehicles. Construction will be staged to enable movement of construction traffic along the route from this main access point.

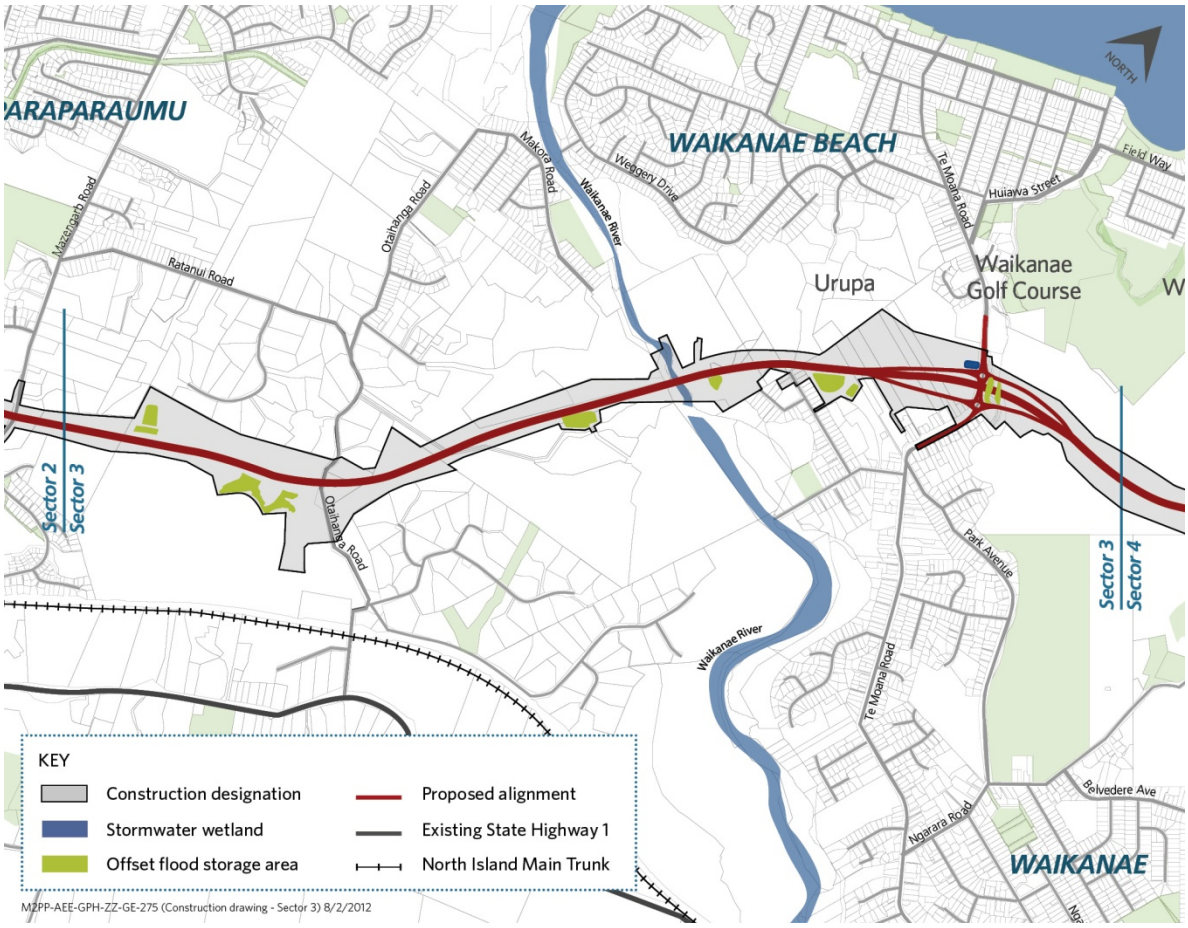

Figure 8.6: Extent of proposed construction designation in Sector 3

Mazengarb Road +300m – to Otaihanga Road

Preload fill will be brought into this section and allowed to settle for up to 6 months. Imported fill will be initially delivered by truck & trailer units and placed using bulldozers and compactors. The embankments will then be completed by moving cut material within the section, using bulldozers and motor scrapers and transporting material from Sector 4 along the haul route, using off-road dumpers. Following the preload settlement period, the new alignment will be constructed using earthmoving and road construction plant and equipment. One carriageway will only be completed to subbase level at first to provide the earthworks haul route. Following completion of all earthworks in Sector 2, the haul route will be paved and surfaced to completion. Works are likely to be carried out during the day.

Underbridge Construction – Otaihanga Road

Construction of the underbridge at Otaihanga Road will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position. Due to the daytime traffic volumes on Otaihanga Road, bridge beam placement is likely to proceed under night-time road closures.

New access road to Otaihanga Road

A new access road for properties to the west of the proposed Expressway will be provided. This road will link to Otaihanga Road, and will be constructed using standard road construction machinery. It is anticipated that the work is likely to proceed under temporary traffic management arrangements during the day.

Otaihanga Road- Waikanae River

The earthworks phase of this section will involve scrapers moving material along the alignment between Otaihanga Road and Waikanae River. Upon completion of the earthworks activity, the proposed Expressway pavement will be completed using standard road construction machinery. One carriageway will only be completed to subbase level at first to provide a haul route through Sector 3. Following completion of all earthworks in Sector 3, the haul route will be paved and surfaced to completion. Work is likely to be carried out during the day.

Waikanae River Bridge

Construction of the Waikanae River Bridge will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position. Bridge beams will be transported to the construction site along the alignment, accessing from Otaihanga Road and from Te Moana Road. Streamworks and flood mitigations works to the Waikanae River will also be carried out at this time using standard earthmoving equipment.

Waikanae River – to Te Moana Road

The earthworks phase of this section will involve scrapers moving material along the alignment between Waikanae River and Te Moana Road. Upon completion of the earthworks activity, the proposed Expressway pavement will be completed using standard road construction machinery. One carriageway will only be completed to subbase level at first to provide a haul route through Sector 3. Following completion of all earthworks in Sector 3, the haul route will be paved and surfaced to completion. Work is likely to be carried out during the day.

Te Moana Road Interchange

The formation of the new intersection at Te Moana Road will be carried out using standard road construction machinery. It is anticipated that the work will proceed under temporary traffic management arrangements during the day. However, some operations may be required at night due to daytime traffic volumes.

Underbridge Construction – Te Moana Road

Construction of the underbridge at Te Moana Road will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site

and placed in position. Due to daytime traffic volumes on Te Moana Road, bridge beam placement is likely to proceed under night-time closures.

8.6.3.2 Stormwater wetland ponds

Stormwater wetland ponds will be constructed either side of the proposed Expressway at the Te Moana Interchange. These ponds will require a cut to waste activity, with waste material transported to the Otaihanga Yard via the route of the proposed Expressway.

8.6.3.3 Temporary traffic management

As described above, the main project office and yard are planned to be established off Otaihanga Road.

The construction of the proposed Expressway bridge over Otaihanga Road are planned to be staged, requiring traffic lanes to be realigned around the construction works, maintaining bi-directional flow. The proposed Expressway Bridge beams are planned to be lifted in place under a detour, probably overnight.

The construction of the Waikanae River Bridge is expected to require the realignment of the Waikanae River trail. Pedestrian and cycle detours are expected to be required during abutment construction and bridge beam placement.

The construction of the Te Moana Road Interchange is planned to be constructed in three phases: south side, north side and central area. In each phase, the existing Te Moana Road will be temporarily diverted around the construction area, making use of the additional width provided by the new configuration. The Te Moana Road Bridge beams are planned to be lifted in place under a detour, probably overnight.

8.6.3.4 Erosion and sediment control

Sector 3 is anticipated to include the following methods:

- SRP's (number 10 and 11);
- topsoil bunds and decanting earth bunds;
- pumping;
- progressive stabilisation of batter slopes; and
- Super silt fences.

A portion of the existing land fill and transfer station area will be utilised as a construction yard with specific erosion and sediment controls for the establishment of this yard as illustrated in drawing CV-SP-159, Volume 5.

These methods are outlined within CEMP Appendix H, Volume 4. The location for each method is illustrated on Drawings CV – CM - 212 to 218, Volume 5, Folder 3 of 3.

8.6.3.5 Temporary stormwater management

Sector 3 is anticipated to include the following temporary stormwater management methods:

- Long term stormwater wetlands will be utilised as SRP number 10 and 11;
- Other long term stormwater wetland areas will be utilised where necessary;
- Drainage swales and associated rock filters which are to be developed as part of the long term stormwater management; and
- Culvert extensions.

These methods are outlined within Technical Report 4, Volume 3 (Construction Methodology) and the CEMP Appendix H, Volume 4. The location for each method is illustrated on Drawings CV – CM - 212 to 218, Volume 5, Folder 3 of 3.

8.6.3.6 Service relocations

A number of services will require relocating in Sector 3. These include:

- Gas supply pipelines and delivery point station;
- Water mains and waste water pipelines;
- Telecom, Telstra and Electra cables. A length of the twin Vector gas supply pipelines, north of the Waikanae River, will require relocation.

The final design detail of the Te Moana interchange may require the relocation of the KCDC bore water supply near the Market Gardens.

8.6.4 Sector 4

This Sector (chainage 12400 to 18050) includes the following specific construction stages of the North Zone:

- Te Moana Road-plus 600m to Ngarara Road;
- Ngarara Road-Peka Peka (NGA-PP); and
- Peka Peka Interchange (PP).

These sections are illustrated within the Construction Zone Diagram (Drawings CV-CM-101 to 108, Volume 5, Folder 1 of 3).

8.6.4.1 Construction activity overview

Sector 4 involves construction of the proposed Expressway through a mainly rural area to link back with the existing SH1 at Peka Peka or the Peka Peka to Ōtaki Project, depending on if and when that is constructed. A new alignment of Ngarara Road will be built with the road crossing the proposed Expressway, which will include construction of an overbridge. Smithfield Road will be relocated to the

south of its existing position, with an overbridge constructed to carry the new alignment over the proposed Expressway.

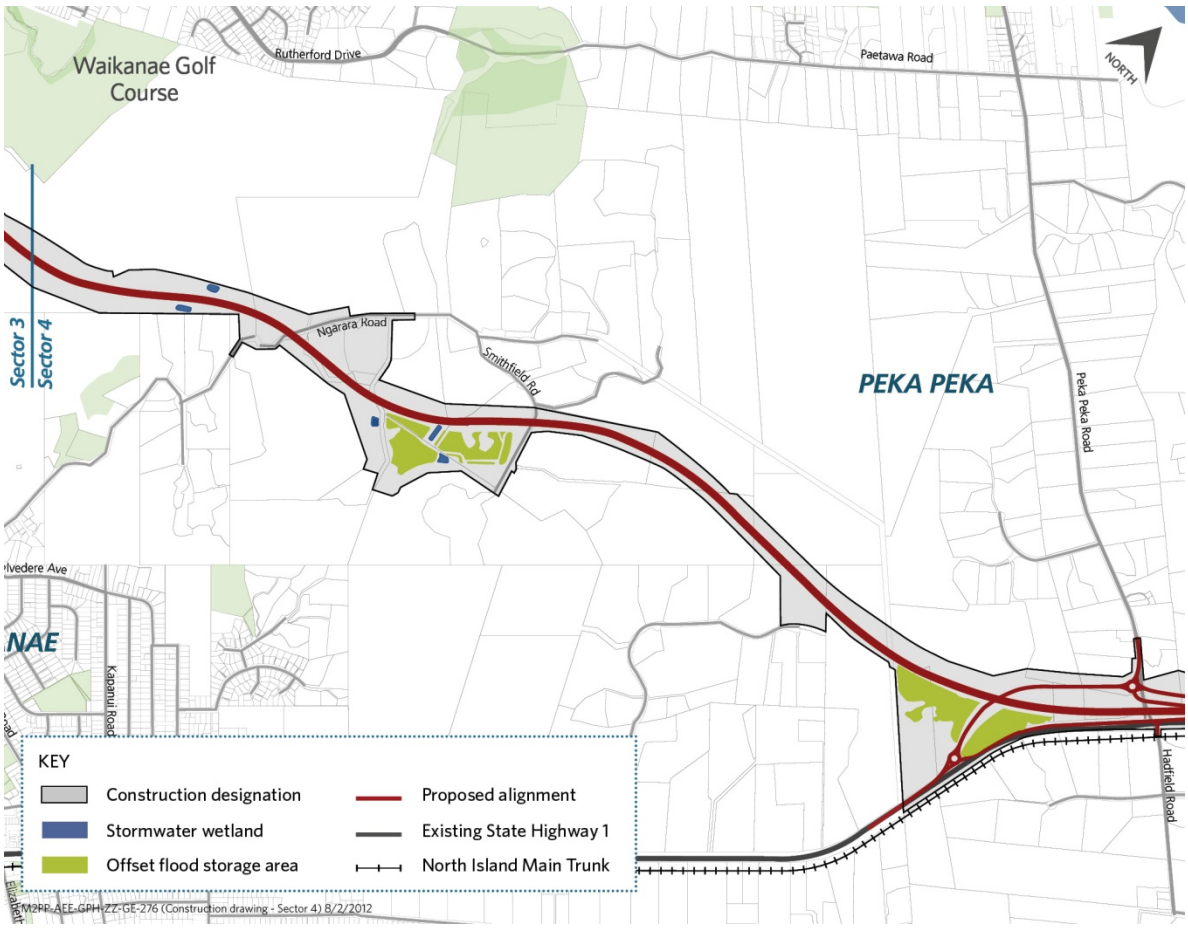

Figure 8.7: Extent of proposed construction designation in Sector 4

Te Moana Road +600m- to Ngarara Road

The earthworks phase of this section will involve scrapers moving material along the alignment between Te Moana Road and Ngarara Road. This section is also the main source of fill material for the proposed Expressway, so in addition to scrapers forming the alignment in this area, excavators will also be loading off-road dump trucks for transport to fill locations to the north and south via the haul routes . Upon completion of the earthworks activity, the proposed Expressway pavement will be completed using standard road construction machinery. Work is likely to be carried out during the day.

Ngarara Road Realignment

The realignment of Ngarara Road will be carried out using standard road construction machinery. It is anticipated that the work will proceed under temporary traffic management arrangements during the day.

Overbridge Construction – Ngarara Road

Construction of the overbridge to carry the new Ngarara Road alignment over the proposed Expressway will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site. They will be lifted into position from the new alignment and so work should be able to proceed during the day.

Smithfield Road Realignment

The formation of the new Smithfield Road alignment will be carried out using standard earthworks and road construction machinery. As the new alignment is away from existing roads, work is likely to proceed during the day.

Overbridge Construction – Smithfield Road

Construction of the overbridge to take the new Smithfield Road over the proposed Expressway will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site. They will be lifted into position from the new Smithfield Road alignment and so work should be able to proceed during the day.

Ngarara Road- Peka Peka

Initially, preload fill will be brought into this section and allowed to settle for up to eighteen months. Imported fill will be initially delivered by truck & trailer units and placed using bulldozers and compactors. The embankments will then be completed by moving cut material within the section, using bulldozers and motor scrapers and transporting material from the TEM-NGA section along the haul route, using off-road dumpers. Following the preload settlement period, the new alignment will be constructed using earthmoving and road construction plant and equipment. One carriageway will only be completed to subbase level at first to maintain the haul route to the Peka Peka Interchange. Following completion of all earthworks, this haul route will be paved and surfaced to completion. All works are likely to be carried out during the day. Access will be directly from SH1 at Peka Peka Beach Road.

Peka Peka Interchange

The formation of the new interchange at Peka Peka will be carried out using standard earthmoving and road construction machinery. It is anticipated that the work will proceed under temporary traffic management arrangements during the day. However, some operations may be required at night due to daytime traffic volumes.

Overbridge Construction – SH1 (Peka Peka)

Construction of the overbridge to carry SH1 across the proposed Expressway at Peka Peka Interchange will involve ground improvements using vibro-replacement techniques, piling operations and reinforced concrete column and crosshead construction. Bridge beams will be cast off-site in the precast concrete construction yard and then transported to site and placed in position.

8.6.4.2 Temporary traffic management

The Ngarara Road Overbridge and Smithfield Road Extension will be constructed off-line, using a haul road from Peka Peka Road. Ngarara Road will be temporarily realigned during the Ngarara Road Bridge construction to enable traffic to be diverted around the worksite.

The existing connection of Peka Peka Road to SH1 will be maintained while the proposed bridge and link to SH1/the Peka Peka to Ōtaki Project, is constructed. The proposed roundabout on Peka Peka Road will be built off line and the link road to Te Kowhai Road then constructed. Once complete traffic on Peka Peka Road and Te Kowhai Road will be diverted onto the new links and the proposed Expressway.

8.6.4.3 Erosion and sediment control

Sector 4 is anticipated to include the following erosion and sediment control methods:

- SRP's (number 12 and 13);
- Dirty water diversion channels;
- Silt fences and super silt fences; and
- Decanting earth bunds.

These methods are outlined within Technical Report 4, Volume 3 (Construction Methodology) and the CEMP Appendix H, Volume 4. The indicative location for each method is illustrated on Drawings CV – CM – 218 to 231, Volume 5, Folder 3 of 3.

8.6.4.4 Temporary stormwater management

Sector 4 is anticipated to include the following temporary stormwater management methods:

- Long term stormwater wetlands will be utilised as SRP's (number 12 at approx. chainage 14000m and 13 at approx. chainage 14200m);
- Drainage swales and associated rock filters which are to be developed as part of the long term stormwater management; and
- Culvert extensions.

These methods are outlined within Technical Report 4, Volume 3 (Construction Methodology) and the CEMP Appendix H, Volume 4. The location for each method is illustrated on Drawings CV – CM – 218 to 231, Volume 5, Folder 3 of 3.

8.6.4.5 Service relocations

A number of services will require relocation in Sector 4. These will include:

- Water mains and waste water pipelines; and
- Telecom and Electra cables.

PART E: CONSIDERATION OF ALTERNATIVES

9 Consideration of alternatives

Overview

Under the RMA a requiring authority needs to consider alternative sites, routes and methods of undertaking a work when lodging a notice of requirement (NoR) if it does not have an interest in the land sufficient for undertaking the work or the work is likely to have a significant adverse effect on the environment. The Act also requires an applicant to consider alternative methods and locations for resource consents relating to any activity that may have significant adverse effects on the environment or, when an activity involves the discharge of a contaminant, alternative methods of discharge.

This Chapter outlines the alternatives that were identified and assessed as part of the process to determine the selected alignment and design of the proposed MacKays to Peka Peka Expressway. This included a detailed analysis of 4 principal route options (i.e. an Expressway alignment within one of the four principal corridor options between MacKays Crossing and Peka Peka: the Western Link Road Corridor, the Western Corridor, the Eastern Corridor and the Existing State Highway Corridor), 12 connectivity options (i.e. number, location and orientation of ramps and interchanges) and 24 alignment sub-options (i.e. local road tie-ins and location).

The assessment of alternatives demonstrates that the NZTA, in developing the proposed route, alignment, design, and methodology for the proposed Expressway has considered:

- alternative routes (as appropriate);
- alternative alignments and interchanges/connections to the transport network;
- alternative designs, including construction methods and alternative measures to avoid, remedy and mitigate identified adverse effects on the environment; and
- alternative methods of discharging contaminants.

The assessment process applied was highly iterative, and involved ongoing refinement of the Project on the basis of information derived from desk top studies, field work, community and stakeholder engagement and detailed technical investigations. The process was also informed by the requirements of Part 2 of the RMA, the objectives of the Project and relevant national policy directives. The process satisfies the requirements of section 171 and Schedule 4 of the RMA.

9.1 Introduction

This Chapter provides a summary of the key aspects of the alternatives assessment process undertaken during the development of the Project, including that undertaken in 2009 to inform the NZTA Board's choice of the Western Link Road as its preferred route.

The process focused on identifying the most appropriate route and alignment for the Project. It commenced at a broad scale and systematically narrowed the geographic area of assessment to identified route and alignment options. At each stage of this process, the existing natural and built environment was taken into account, as well as social and cultural values.

The initial assessment was primarily based on desk top analysis and the outcomes of previous and preliminary consultation. Subsequently, the options assessment was supplemented by more detailed field investigations and targeted stakeholder and community engagement (for example, community expos and feedback). The information derived from this process was fully considered and incorporated into the decision-making process during the development of the final project scheme.

This Chapter summarises the decision-making process involved in the evaluation of alternative routes, sites and methods, with reference to the relevant statutory requirements, and the key steps involved in the assessment process, which were as follows:

- Route Options Assessment;
- Alignment and Interchange Options Assessment; and
- Design and Mitigation Options Assessment.

Further detail regarding alternatives to address specific or potential environmental effects associated with the project is provided in the Technical Reports in Volume 3 of the AEE.

9.2 Statutory requirement to consider alternatives

Under the RMA, a consideration of alternative routes, sites and methods is relevant in certain specific respects:

- In relation to Notices of Requirement, one of the matters to which particular regard must be given is to whether adequate consideration has been given to alternative sites, routes and methods of undertaking the work (where a requiring authority does not have an interest in the land sufficient for undertaking the work, or it is likely that work will have a significant adverse effect on the environment) (section171(1)(b);
- In relation to resource consent applications, the Fourth Schedule requires an AEE to include a description of possible alternative locations or methods for undertaking the activity where it is likely that the activity will have a significant adverse effect on the environment (Schedule 4 clause 1(b);
- In relation to applications for discharge permits, section 105 requires decision makers to have regard to various matters including “any possible alternative methods of discharge, including discharge into any other receiving environment”; and
- The RMA specifies a “best practicable option” regime in relation to noise, and implies consideration of options.

9.2.1 Section 171(1)(b) - NOR

With respect to section 171(1)(b), the NZTA does not have an interest in all of the land required for the Project. While the Crown will continue to acquire the necessary property interests after the NOR has been lodged, it will not have completed the property acquisition process prior to the NOR being determined. Consequently, consideration of alternative sites, route and methods needs to be undertaken. The alternatives considered by the NZTA are those that are within its powers to undertake and that will assist it to achieve its objectives for the project.

Section 171(1)(b) also requires the NZTA to demonstrate that its investigation of alternatives has not been carried out in an arbitrary or cursory way.[74] However, this does not mean that it is required to consider the full suite of alternatives available, or to select the best option in assessing the relative merits of the alternatives identified.[75]

Under section 167 of the RMA the NZTA is an approved requiring authority for the:

> *construction and operation (including the maintenance, improvement, enhancement, expansion, realignment and alteration) of any State highway or motorway, pursuant to the [Transit New Zealand Act 1989].*[76]

Improvements in public transport between Wellington City and the Kāpiti Coast were not considered as an alternative in relation to this project as the provision of public transport is outside the scope of NZTA's statutory powers under the Land Transport Management Act 2003 (LTMA) and the Government Roading Powers Act 1989. However, public transport improvements along this corridor have been identified by Greater Wellington Regional Council as part of a package of transport measures outlined in the Western Corridor Plan (2006), and which are contained with the current Wellington Regional Land Transport Strategy (RLTS) 2010-2040.

9.2.2 Resource consent applications

For the resource consent applications (including discharge permit applications), the available choice of locations or methods is constrained by the Project for which the designation is sought. That is, locations or methods that will not enable the work for which the designation is sought are not "possible"

---

[74] Refer Environmental Defence Society v Mangonui County Council HC Auckland M101/81, 23 October 1981, Waimairi District Council v Christchurch City Council EC 030/82 and Villages of NZ (Mt Wellington) Ltd v Auckland City Council EC A023/09.

[75] Refer Beda Family Trust v Transit New Zealand A139/04.

[76] Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994, notified in the Government Gazette on 3 March 1994. Under clause 29 of Schedule 2 of the Land Transport Management Amendment Act 2008, the NZTA replaced Transit New Zealand as the requiring authority approved under this Gazette Notice. Under section 47(1)(c) of the Land Transport Management Amendment Act 2008, from 1 July 2008 the Transit New Zealand Act 1989 is to be called the Government Roading Powers Act 1989.

alternatives. In this sense, the alternatives to be considered in relation to both the designations and resource consents must align.

9.2.3 Mitigation

See discussion in Section 9.8.

9.3 Base information - constraints analysis

To inform the scoping of alternative routes a study was undertaken to identify and map specific features within the Project area that could act as a potential constraint to constructing the proposed Expressway.[77] The constraints mapping included reviewing previous transport studies relating to the Project area,[78] examining the existing environment in the vicinity of the proposed Expressway routes, preparing relevant technical desktop studies, undertaking traffic modelling (where appropriate), ground photography and site visits.

The examination of the existing environment highlighted a number of constraints that were relevant to the consideration of route alternatives and the development of project options. These constraints fell into the following areas:

- Cultural and archaeological (for example, potential for unknown archaeological sites; sites and localities of cultural importance to Iwi);
- Environmental (for example, air quality; wetlands; habitat severance; indigenous vegetation);
- Land use (for example, zoning; existing land uses; designations);
- Urban design (for example, urban form; accessibility; east-west connectivity);
- Social and community (for example, proximity to residential areas; property acquisition and associated displacement costs);
- Landscape and visual (for example, dune system; Raumati Escarpment);
- Geology and ground conditions (for example, peat deposits; sand dunes); and
- Stormwater and Hydrology (for example, flood levels; secondary flow paths).

The results of the constraints mapping are documented in Table 19 of the *M2PP Scoping Report* (2010), and were used as the basis for generating and assessing the alignment options.

---

[77] For the purposes of this study a constraint was considered to comprise any feature that needed to be taken into account when considering alignment options. Depending on the significance of the constraint (compared with other constraints) alignment options generally sought to avoid key constraints as far as practicable.

[78] For example, the *Transit NZ SH1 Kāpiti Strategic Study: Scoping Report* prepared by Opus in 2008.

9.4 Assessment of alternative route options

9.4.1 Project context

Construction of some form of roadway in the corridor occupied by the current Western Link Road (WLR) designation is an outcome that has been anticipated for more than 50 years. In 1949 the Governor-General authorised a motorway to be constructed between Wellington and Foxton, and an associated middle line proclamation was issued in 1956.

From that time onwards there has been a consistent preference for this corridor over other options (although corridor options have been re-appraised from time to time) and, until 1995, for it to be used for motorway purposes (refer to Appendix K – Chronology of Proposed Kāpiti Coast Arterial Route in the *M2PP Alternative Route Options Report* (2011)). After that date the preference shifted to an arterial road comprising two and four lane sections and at-grade intersections with local roads.

A more detailed account of the historical context of the project, along with associated investigations that have been carried out on the future of SH1which have been used to inform option identification, is included in Chapter 2, Part A, Volume 2 of the AEE.

9.4.2 NZTA – options assessment

In 2009, following extensive consultation and engagement with the Kāpiti community on three route options - the WLR (Sandhills) option, the Western option and the Eastern option (refer to Chapter 10, Part F, Volume 2 of the AEE) - the NZTA undertook an assessment against the statutory requirements of the LTMA. As part of this analysis, a series of papers relevant to option selection were prepared by NZTA staff and supplied to the NZTA Board for consideration. The papers included:[79]

- Workshop paper 09/12/0300 - SH1 Kāpiti Expressway, MacKay's Crossing to Peka Peka – Workshop Briefing, 8 December 2009;
- Workshop paper 09/12/0306 - MacKay's Crossing to Peka Peka Expressway options consultation analysis, 8 December 2009;
- Board paper 09/12/0326 - Kāpiti Board workshop additional information, 11 December 2009; and
- Board paper 09/12/0327 - SH1 Kāpiti Expressway: MacKay's Crossing to Peka Peka option selection, 11 December 2009.

In addition to these papers, associated NZTA workshops were undertaken (in which the Board participated) and the Board received advice from an independent panel of urban design specialists.

[79] These papers are publicly available and can be viewed at http://www.nzta.govt.nz/projects/mackays-to-peka-peka/resources.html

Having considered and weighed up the information provided, the Board resolved in December 2009 that it:[80]

a. **notes** the consultation report and key issues arising:

b. **notes** that three options have been thoroughly investigated for the alignment of a SH1 expressway corridor through Kāpiti;

c. **notes** that each option has strengths and weaknesses with respect to social, cultural and environmental concerns;

d. **notes** that the Kāpiti Coast District Council supports the Eastern option;

e. **notes** that the community consultation indicated greater support for the Sandhills option compared with the other options;

f. **notes** that there are clear cost advantages of the Sandhills option, compared with the other options;

g. **agrees** that the Sandhills option is the preferred Corridor for the SH1 expressway through Kāpiti, subject to further alignment development within the corridor including more detailed assessment of effects and further community consultation.

The reasons for Board selection of the WLR corridor were that, when compared with the other route options, it:

- would have the least impact on properties, least population displacement, and the fewest properties required;
- would be the least cost to construct (an estimated 25-30% lower);
- could be constructed within the shortest period, with least disruption; and
- had the greatest proportion of local community support.

9.4.3 M2PP Alliance - options assessment

Subsequent to the NZTA Board's resolution that the WLR was its preferred route, the M2PP Alliance undertook a further RMA based assessment of the principal alternative route options, using accepted methodologies for evaluating the comparative impacts of the principal options. A detailed description of the process and associated outcomes is documented in the *M2PP Alternative Route Options Report* (2011).

[80] Minutes of NZTA Board meeting, 11 December 2009, Minute 1c

The following key stages were involved in this further options assessment:

- Reviewing and confirming the principal route options for constructing an Expressway between MacKays Crossing and Peka Peka;
- Undertaking a design, transportation and environmental evaluation of the non-cost attributes of these route options;
- Undertaking a multi-criteria analysis (MCA) of the comparative non-cost attributes of the route options, including sensitivity testing of the various attributes; and
- Undertaking a cost assessment of the principal route options to inform the analysis of the comparative cost attributes.

9.4.4 Overview of alternative expressway routes

Previously proposed arrangements between MacKays Crossing and Peka Peka were identified and reviewed by the Alliance project team on behalf of the NZTA. The seven options considered were as follows:

- **Option 1: Western Link Arterial**[81] (this being the 'proposed road' described in the notice of requirement lodged by KCDC in December 1997) – this option involves construction of a local road that connects into the existing local roading network, the final form of which consists of a 4 lane road between Raumati Road and Te Moana Road with a two lane section south of Raumati Road and north of Te Moana Road;
- **Option 2: Western Link Road** (developed by KCDC within the Western Link Arterial designation) – this option would provide a two lane arterial with ten at-grade intersections, an urban speed posting and elements of "traffic calming" to encourage low speed;
- **Option 3: Western Link Arterial or Western Link Road as an interim option** – this option involves retaining SH1 and constructing either the Western Link Arterial or Western Link Road to divert some of the local traffic between Poplar Avenue and Peka Peka:
- **Option 4: Upgrade the Existing SH1 Alignment**[82] - this option involves provision of a four lane Expressway on the existing alignment, including construction of new bridge structures where the proposed Expressway crosses the rail line at Paraparaumu and re-crosses it south of Waikanae;

[81] Options 1-3 comprise alternatives that involve KCDC as opposed to NZTA undertaking the proposed roading works. However, as these local roading projects would be significantly subsidised by NZTA and would have a major influence on the efficiency and effectiveness of the wider State Highway network they were included for consideration in the assessment of alternatives

[82] Options 4 -7 were initially identified in the Opus (2009) Kāpiti SH1 Strategy Study – Technical Report

- **Option 5: Expressway following WLR Designation** – this option generally utilises the current designated WLR route which passes between the inland communities of Raumati, Paraparaumu, Waikanae and their associated beach settlements;
- **Option 6: Expressway following Rail Corridor** – this option involves provision of a four-lane Expressway running along the western side of the rail line between Mackays Crossing and Peka Peka, with the route utilising the existing SH1 corridor as far as Paraparaumu then following the rail line as far as Waikanae before diverting back to the existing SH1 corridor; and
- **Option 7: Expressway Avoiding Waikanae Town Centre** – this option provides a four lane Expressway on the existing SH1 alignment as far north as Otaihanga where it would then divert west to link with the WLR alignment.

In reviewing these proposed options, emphasis was placed on the extent to which they achieved the Project Objectives set out in Chapter 2, Part A, Volume 2 of the AEE and met the following design requirements:[83]

- A 110 km/h design speed;
- Four lanes; and
- Grade separated intersections.

The outcome of the project team assessment of these options was as follows:

Option 1 this was considered to be an unfeasible option as it did not meet the essential design requirements necessary to achieve the Project Objectives. Although the horizontal alignment of the proposal would generally permit a 110km/h design speed along the route (with the exception of the area in the vicinity of the Takamore urupā), posting such a speed was largely considered unacceptable due to safety concerns relating to closely spaced at-grade intersections;

Option 2 this was considered to be an unfeasible option as it did not meet the essential design requirements necessary to achieve the Project Objectives (i.e. design speed and safety). In particular, the detailed design was based on a two lane arterial with at-grade intersections at ten locations, and an urban speed posting with elements of "traffic calming" to encourage low speed. This form of road was not intended to accommodate inter-regional (State Highway) traffic and would be neither adequate nor appropriate for this purpose;

[83] These requirements are set out in the NZTA RoNS Guidelines and the Guiding Objectives for the Project Alliance, and reflect the Level of Service criteria contained in the Austroads Guide to Traffic Management (refer also to Part A, Chapter 2 of Volume 2 of the AEE)

Option 3 it was considered that maintaining existing SH1 and diverting local traffic onto either the Western Link Arterial or Western Link Road as an interim option would not achieve the Project Objectives. In their current form, the physical arrangements on SH1 between Poplar Avenue and Peka Peka Road would not provide the necessary physical attributes required for an Expressway (particularly meeting KiwiRAP 4 star standards[84] and reaching Level of Service (LOS) B or better) without significant roading improvements being undertaken; and

Options 4 to 7 these routes were considered to be viable options as they generally aligned with the Project Objectives and the LOS criteria contained in the Austroads Road Engineering Guides 2009.[85]

Following network analyses, the project team concluded that the most effective and beneficial locations for connections with the local roading was at Paraparaumu and Waikanae, rather than a single mid-point interchange (at Otaihanga) as was initially proposed. This arrangement was subsequently adopted in the development and analysis of the principal route options to ensure all Expressway options were comparable.

9.4.5 Principal route options identified

Based on the review of the alternative route options identified in Section 9.4.1, four principal Expressway route options were selected for further detailed analysis as follows:

- Route 1 – Expressway following WLR Corridor (equates to Option 5 in Section 9.4.1);
- Route 2 – Western Corridor (equates to Option 6 in Section 9.4.1);
- Route 3 – Eastern Corridor (equates to Option 7 in Section 9.4.1); and
- Route 4 –Existing State Highway Corridor (Option 4 in Section 9.4.1).

These routes are illustrated in Figure 9.1.

[84] KiwiRAP is an international system for road assessment which has been adopted in New Zealand. Star ratings are derived from a Road Protection Score determined from each road's design elements

[85] These comprise a series of 10 guides relating to the life cycle of a roading project and cover such matters as: asset management; bridge and pavement technology; project delivery and evaluation; road design, safety and transport planning; traffic management and tunnels

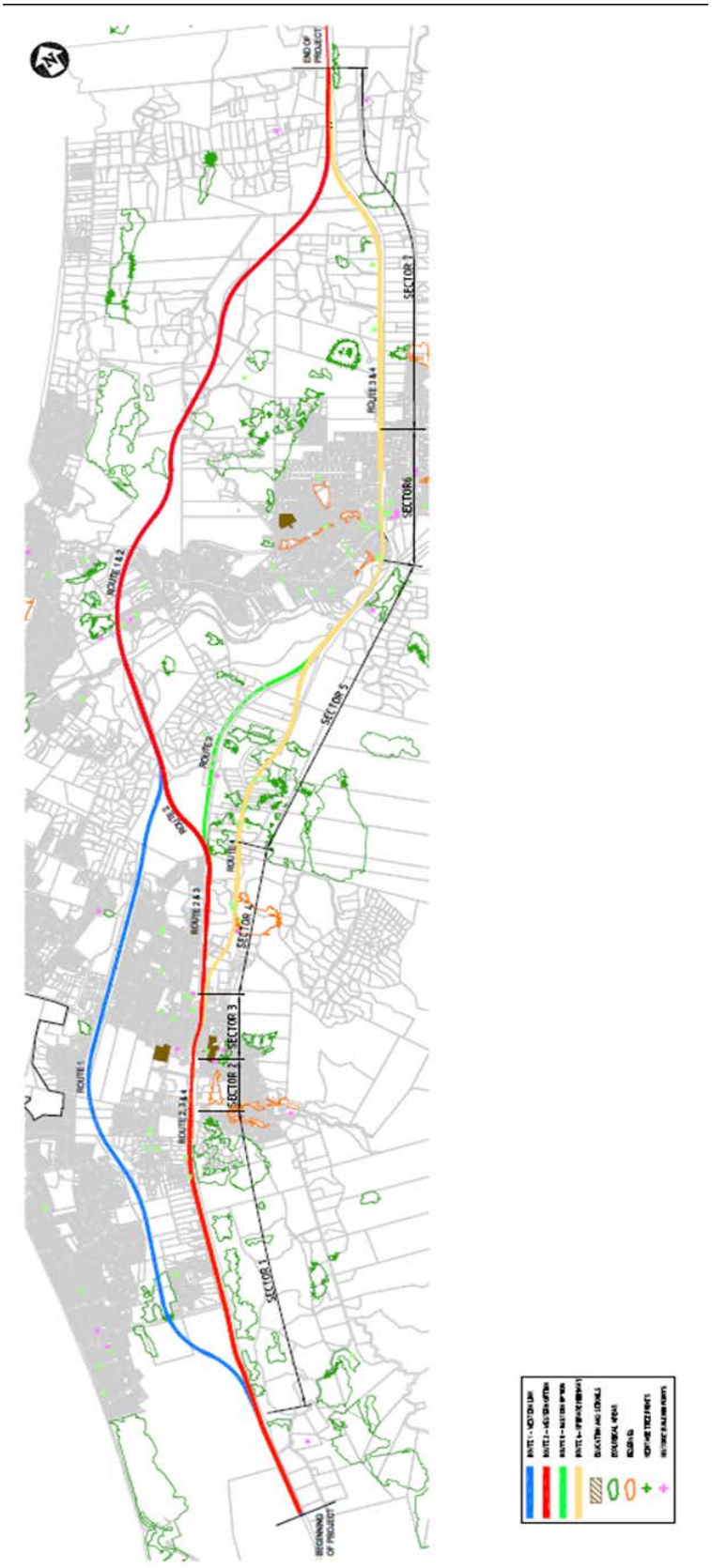

Figure 9.1: Principal Route Options

9.4.6 Assessment of principal route options

As outlined above, an assessment of the four proposed Expressway route options was undertaken in 2009 as part of NZTA's process for selecting a preferred route between MacKays Crossing and Peka Peka. However, this assessment did not take into account:

- refinements to the concept design for the proposed Expressway that were made by the NZTA in 2010;[86] and
- consequential concept design changes to the other route options that were made as a result of these refinements (particularly the number and location of interchanges).

In order to determine the relative merits of the revised route options, and which of the routes, if any, had significant advantages over the others in terms of their non-cost attributes, a further MCA of the proposed Expressway route options was undertaken by the Project team, on behalf of the NZTA. The process consisted of the following phases:

Phase 1	An initial workshop was held at which participants were briefed on the MCA process and an outline of the alternative route options provided. Participants included technical experts[87] from the various specialist disciplines required to assess the alternative routes according to the identified cost and non-cost attributes.
Phase 2	Development of further option layouts in response to comments/requests received during Phase 1.
Phase 3	Under the guidance of lead assessors assigned to each MCA framework outcome (refer to Table 9.1), specialist technical experts familiar with roading projects and the Mackays to Peka Peka area (through sites visits and/or prior knowledge of the area) reviewed and assessed the proposed Expressway route options against the MCA outcomes appropriate to their area of expertise.
Phase 4	A second workshop was held at which lead assessors and technical experts presented their initial scores on the comparative impacts of each option to the wider team of experts for challenge and testing. A set of revised final scores were derived through the workshop.
Phase 5	The scores derived from the assessment workshop were further tested by applying different weightings to each key outcome area (sensitivity testing) to examine option responsiveness.

The MCA process provides a well established evaluative framework for comparing the environmental impacts of the route options relative to each other. The criteria used in the comparative assessment were informed by the project objectives and the environmental context of the area (i.e. to derive appropriate and relevant environmental parameters to guide the assessment). It also provided a

[86] This included minor realignment of the proposed Expressway route to avoid areas of high ecological value (e.g. Te Harakeke Wetland, Ngarara Wetland)

[87] These included experts in such areas as archaeology, ecology, landscape/visual assessment, traffic/transportation, water/air quality, cultural, noise, hydrology/stormwater, geotechnical, urban design, land contamination and vibration

structured approach to determining the respective advantages and disadvantages of each of the route options, based on a range of environmental and other attributes which reflected, amongst other considerations, the statutory tests under the RMA.

Where possible, data was obtained to provide a measureable assessment of potential impacts. Otherwise, the MCA relied on an expert qualitative evaluation of the route options based on the experience and knowledge of the technical experts involved and subsequent testing at the workshops referred to above.

A detailed summary of the process and associated findings is set out in Volume 1 of the *M2PP Alternative Route Options Report* (2011).

9.4.6.1 Multi- criteria assessment framework

The MCA framework applied to the four principal route options and took into account the following:

- The Project Objectives and the Alliance Guiding Objectives (refer to Chapter 2, Part A, Volume 2 of the AEE);
- The relevant statutory requirements and the broad RMA policy context for the project (refer to Part B, Volume 2 of the AEE);
- The specific environmental context and conditions of the study area; and
- The interests of Iwi and key stakeholders, including Greater Wellington Regional Council, the Department of Conservation and the New Zealand Historic Places Trust.

The MCA criteria used to assess the proposed Expressway route options were similar to the criteria developed and applied to other recent NZTA roading projects, but adapted to ensure the criteria were 'fit for purpose' to assess the proposed Expressway route options (for example, integration of the proposed Expressway into the existing urban fabric, social disturbance, landscape and ecology).

9.4.6.2 MCA outcomes and sub- criteria

To ensure that the proposed Expressway route options were robustly assessed and relevant statutory requirements met, both cost and non-cost related outcomes were included in the MCA framework criteria. The non-cost outcomes essentially provided an assessment of the environmental, social and cultural 'effects' of the proposed Expressway route options, while the cost outcomes essentially focused on the financial aspects of the proposed Expressway route options. Together, the non-cost and cost related outcomes provided a comprehensive assessment.

Sub-criteria under each project outcome were also developed to more clearly inform the proposed Expressway route assessment.

9.4.6.3 Non- cost related outcomes

The non-cost criteria of the MCA framework essentially reflect 'effects' based criteria as presented in Table 9.1. Based on these non-cost outcomes, specific sub-criteria were developed to aid consideration of the merits of the four proposed Expressway route options and further inform the MCA process in respect of the Project and its specific environmental context. The sub-criteria and associated measures are presented in full in Table 12 of Volume 1 of the *M2PP Alternative Route Options Report* (2011).

Table 9.1: Non- Cost MCA Outcomes

	Outcome	Description
1	*Movement*	*The project provides for people to move efficiently, conveniently and safely throughout the Kāpiti District as pedestrians, cyclists or in vehicles.*
2	*Built Environment*	*The project provides for the integration of infrastructure in the urban environment. The design does not significantly detract from the urban form and the adverse effects on urban form and features are no more than minor.*
3	*Cultural/Heritage*	*The project traverses areas with significant heritage and cultural values. The design reduces the risk of adversely affecting known and unknown sites and areas with heritage and cultural values.*
4	*Natural Environment*	*The project integrates well with the environment and any adverse environmental effects on natural resources and systems such as land, air and water are no more than minor.*
5	*Social/Community*	*The project provides for people's well-being and health, and promotes the safe and efficient movement to and from community health and emergency services.*
6	*Economic*	*The project promotes national, regional and local economic growth.*
7	*Implementation Timeframe*	*The project is able to be consented and implemented within the project timeline.*

In respect of Outcomes 1- 6, the four principal route options considered were assessed relative to one another. Outcome 7 (implementation timeframe) was used to assess whether each proposed Expressway route option was able to be consented and implemented within the project timeline. Outcome 7 also took into account the time anticipated to acquire properties – generally, the greater the number of properties, the higher the probability of delays in property acquisition and hence construction commencement.

9.4.6.4 Cost related outcomes

The principal route options were also assessed according to their comparative costs and benefit/cost ratios (BCRs). Table 9.2 identifies the criteria used to assess the cost related elements of the MCA framework.

Table 9.2: Cost Related Outcomes

	Outcome	Description
8	*Cost*	*The relative list of options and sub-options.*
9	*BCR*	*The relative BCR for each option, calculated in accordance with the NZTA evaluation manual.*

The lowest cost option (Outcome 8) and best benefit–cost ratio (Outcome 9) of the four proposed Expressway route options considered were used as an assessment baseline.

9.4.6.5 Scoring rationale

Each sub-criterion was assigned a score based on whether or not the route option positively or negatively contributed to the particular outcome. In respect of Outcomes 1– 6 referred to in Section 9.4.6.3, the assessment was numerically scored as indicated in Table 9.3:

Table 9.3: MCA Scoring Rationale for Outcomes 1- 6

Score	Assessment
3	*Significant Positive*
2	*Moderate Positive*
1	*Minor Positive*
0	*Insignificant*
-1	*Minor Negative*
-2	*Moderate Negative*
-3	*Significant Negative*

In respect of Outcome 7 (implementation timeframe), the assessment was numerically scored as indicated in Table 9.4.

Table 9.4: MCA Scoring Rationale for Outcome 7

Score	Assessment
0	*Could be consented within project timeframe*
-1	*+0-1 year to consent*
-2	*+ 1-2 years to consent*
-3	*+2 years to consent*

In respect of the cost related Outcomes, the proposed Expressway route options were numerically scored relative to the lowest cost option as indicated in Table 9.5.

Table 9.5: MCA Scoring Rationale for Outcome 8

Score	Assessment
2	*-5.0% to -7.5%*
1	*-2.5% to -5.0%*
0	*-2.5% to +2.5%*
-1	*+2.5% to +5.0%*
-2	*+5.0% to +7.5%*
-3	*+7.5% to +10%*

In respect of the BCR, the principal route options were numerically scored in accordance with NZTA's Economic Evaluation Manual (2010) as illustrated in Table 9.6:

Table 9.6: MCA Scoring Rationale for Outcome 9

Score	Assessment
0	*0.9 to 1.1*
-1	*0.7 to 0.9*
-2	*0.5 to 0.7*
-3	*0.3 to 0.5*

9.4.6.6 MCA workshops

Workshop 1: 18 November 2010

An initial workshop with specialist technical experts[88] was held at which:

- the proposed Expressway route options were described and reviewed, and
- the proposed MCA framework (comprising a series of project related outcomes and associated sub criteria – refer to Table 9.1) was presented and discussed.

Recommendations for changes to the concept designs of each route option to reduce their potential environmental impacts were recorded for development prior to the next workshop. Changes to the MCA assessment were also made to ensure the assessment criteria were 'fit for purpose' – particularly that they were:

- fully relevant to the project and its environmental context; and
- consistent and non-repetitive.

Workshop 2: 8 December 2010

A second workshop was held at which the relative attributes of the four principal route options were scored by participants according to the agreed criteria.

Prior to the workshop, lead assessors were tasked with reviewing the four principal route options, and assigned initial scores to the sub-criteria associated with the particular outcome relevant to their area of expertise. The assessors undertook any necessary site visits and investigations to assist in their evaluation. The scores were generated in accordance with the scoring rationale outlined in Section 9.4.3.5.

Lead assessors called on the expertise of other relevant technical experts to assist with the generation of their initial scores for each route option and to note the reasons for the scores produced.

Lead assessors presented their initial scoring at the workshop held on 8 December 2010. The scores were then rigorously challenged and debated by workshop participants and any 'double dipping' or areas of overlap were identified.

[88] Refer Footnote 14

Workshop 3: 9 December 2010

Following the 8 December 2010 workshop, a third workshop was convened which was attended by lead assessors and a number of technical experts.

The purpose of this further workshop was to discuss and review the scores generated at the previous workshop, as well as to discuss and confirm the parameters for undertaking sensitivity testing of the scores. Table 12 of Volume 1 of the *M2PP Alternative Route Options Report* (2011) sets out the final scores derived for the sub-criteria under each outcome, while the rationale for these scores is outlined in Appendix H of this report.

9.4.6.7 Summary of overall MCA score

As the MCA framework did not include a uniform number of sub-criteria under each outcome (for example, the Movement outcome had seven sub-criteria while the Built Environment outcome had three), the total outcome score was divided by the number of sub-criteria under each particular outcome to provide a total average score which was then used to compare route options. The total average score for each outcome was then presented to 1 decimal place to more clearly distinguish the difference between the route options and avoid differences becoming blurred due to 'rounding' of scores.

Table 9.7 presents a summary of the total average scores for each of the seven environmental attributes of the four route options (i.e., excluding implementation and cost scores). Scoring was presented in this manner to assist with the comparison of the route options based on those matters of particular relevance in an RMA context (i.e., both positive and adverse environmental, social and economic effects).

By contrast, Table 9.8 includes all cost and non-cost scores. Scoring was presented in this manner to assist the LTMA assessment used to inform NZTA project funding decisions relating to the national land transport fund, including consideration of associated value for money factors.

The MCA scores do not indicate any quantitative measure of the value of the four route options, but instead offer a useful means to assist in understanding the relative attributes of one route option compared with the others. Ultimately, it is the degree of difference between the scores that is useful in distinguishing the comparative merits of the route options.

9.4.6.8 RMA context: environmental, social and economic outcomes

The four principal route options scored as follows in a RMA 'effects based' statutory context:

Table 9.7: Effects Outcomes

Outcome	Route			
	1	2	3	4
Movement	2.6	1.7	1.4	1.4
Built Environment	-1.3	-1.7	-2.3	-2.3
Cultural / Heritage	-3.0	-2.3	-1.3	-0.3
Natural Environment	-1.6	-1.8	-1.2	-1.6
Social	0.3	-0.3	-1.7	-2.0
Economic	1.5	1.5	1.5	1.5
Overall scores	-1.5	-2.9	-3.6	-3.3
Ranking	1	2	4	3

In overall terms, Route 1 (Expressway following the WLR) ranked highest when assessed against the RMA 'effects' related outcomes. Furthermore, there was a clear margin between Route 1 (Expressway following the WLR) and the second ranked option (Western Route), indicating that there is a definite difference between this option and the other route options in terms of the nature and extent of the anticipated impact.

The 'effects' outcome scoring demonstrates a minimal difference between all other route options which are separated by a score of 0.7 points.

In summary, the scoring indicates that, compared with the other options, Route 1 is:

- least preferred in terms of its potential effects on cultural and heritage values;
- comparable to the other three options in terms of the potential impact on the natural environment; and
- similar to the other three options regarding the economic benefits that would be derived for the District and the wider region.

However, Route 1 offers significantly greater overall benefit over the other route options in terms of promoting the efficient, convenient and safe movement of pedestrians, cyclists and vehicles throughout the District. It would also have the least impact on the built environment as it involves less physical disruption to the existing form of the residential areas and the Paraparaumu and/or Waikanae town centres than the other options. The lesser degree of disruption and consequential social impact were also factors behind the higher social outcome score for Route 1 relative to the other options.

9.4.6.9 LTMA context outcomes

The four principal route options scored as follows when cost and implementation timeframe are taken into account:

Table 9.8: Environmental, Implementation and Cost Factors

Outcome	Route			
	1	2	3	4
Movement	2.6	1.7	1.4	1.4
Built Environment	-1.3	-1.7	-2.3	-2.3
Cultural / Heritage	-3.0	-2.3	-1.3	-0.3
Natural Environment	-1.6	-1.8	-1.2	-1.6
Social	0.3	-0.3	-1.7	-2.0
Economic	1.5	1.5	1.5	1.5
Implementation Timeframe	0	-2	-2.5	-2.5
Cost	0	-3	-3	-3
Benefit / Cost Ratio	0	-2	-2	-2
Overall scores	-1.5	-9.9	-11.1	-10.8
Ranking	1	2	4	3

The results in the above table illustrate that Route 1 (Expressway following the WLR option) ranked highest when assessed against all the outcomes considered. It also illustrates that there is a significant margin (8.4 points) between Route 1 and the second ranked option (Route 2 - Western Route), with minimal separation between the second and fourth ranked options (a 1.2 point spread).

In addition to those factors affecting the non-cost attributes, the difference in scoring between Route 1 and Routes 2 to 4 is largely attributable to the increased comparative cost associated with property acquisition, construction and securing the necessary access and local road connections for these latter routes. It also reflects the fact that the increased level of property acquisition associated with Routes 2 to 4 significantly increases the risk of consenting and construction delays.

9.4.6.10 MCA weighting analysis: sensitivity testing

To determine whether the outcomes would be affected if greater weight was assigned to particular attributes, the MCA scoring of the four proposed Expressway route options was subjected to further sensitivity testing.

Sensitivity testing and weighting selection was discussed at the third workshop on 9 December 2010 and an agreement reached to test the scores derived from the MCA process according to the following weighting methodology:

- Transportation – increased weight given to traffic safety, travel efficiency and multi-modal opportunities;
- Community – increased weight given to the effects on the urban form, town centres and areas of community open space and values;

- Environmental – increased weight given to the effects on the natural environment and amenity values;
- Social – increased weight given the social impact of the options; and
- Cultural/Heritage – increased weight given to the effects on cultural/heritage values.

Sensitivity testing was carried out by assigning an increased percentage weighting (50%) to particular MCA outcomes. In addition, sub-criteria under each outcome were enhanced to reflect particular stakeholder interests. A breakdown of the sensitivity weightings applied to each outcome and associated sub-criteria is included in Appendix G of Volume 1 of the *M2PP Alternative Route Options Report* (2011).

As the primary purpose of the testing was to assess the sensitivity of the non-cost related outcomes, implementation and project cost related factors were excluded from consideration.

The outcomes of the sensitivity testing are as follows:

- Transportation – Under this weighting scenario Route 1 (Expressway following the WLR) was the highest ranked route option, reflecting the benefits that it offers in terms of safety and movement efficiency;
- Community – Under this weighting scenario Route 1 (Expressway following the WLR) was the highest ranked route option. This is largely attributable to the significant divisive impact and associated visual effects that the other options would generate as a result of constructing an Expressway through existing town centres and residential areas;
- Environmental – The sensitivity testing indentified little difference between the route options if increased weight is applied to potential effects on the natural environment. Under this weighting scenario Route 1 (Expressway following the WLR) and Route 3 (Eastern Corridor) ranked first equal;
- Social – Under this weighting scenario Route 1 (Expressway following the WLR) was the highest ranked route option taking potential social effects such as safe and efficient movement to and from community health and emergency services into account; and
- Cultural/Heritage – Under this weighting scenario the highest ranked option is Route 4 (Existing State Highway Corridor), with Route 1(Expressway following the WLR) being lowest ranked. The result for Route 4 largely reflects the fact that as this option follows the existing, albeit widened, SH1 alignment and accordingly the likely impact on sites and places of cultural and heritage value is significantly reduced. By contrast, the result for Route 1 reflects the increased probability of likely cultural/heritage impacts given the large areas of unmodified ground surface included in the proposed alignment, and its location relative to recorded archaeological sites and places of cultural and historic heritage value and the coastal dune system.

A full summary of the sensitivity testing results is presented in Section 4.5 of Volume 1 of the *M2PP Alternative Route Options Report* (2011).

9.4.7 Route selected for the proposed MacKays to Peka Peka Expressway

The MCA process identified that Route 1 (Expressway following the WLR) was the preferred proposed Expressway route option when assessed against the other three principal alternatives.

In particular, the assessment confirmed Route 1 as the highest overall ranked option when non-cost and cost related outcomes are equally weighted. Furthermore, the route was confirmed as being insensitive to variable weight being applied to a number of interest/stakeholder related factors (for example, noise and visual impacts). Given that Route 1 largely follows a corridor that has been kept clear of development for future roading purposes since the 1950s, this finding is not surprising.

However, Route 1 did not rank highest when greater weight was applied to natural environmental and cultural/heritage factors, ranking first equal with Route 3 (Eastern) with respect to the former and fourth with respect to the latter. Again, given the largely undeveloped nature of this corridor, this finding is not surprising.

Under the LTMA the NZTA is required to seek value for money in the use of its funds. The cost assessment of the four principal route options confirmed that the costs of constructing Route 1 are significantly less than any of the other three route options: the P95 cost estimates[89] indicate that the other route options would be between 32% and 57% more costly to construct. Furthermore, the property acquisition costs of the other route options would be two to three times that for Route 1.

The economic assessment concluded that Route 1 would have a significantly higher benefit-cost ratio than the other route options, with an estimated BCR of 0.95 compared with ratios of between 0.57 and 0.66 for the other route options.

9.5 Assessment of alternative alignments and interchanges – phase one

A broad range of connectivity and alignment options within the preferred route corridor (i.e. Route 1) were identified (through environmental constraints analysis) and developed and evaluated, using MCA. A detailed description of the process is set out in the *M2PP Scoping Report* (2010).

On completion of the scoping process, a shortlist comprising three connectivity options and seven alignment options was compiled.

9.5.1 Option identification workshops

A series of workshops were held with the project team to develop and refine viable options along the route. Participants at these workshops included members of the project team representing the various specialist and technical disciplines involved in the project (including ecology, landscape and urban design, social impact assessment, archaeology, air quality, traffic engineering, stormwater design).

---

[89] These estimates represent a 95 percentile prediction that the probability of the final outcome cost exceeding the P95 value is 5%. The cost estimates were undertaken in November 2010.

To assist the identification and assessment of options, the project area was divided into the following sectors in recognition of their differing community and environmental characteristics:

- Sector 1 – Raumati South: from MacKays Crossing to just north of Raumati Road;
- Sector 2 - Raumati/Paraparaumu: from north of Raumati Road to north of Mazengarb Road;
- Sector 3 - Otaihanga/Waikanae: from north of Mazengarb Road to north of Te Moana Road; and
- Sector 4 - Waikanae North: from north of Te Moana Road to Peka Peka.

The sectors are illustrated in Section 3, Chapter 6, Part A, Volume 2 of the AEE.

The corresponding options identified within each of these sectors were developed on the following basis:

- Base Options – high level options that detailed the number and geographical location of interchanges and key connections over the length of the route; and
- Sub-Option alignments – sector specific options that detailed the actual alignment of the route, based on the identified constraints associated with each sector.

9.5.1.1 Workshop 1: 14 July 2010

The initial workshop involved participants from all of the project disciplines. The purpose of the workshop was to identify and assess the relative constraints that required consideration across the project area and to introduce the project team to the various features of the proposed route. Following the constraints' identification, the project team identified potential sub-options for each of the sectors.

9.5.1.2 Workshop 2: 3 August 2010

At the second workshop, schematic drawings of the options derived from the initial workshop were presented to the project team. The purpose of the workshop was to provide the project team with an opportunity to review the options, to challenge their feasibility and to identify any additional options for consideration.

The initial results of the traffic modelling were also presented at this workshop, along with further constraints that had been identified. The outcome of the workshop was the development of a long-list of options.

9.5.1.3 Workshop 3: 18 August 2010

At the closing workshop the final long list of options, along with supplementary technical information, from various technical disciplines, was presented to the project team. Information presented included additional geometric design work that more clearly identified the 'footprint' required for several of the options – this work provided the technical disciplines with further detail to assist with identifying and assessing the likely impacts associated with each of the options.

A preliminary evaluation of the options (excluding cost or BCR information) was also carried out as part of developing appropriate and robust assessment criteria.

9.5.2 Long list of options identified

A total of 12 base-options and 24 sub-options were included in the final long-list and are briefly outlined below.

9.5.2.1 Base- options (connectivity options)

The base-options were developed to consider connectivity options along the full length of the route. These options fell into three general categories:

- Option 1 – north and south connections to the existing SH1 but no intermediate interchanges;
- Option 2 – north and south connections to SH1 plus one intermediate interchange; and
- Option 3 – north and south connections to SH1 plus two intermediate interchanges.

In addition, a scenario comprising a local road crossing of the Waikanae River was included with each base-option.

The twelve identified base-options provided a range of connectivity to the local street network and were modelled to assess their relative effectiveness. The list of base-options considered is set out in Figure 9.2 and a description is provided in Appendix C of the *M2PP Scoping Report* (2010).

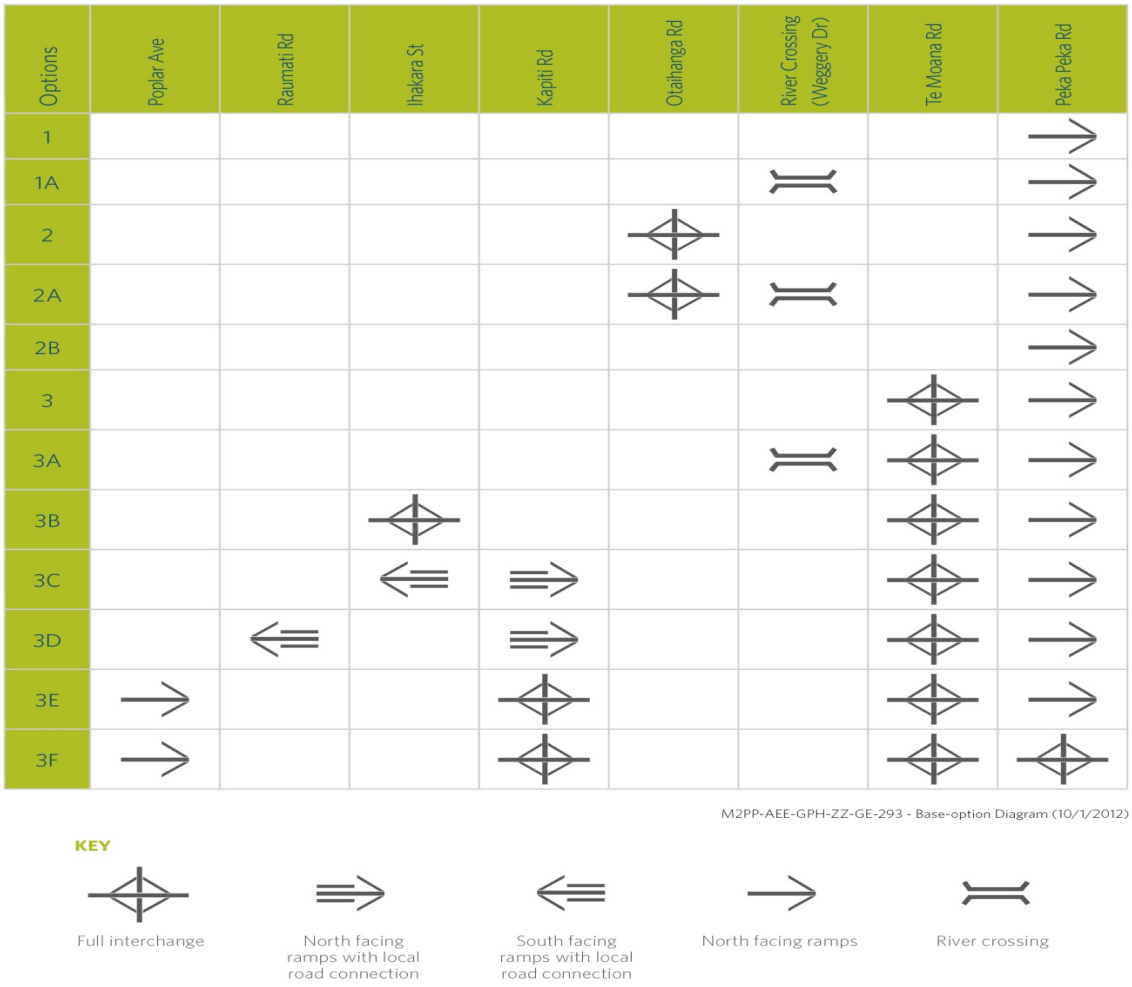

Figure 9.2: Base- option Diagram

9.5.2.2 Sector sub- options (alignment options)

There were 24 alignment sub-options included on the long-list for the route (refer Appendix C of the *M2PP Scoping Report* (2010)). The sub-options identified within the four sectors along the route (refer to Section 3, Chapter 6, Part A of the AEE) are as follows:

a. Sector 1 – Raumati South: from MacKays Crossing to just north of Raumati Road

The sub-options included four basic alignments with interchanges/local road connections in a range of locations. A section of three of these alignments would pass through QE Park (sub-options A - C), while the fourth ties into existing SH1 just north of Poplar Ave (sub option D). Interchange configurations were considered for each of the alignments, with some requiring additional work on local roads such as Poplar Ave. The western most alignment linking the existing designation directly to MacKays Crossing through QE Park did not progress past the 2nd workshop due to the significant severance and environmental and cultural/heritage impacts it would have on the Park. The option that tied in north of Poplar Ave also required an additional local road connection to allow convenient access to and from Raumati and the existing SH1north.

b. Sector 2 – Raumati/Paraparaumu: from north of Raumati Road to north of Mazengarb Road

The four sub-options identified in this sector focused on interchange locations, a split versus full single interchange and a slight alignment shift east of the WLR designation mid-way between Raumati Road and Kāpiti Road (adjacent to the potential Ihakara Street Extension). With regard to the interchange options, KCDC intends to extend Ihakara Street through to link with Waikare Road to create an additional east-west link to ease traffic congestion on Kāpiti Road. This would provide an opportunity to use Ihakara Street for the purposes of either a single full interchange or a split interchange with access/egress onto Kāpiti Road. It was recognised that the sub-options would also need to integrate, where possible, with KCDC's town centre plans which are yet to be finalised.

c. Sector 3 – Otaihanga/Waikanae: from north of Mazengarb Road to north of Te Moana Road

The identified sub-options in this sector focused on alternative route alignments to minimise impacts on the New Zealand Historic Places Trust registered Takamore Wāhi Tapu Area and on private property. Five routes were identified: three passing through the wāhi tapu area, one passing over the eastern corner of the wāhi tapu area, and one to the east of the wāhi tapu area through residential properties. A sub-option consisting of a near straight line from Otaihanga Road to Peka Peka was discarded as the impact on private property and ecological areas was considered to be too significant.

d. Sector 4 – Waikanae North: from north of Te Moana Road to Peka Peka

The identified sub-options in this sector focused on avoiding ecological areas, particularly significant wetlands and sites subject to QE II covenants. Six options were developed, with some discarded early as they severed properties and derived no additional benefit. As there was negligible Crown ownership of property in this sector, options outside the existing WLR designation were also considered.

9.5.3 Long list option assessment and evaluation

Consistent with the assessment of alternative route options, a MCA was also applied to the base options and sector sub-options identified during the scoping stage. For the purposes of this stage of the investigation the MCA process was used to determine the 'high-level' merits of each option and to identify key positive or negative differentiators between the options. The outcomes of the MCA were then used to derive a shortlist of options.

9.5.3.1 Options assessment and ranking workshop: 15 September 2010

An evaluation workshop was convened to enable the Project team to undertake a final assessment, comparison and ranking of the options using a MCA process consistent with that outlined in Sections 9.4.3.2 to 9.4.3.4 and Section 9.4.3.7 of this Chapter of the AEE.

Key inputs to the workshop were the preliminary outcomes of the non-cost assessment derived from the 18 August 2010 workshop, together with base-option/sub-option costs and benefit cost ratios (BCR) for the base-options. New alignment information was also presented identifying option foot prints in more detail.

Prior to the workshop, the lead assessors re-evaluated and scored their relevant MCA outcome areas, noting their reasons. The outcome of this exercise was presented to the project team at the evaluation workshop where the scoring was challenged and debated.

Once the marking of the base-options and sub-options was completed, the results were tabulated and sensitivity testing carried out. This process confirmed Options 3, 3B and 3C as the highest ranking base-options for 'non-cost' outcomes. A comparative analysis of the non-cost, cost and BCR outcomes of each base option further confirmed Options 3, 3B and 3C (refer Figure 9.1) to be the highest ranked route options and on this basis they were carried forward to the shortlist (refer to Table 26 and Figures 10 and 11 in the *M2PP Scoping Report* (2010)).

The project team also evaluated the sub-options against the non-cost and cost related MCA outcomes. The sub-options that were carried forward to the shortlist following this evaluation included:

- Two sub-options at the southern tie-in in Sector 1 (sub-options S1Ciii and S1Dii – refer to Table 9.9);
- One sub-option in Sector 2 to move the alignment slightly east of the current designation near Ihakara Street Extension;
- Two sub-options between Otaihanga Road and Te Moana Road in Sector 3 (sub-options S3D and S3E – refer to Table 9.9); and
- Two sub-options in Sector 4, one within the designation north of Smithfield Road and one located outside the designation away from some wetlands (sub-options S4Ai and S4F – refer to Table 9.9).

For the two sub-options in Sector 1, sub-option S1Dii (south connection north of Poplar Avenue) scored highest in non-cost terms but scored lower when assessed against cost (i.e. had a higher cost), due to the expenditure that would be incurred as a result of the additional properties that would need to be purchased. However, both sub-options for the southern connection were included on the shortlist.

In Sector 3, sub option S3D (the western option) scored highest in non-cost terms and is the least expensive option. By contrast, sub-option S3E (the eastern option) impacts on more properties and therefore would incur a higher cost.

9.5.4 Shortlist of options identified

The output of the MCA process was a shortlist comprising three connectivity options and seven alignment options. These options are briefly outlined in Table 9.9.

Table 9.9: Shortlisted Base- options and Sub- options

Base-option	Description
3	South-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka. Interchanges at Kāpiti Road and Te Moana Road.
3B	South-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka. Full interchanges at Ihakara Street extension and Te Moana Road.
3C	South-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka. Full interchange at Te Moana Road. Split interchange, with south facing ramps at Ihakara Street extension and north facing ramps at Kāpiti Road with one way auxiliary lanes between Kāpiti Road and Ihakara Street.
Sub-option	**Description**
S1Ciii	South facing ramps, south of Poplar Road, including local road over bridge in QE park. Alignment located east of Steiner school.
S1Dii	Ties in North of Poplar Ave, (approx.200 Main Road). North bound off ramp on local road between Main Road and possibly Poplar Ave.
S2Bi	Alignment east of existing designation. With or without Interchange at extended Ihakara Street.
S3D	Crosses Waikanae River near existing designation - east of urupā, west of Maketu tree (straighter north/south alignment), crosses corner of wāhi tapu area.
S3E	Crosses Waikanae River east of current designation, straighter north/south alignment. East of the wāhi tapu area (including urupā/Maketu tree) but severs Puriri Road.
S4F	Alignment avoids QEII covenant sites and other wetland areas. Crosses additional property north of Maypole boundary on Ngarara Road.
S4Ai	Alignment within designation north of Smithfield Road.

The shortlisted base-options and sub-options are also illustrated in Figure 9.3.

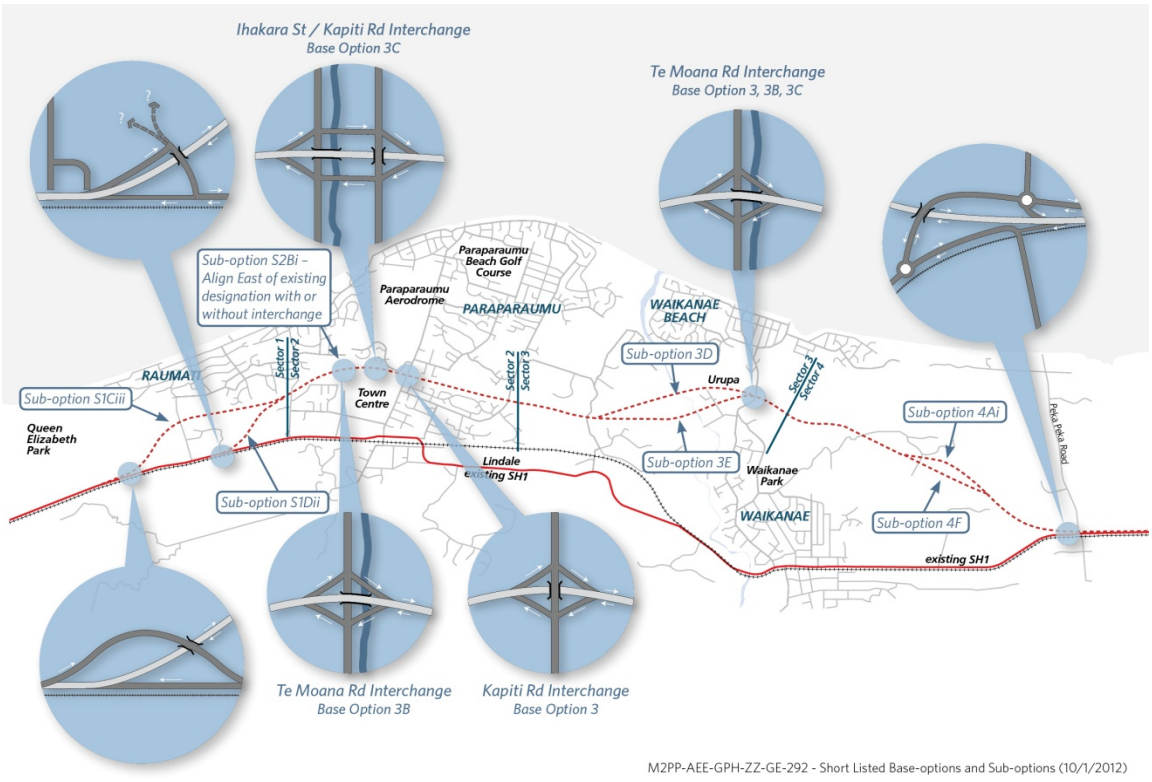

Figure 9.3: Shortlisted Base- options and Sub- options

9.6 Assessment of alternative alignments and interchanges – phase two

Following confirmation of the route option shortlist, a more detailed assessment was undertaken to identify an overall preferred scheme option. This process is documented in detail in the *M2PP Options Report* (2011).

9.6.1 Options investigation

To inform the process of assessing and selecting a preferred option from the shortlist of options compiled during the preceding scoping stage, further work was undertaken by a wide range of technical specialists in the project team (for example, noise, urban design, ecology, social impact assessment, archaeology, landscape and visual assessment, geotechnical engineering, air quality, cultural impact assessment, traffic engineering, stormwater management). This work included:

- Consultation with the local community in November 2010 and May 2011 - this included eight Expo's in the Kāpiti community along with public meetings and property visits;
- Ongoing engagement with local iwi, including a hui held at Whakarongotai Marae on 8 – 9 October 2010 regarding the impacts on the Takamore urupā and surrounding wāhi tapu area;
- Design work to progress the options to a level that enabled a more detailed technical assessment of the options for the MCA process and for options to be priced;
- Continued data gathering from environmental field work (for example, ecology);
- Air quality monitoring and contaminated land investigations;
- Geotechnical and hydrological sampling and monitoring to inform the design process;
- Social and community investigations in the form of surveys and observations, including a walking and cycling survey to determine existing routes used;
- Preparation of visual simulations of the short-listed options to illustrate their potential impact on the surrounding landscape; and
- Noise modelling of the shortlisted options to assess potential noise effects.

9.6.2 Option development workshops

Workshops were convened throughout the period between preparation of the *M2PP Scoping Report* in October 2010 and the final MCA workshops in February and March 2011 to review and assess further refinements to the shortlisted base options and sub-options. The workshops were as follows:

9.6.2.1 Workshop 1: 21 October 2010

An initial workshop was convened with technical specialists involved in the Project to identify key issues for consideration in the options phase and in developing a preferred option. These included issues that were generic to the overall alignment as well as issues relating to specific connection points.

9.6.2.2 Workshop 2: 8 November 2010

A MCA workshop was held to evaluate options at the southern connection and the section between Waikanae River and Te Moana Road. Preferred options relating to each of these locations were identified for further evaluation and consideration at two further MCA workshops scheduled in February/March 2011.

9.6.2.3 Workshop 3: 24 November 2010

A further options phase workshop was held to review progress on options investigations that had been undertaken subsequent to the initial 21 October 2010 workshop.

9.6.2.4 Workshop 4: 15 December 2010

A 'Challenge Workshop' was convened at which members of the project team, along with several external participants, critiqued the shortlisted options and sub-options. Proposed overbridges and underbridges at Kāpiti Road, Otaihanga Road, Te Moana Road, Ngarara Road and options at Peka Peka were also considered. Decisions on preferred options relating to some of these crossings were also made.

9.6.3 Final shortlist

Based on the outcomes of the option development workshops, and further developed design work carried out following the Scoping Report, a final shortlist was compiled, comprising the following:

- one base option (Scoping Report Base Option 3, with south-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka and interchanges at Kāpiti Road and Te Moana Road); and
- twelve sub-options, two each at six locations along the route.

The 12 sub-options are summarised in Table 9.11. This final option shortlist was subsequently carried forward for evaluation at two further MCA workshops scheduled for February/March 2011.

In addition to the shortlisted options, five connection options were developed in the vicinity of Smithfield Road to address potential property severance issues in this vicinity and access to the Nga Manu Nature Reserve. These were also carried forward for evaluation at the final MCA workshop held in March 2011.

Table 9.10: Final Shortlisted Options

Option No.	Option Title	Description
1	**Raumati Straight**[90]	**Two widening options for Raumati Straight.**
1A	Four metre wide median	■ 4 metre median. ■ Traffic lanes and shoulder constructed outside the existing QE Park, with some encroachment into the park for wetland swale and cycleway/walkway.
1B	Six metre wide median	■ 6 metre median. ■ Shoulder and all or part of the northbound traffic lanes encroach into QE Park, together with the wetland swale and cycleway/walkway.
2	**Southern Connection**	**Two options for Southern Connection**
2A	Alignment through QE Park (sub-option S1Ciii in Table 9.10)	■ North bound off ramp in QE Park, over proposed Expressway tying back into existing highway. ■ Southbound on ramp on existing highway south of Poplar Avenue. ■ Poplar Avenue realigned to the south and raised over proposed Expressway, for property access on northern side and to allow construction "offline". ■ Te Ra School relocated for proposed Expressway to pass through and therefore reduce impact on wetland area.
2B	Alignment option through 200 Main Road (sub-option S1Diii in Table 9.10)	■ Proposed Expressway passes over Poplar Avenue, just west of existing highway. ■ Leinster Avenue closed at proposed Expressway. ■ New accessway for severed properties off Leinster Avenue. ■ North bound off ramp exits onto Poplar Avenue, at new roundabout.
3	**Kāpiti Road Interchange**	**Two Options for Crossing Kāpiti Road**
3A	Kāpiti Road under proposed Expressway.	■ Proposed Expressway passes over Kāpiti Road, with Kāpiti Road left at existing level. ■ Kāpiti Road widened to provide through lanes and turning lanes with signalised intersections.
3B	Kāpiti Road over proposed Expressway.	■ Proposed Expressway passes under Kāpiti Road, with the proposed Expressway lowered approximately 1.5 m below existing ground level. ■ Kāpiti Road widened as for Option 3A, with elevated signalised intersections.
4	**Otaihanga Road Crossing**	**Two Options for Crossing Otaihanga Road**
4A	Proposed Expressway over Otaihanga Road.	■ Proposed Expressway passes over Otaihanga Road, with Otaihanga Road remaining on current alignment.
4B	Proposed Expressway under Otaihanga Road	■ Proposed Expressway under Otaihanga Road. ■ Local road realigned to form ramp and bridge over proposed Expressway.

[90] The works associated with the Raumati Straight options were subsequently modified and deemed to comprise upgrade activities within the scope of the existing SH1 designation

Option No.	Option Title	Description
5	**Waikanae River to Te Moana Road**	**Two Options, a western and an eastern option**
5A	Western option (sub-option S3D in Table 9.10)	■ Passes west of the Maketu Tree and east of the Urupā. ■ Passes over a corner of the registered wāhi tapu area. ■ Encroaches on El Rancho property.
5B	Eastern option (option 3H, which replaces option S3E in Table 9.10)	■ Passes east of the Maketu tree and east of the Urupā. ■ Does not cross the registered wāhi tapu area. ■ Passes through historic house. ■ Further from El Rancho facilities.
6	**Northern Connection**	
6A	Option 1 Rail crossing at grade	■ Proposed Expressway under local road. ■ Roundabout at Peka Peka Road. ■ Roundabout just south of bridge over proposed Expressway. ■ At grade railway crossing retained at Hadfield Road.
6B	Option 2 (Dog bone)	■ Proposed Expressway under local road. ■ Hadfield Road passes over the railway line. ■ Elevated roundabouts provided at both Hadfield Road and Peka Peka Road.

9.6.4 Option assessment and evaluation

To determine the preferred options the assessment of shortlisted options included a number of processes, both quantitative and qualitative. These included:

- Consideration of the feedback received through community consultation and engagement;
- Further technical investigations and consideration to clarify the options;
- An assessment of option costs;
- A MCA of the options; and
- Alliance Management Team review and recommendation to the Project Alliance Board.

9.6.4.1 Feedback from consultation and engagement

To inform option development during this phase the project team built on the information derived from the extensive consultation and engagement undertaken to date as part of the Project (refer to Chapter 10, Part F of the AEE).

On 18 January 2011 and 18 February 2011, meetings were held with the design team to discuss the design related issues raised in the feedback received during the consultation and engagement process. During these sessions the design team considered the points raised, identified matters requiring further investigation and highlighted matters for consideration as part of the further round of project consultation scheduled for May 2011.

9.6.4.2 Technical considerations

In addition to the information derived from the consultation process a range of technical factors were also considered in determining the final shape of the shortlisted options. These included:

- Technical Design Considerations
    - Roading design standards, including alignment with the NZTA's 'Roads of National Significance Design Standards and Guidelines';
    - Road geometrics, including application of NZTA's general Expressway design criteria and review of the options from a safety perspective;
    - Geotechnical, including the extent of peat deposits and seismic performance;
    - Structures, including the location and design of overbridges, underbridges, a Waikanae River crossing, pedestrian/cycle bridges, culverts, retaining walls and sign gantries;
    - Stormwater and flood risk management, including location relative to flood prone land, impacts on flood flow paths and stormwater discharge and the impact of a proposed bridge crossing in the Waikanae River;
    - Pavements, including differential subgrade settlement rates, noise mitigation properties and rehabilitation of existing pavements;
    - Cycleways/walkways/bridleways, including continuous provision along the length of the proposed Expressway;
    - Services, including the impact on existing gas, electricity, telecommunications and water and wastewater transmission and distribution;
    - Urban design, including the potential to integrate the proposed Expressway into the urban form and fabric of the district (for example, existing urban centres) and opportunities for urban form improvements; and
    - Noise, including the number of potentially affected noise sensitive receivers, the effects of introducing traffic noise into areas that are currently relatively quiet.
- Environmental and Social Considerations
    - Re-evaluation of the options against the constraints identified in Section 9.3.
- Construction Considerations
    - Ground conditions, including pre-loading peat in deeper peat areas and excavation and replacement in shallower areas;
    - Sources of material, including use of local quarry materials and sand from adjacent dunes;
    - Disposal of excess materials, including the potential for on-site disposal (for example, as noise mitigation bunds); and
    - Existing traffic safety and movements, including the impact on local road users and the performance of existing traffic (for example, vehicles, cyclists, pedestrians).

- Cost and Risk Considerations
- Cost, including the comparative cost of each of the options; and
    - Risks, including reviewing the identified risks and opportunities allied with the Project along with their associated probability and consequence rating.

9.6.4.3 MCA framework

Following completion of the scoping report, a review was undertaken of the MCA relating to the initial range of options that were shortlisted. The purpose of the review was to ensure that the outcome descriptions were sufficiently detailed to facilitate a robust assessment of the shortlisted options.

The resulting outcomes, criteria and measures that formed the basis for assessing the final shortlist of options are outlined in Table 9.11:

Table 9.11: MCA Outcomes, Criteria and Measures

Outcome	Criteria Heading	Measure
Movement	1.1 Travel Safety	Level of safety provided by option design and local road connectors.
	1.2 Vehicles: Through traffic benefits	Movement efficiency and user benefits for through traffic.
	1.3 Vehicle: Local traffic benefits	Movement efficiency and user benefits for local traffic.
	1.4 Integration with public transport	Ability of public transport (train, bus, rail, airport) to safely and efficiently integrate with option design.
	1.5 Integration with cycleways and pedestrian links	Ability of pedestrian links & cycleways to safely and efficiently integrate with option design.
Built Environment	2.1 Visual effects	Visual relationship with the local environment; extent of visual effects of structures and earthworks in relation to context, including town centres, residential areas, Waikanae River corridor and other public amenity locations. Ability to integrate into landscape context.
	2.2 Built form	Relationship and integration with urban form and town centres, including responding to the individual urban identities of Raumati Village, Paraparaumu, Paraparaumu Beach and Waikanae. Includes the potential for built form improvements.
	2.3 Public Areas/ Parks/ Recreational Areas	Effects on public open space areas including the (loss of) potential for park/recreational improvements.
Cultural / Heritage	3.1 Built Heritage	Effects on identified built heritage recognised in the District Plan and/or by the New Zealand Historic Places Trust (section 6(e), RMA).
	3.2 Archaeology - known	Effects on identified/recorded (NZHPT Register, District Plan or NZAA Site Records) historic heritage places affected by option, including archaeological sites, identified Māori sites and features, historic buildings and structures (section 6(e),(f), RMA)
	3.3 Archaeology - unknown	Effects on predicted unknown/unrecorded archaeological items and sites, and sites/items of significance/value to Māori (section 6(e),(f), RMA)
	3.4 Cultural health effects	Effects on the relationship of Māori and their culture and traditions and customary activities with their ancestral lands, water, sites, wāhi tapu, and other taonga, including the effects from changes to ecology and water quality (sections 6(e), (g), 7(a) and 8, RMA).

Outcome	Criteria Heading	Measure
Natural Environment	4.1 Natural landscapes and features	Effects on outstanding natural landscapes and features requiring protection, including those listed in district and regional plans (section 6(b), RMA).
	4.2 Surface water	Effects on surface water resources, including quality, quantity and flooding issues.
	4.3 Groundwater	Changes in groundwater and associated effects, including construction and operational.
	4.4 Ecology	Effects on areas of significant indigenous vegetation and habitats (section 6(c) RMA), biodiversity, and ecological processes.
Social / Community	5.1 Air Emissions	Effect of the changes of air quality on sensitive receptors, including residential areas, hospitals and schools (MfE Good Practice Guide for assessing discharges to air from land transport, section 4.4).
	5.2 Traffic noise & Vibration	Effect of noise and vibration on Protected Premises and Facilities (Traffic noise-NZS 6806:2010; Vibration-NS 8176.E: 2005).
	5.3 Displacement	Effects of displacement of households, businesses, community services and facilities
	5.4 Community Wellbeing	Effects on community wellbeing and way of life, including access, connectivity and severance.
Economic	6.1 National & Regional Economic Growth	Consistency with National & Regional economic and growth policies (for example, Government Policy Statement, Wellington Regional Strategy).
	6.2 Local Economic Growth	Consistency with local economic and growth policies, particularly the impact on local town centres.
Implementation time frame	7.1 RMA and other statutory approvals/ authorities	Risks of delay to constructing the proposed Expressway within scheduled timeframes through obtaining necessary RMA approvals and other required statutory authorisations (for example, Historic Places Act, Reserves Act).
	7.2 - Public Works Act processes and transfers	Risk of delay to constructing the proposed Expressway within scheduled timeframes through the property acquisition process, including private property acquisition process and process of transferring any Council-owned land to the Crown and changing the purpose for which Crown land is held.

The MCA process and grading scale applied to the assessment of the final shortlist of options was consistent with that used to assess the alternative Expressway route options (refer to Sections 9.4.3.2 – 9.4.3.5 of this Chapter of the AEE).

The process involved technical specialists from the project team assessing the options using the criteria included in Table 9.12 relevant to their specialist area, and generating a score and associated comments. These scores were then reviewed and challenged by the wider project team at subsequent MCA workshops and, in some cases, amended in light of these discussions to ensure a consistent approach to scoring. This approach enabled comprehensive consideration to be given to the relative costs and benefits of options, along with associated opportunities for effects' mitigation.

a. Initial MCA Workshop: 23 February 2011

An initial MCA workshop was held, at which the 12 short-listed options were presented to the wider project team. It was held as a trial run to review the process and criteria prior to the final MCA workshop on 9 and 15 March 2011. The workshop was also held ahead of any detailed costing information being available.

b. Final MCA Workshop: 9 & 15 March 2011

The final MCA workshop was held over two days in March 2011, with specialist assessors grading the various criteria, and providing comments to support the scores supplied. The wider project team challenged the assessments and a management review was held following the MCA.

c. MCA Review

Following each of the two final MCA workshop days, the outcomes of the MCA were reviewed by the Alliance Management Team (AMT)[91] on behalf of the NZTA. The purpose of this review was to:

- Confirm or amend assessment scores derived from the MCA workshop;
- Sensitivity test the assessment to ensure that issues were not over or under-rated;
- Discuss the qualitative merits of each option; and
- Select options along the alignment for recommendation to the Project Alliance Board (PAB).

Following this review the AMT confirmed the final scores. In a few cases, these deviated from the scores derived from the workshop; however, this did not alter the overall outcomes.

The AMT met on 12 April 2011, at which time the northern connection recommendation was reviewed in light of further costing information. At this meeting the Smithfield Road alignment option was also considered and confirmed as the recommended option by the team.

The conclusions and recommendations derived from this review were subsequently supplied to the PAB[92] for consideration and confirmation on behalf of the NZTA.

---

[91] The AMT comprised the following members: Jim Bentley, Alliance Project Manager (Synergine); Graham Spargo, Approvals Manager (Beca); Tamsin Evans, Local Co-ordination Manager (KCDC); Noel Nancekivell, Design Manager (Beca); Bruce Little, Commercial Manager (Fletchers); Andrew Quinn, Co-ordination Manager (NZTA); Stephen Wright, Construction Manager (Fletchers); Robert Schofield, Consents & RMA Manager (Boffa Miskell); Jane Black, Consultation Manager (Incite); Geoff Brown, Structural Manager (Beca); and Richard Muggleston, Cost & Risk Manager (Fletchers)

[92] The PAB comprised the following members: Colin Crompton (NZTA); Neil Walker (NZTA); Graham Darlow (Fletchers); Roly Frost (Beca); and Pat Dougherty (KCDC)

9.6.4.4 Options phase: assessment results

The final MCA scores resulting from the AMT review are outlined in Table 9.12 and, for presentation purposes, have been aggregated under the seven MCA outcomes. A detailed breakdown is included in Appendix H of the *M2PP Options Report* (2011).

Table 9.12: MCA Scores Resulting from the AMT Review

Outcome	Option											
	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B
Movement	0.6	0.6	2.2	2.2	2.4	2.0	2.2	2.2	2.4	2.4	1.0	1.8
Built Environment	-0.3	-0.7	-2.7	-1.3	-0.7	-1.3	-1.0	-1.7	-1.7	-1.7	-0.7	-1.0
Cultural/Heritage	-0.3	-0.3	-1.7	-1.0	-1.0	-1.0	-1.3	-1.3	-2.0	-2.0	-1.0	-1.0
Natural Environment	0	0	-2.5	-1.5	-0.8	-1.5	-0.5	-1.3	-1.8	-1.0	-0.5	-1.0
Social/Community	0	0	-1.0	-1.8	-1.0	-1.3	-0.8	-1.0	-1.5	-1.8	-0.3	-0.3
Economic[93]	0	0	0	0	0	0	0	0	0	0	0	0
Implementation Timeframe	-1.5	-2	-2.0	-2.0	-1.0	-1.5	0	-1.0	-3.0	-2.0	-0.5	-0.5
Total Score	-1.6	-2.4	-7.6	-5.4	-2.0	-4.6	-1.4	-4.1	-7.5	-6.0	-1.9	-2.0

During the AMT review a change was made to the measures relating to the Cultural/Heritage outcome, with known and unknown archaeology combined into a single measure. While the management team acknowledged that it was helpful to separate out these two measures, it considered that scoring them separately resulted in the archaeology score being 'double counted'.

An overview of the AMT decisions relating to the options is as follows:[94]

a. Raumati Straight, Options 1A and 1B[95]

The AMT confirmed the MCA workshop result and recommended the 4m median option (Option 1A) as the preferred option along Raumati Straight. The AMT also adjusted the score relating to the impact on public areas/parks/recreation areas to recognise the importance of minimising the impact on Queen Elizabeth Park.

b. Southern Connection, Options 2A and 2B

The AMT recommended Option 2B (200 Main Road) over Option 2A (through Queen Elizabeth Park) as their preferred option for the southern connection. In making this recommendation, the AMT recognised that there were a significant number of measures that attracted the maximum negative score

[93] This outcome was considered during the MCA process but as there was no differentiation between options a nil value was applied to all the options

[94] Further detail is contained in Appendix H of the *M2PP Options Report* (2011)

[95] Refer to footnote 17

for Option 2A, compared with only one for Option 2B (displacement). However, they considered that, while individually these measures were not as significant as the property effects of Option 2B, collectively they were more significant than the property impacts associated with this option.

c. Kāpiti Road Interchange, Options 3A and 3B

The team concurred with the MCA workshop result that Option 3A (proposed Expressway over Kāpiti Road) was the preferred option, subject to the acceptability of the final bridge design. In making this recommendation it noted that although the bridge design was an important factor to be considered, the outcome of the design process was unlikely to result in a revised score sufficient to reverse this decision.

d. Otaihanga Road Crossing, Options 4A and 4B

The AMT challenged the MCA workshop assessment on the visual impact of having the proposed Expressway cross over Otaihanga Road. However, it concluded that, regardless of the potential adverse visual impact of the proposed Expressway over Otaihanga Road (Option 4A), the balance of the other assessment measures favoured having the proposed Expressway cross over Otaihanga Road (Option 4A) and confirmed this option as the preferred option.

e. Waikanae River to Te Moana Road, Options 5A and 5B

The MCA workshop assessment of the western option (5A) resulted in a lower score than the eastern option (5B): i.e., -7.5 compared with -6.0. However, the AMT concluded that the significant heritage and social impacts associated with the eastern option outweighed the cumulative cultural, archaeological and ecological impacts of the western option. In reaching this conclusion the team acknowledged that both options traversed an area that was significant to iwi but, on balance, considered that the western option was preferable given the more significant effects that the eastern option would have on the heritage and social values of this residential neighbourhood. The western option also offered greater opportunities to mitigate the effects of the proposed Expressway on the ecology of the area and on the residential character.

f. Northern Connection, Options 6A and 6B

The MCA workshop assessment resulted in little difference in the overall score between Options 6A and 6B. The team adjusted some of the MCA scores as part of their review of these options; however, this did not result in a significant alteration to their overall scores. Qualitative factors considered by the team included safety, visual impacts and provision for future development in the area. Based on this consideration, and associated cost estimates for each of the options, the team confirmed Option 6A (Hadfield Road at grade rail crossing) as the preferred option.

9.7 Identification of a preferred alignment

Following consideration of the proposed options recommended by the AMT, the Project Alliance and NZTA Boards confirmed the following as the preferred alignment for the proposed Expressway in April 2011:

- Raumati Straight: Option 1A, Four metre wide median[96];
- Southern Connection: Option 2B, Connection through 200 Main Road;
- Kāpiti Road Interchange: Option 3A, Kāpiti Road under proposed Expressway;
- Otaihanga Road: Option 4A, proposed Expressway over Otaihanga Road;
- Waikanae Road to Te Moana Road: Option 5A, Western option; and
- Northern Connection: Option 6A, at grade rail crossing retained at Hadfield Road, local connection over proposed Expressway, at grade roundabouts at Peka Peka Road and on the east side of the proposed Expressway south of the overbridge.

In addition, it confirmed the following options for overbridges and underbridges at other locations along the route:

- Raumati Road: proposed Expressway over;
- Ihakara Street extension: proposed Expressway over;
- Mazengarb Road: proposed Expressway over, Mazengarb Road lowered;
- Te Moana Road: proposed Expressway over;
- Ngarara Road: Ngarara Road over;
- Smithfield Road: proposed Expressway over, Smithfield Road realigned.

A summary of the preferred alignment options is illustrated in Figure 9.4.

[96] Refer to footnote 17

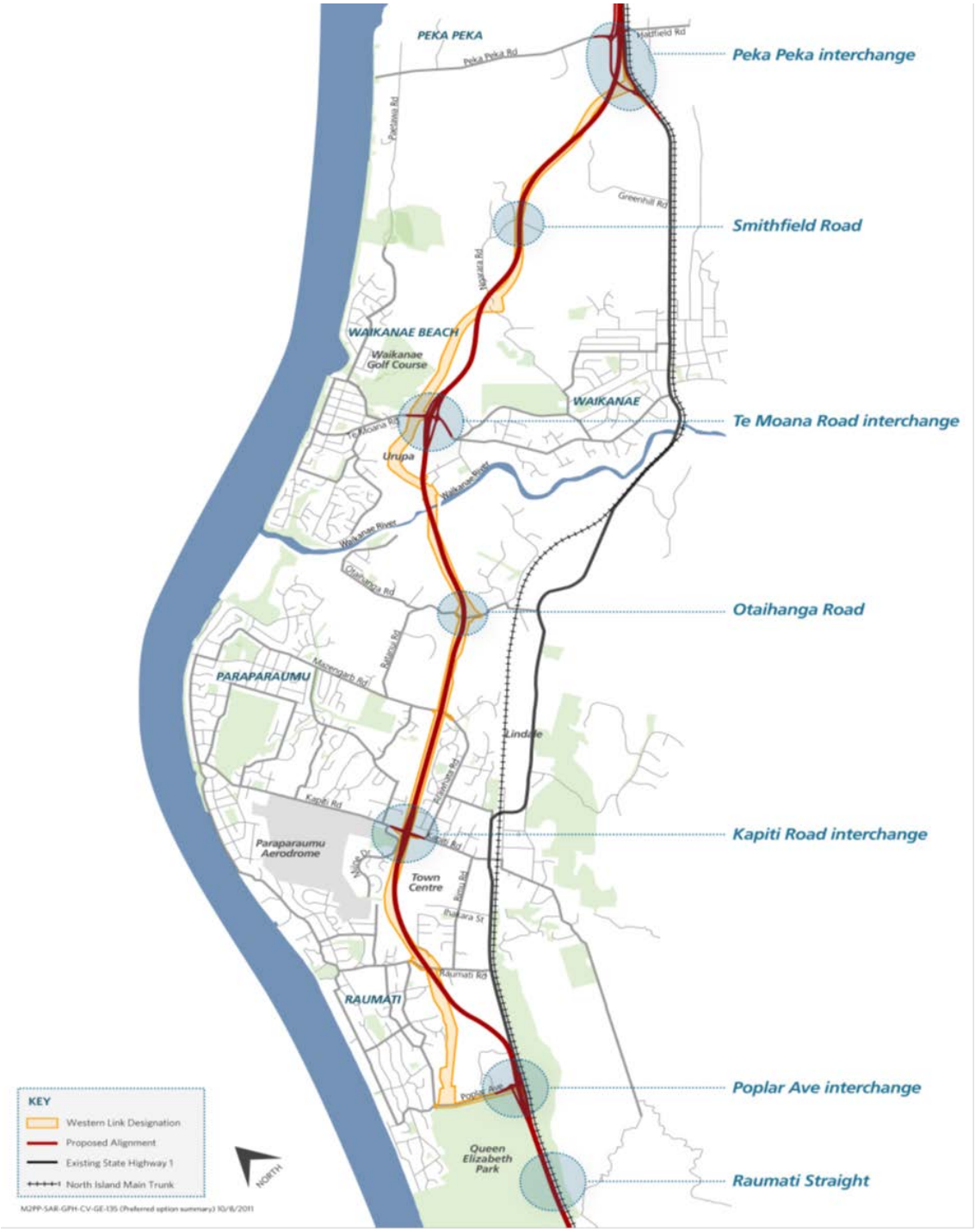

Figure 9.4: Preferred Alignment Options

9.8 Mitigation option assessment

Assessment of mitigation was undertaken throughout the design and development of the Project, particularly where potential adverse effects were identified. Further detail regarding these assessments is provided in the Technical Reports contained in Volume 3 of the AEE.

9.8.1 Contaminants discharge

Section 105 of the RMA requires decision makers, amongst other matters, to have regard to "any possible alternative methods of discharge, including discharge into any other receiving environment".

A number of potential options were identified to manage and treat contaminant discharges associated with the Project, and their viability assessed against such factors as:

- Topology and land gradients;
- Minimising the need for land take beyond the Project designation;
- Sustainability and ongoing maintenance costs; and
- Ability to integrate with landscape and ecological mitigation solutions.

A detailed description regarding the consideration and assessment of methodologies and alternatives to mitigate the discharge of contaminants is included in Technical Reports 13, 14, 21, 22, 23 and 26 of Volume 3 of the AEE.

9.8.2 Existing traffic safety and movements

Much of the proposed Expressway route is to be constructed off line from existing roads, and so will have few effects on existing traffic and pedestrians apart from access for plant and materials (refer to Technical Report 33, Volume 3 of the AEE). However, as the alignment crosses a number of local roads there will be some construction impacts on local traffic movement.

In locations where the proposed Expressway passes over a local road, the impact on road users and the extent and cost of relocating services could be reduced through constructing bridge abutments outside local road footprints and erecting bridge beams during times where there is minimal traffic flow.

In contrast, the impact on existing traffic movement and the scope of work required to relocate or protect services is likely to increase in locations where local roads are to be re-constructed over the proposed Expressway. In such circumstances, construction of the bridge structures and approaches will either occur adjacent to an existing local road or the local road will be temporarily diverted.

A key element of the works' programming is isolation of construction and public traffic during the early phase of bridge construction in order to allow movement of earthworks material and plant along the proposed Expressway route rather than on local roads. Once constructed, it is anticipated that heavy construction traffic will utilise these structures to move along the length of the route, and thereby avoid or reduce the need to use local roads.

9.8.3 Noise

An assessment of noise mitigation options was undertaken for each sector of the preferred alignment. The assessment process applied was in accordance with *New Zealand Standard 6808:2010 - Acoustics (Road-traffic noise) - New and Altered Roads*, and involved a comparison of the options against a 'do

minimum'[97] scenario to identify the BPO for noise mitigation. Details of this process are outlined in Technical Report 15 of Volume 3 of the AEE.

To determine the BPO for each sector a range of noise mitigation options were assessed by the project team at a workshop on 12 July 2011 against a set of standardised criteria. These included:

- The potential impact of the options on the community, including noise effects, visual integration and coherence, safety and security, and the effect on heritage or cultural values;
- The potential impact of the options on the physical environment, including the surrounding landscape, wetlands and habitats; and
- The impact of the options on the safe operation of the proposed Expressway, constructability and technical feasibility and the value for money delivered.

Prior to the workshop the identified mitigation options were circulated to relevant project team members and individual assessment matrices for each sector completed. Discussion during the workshop helped to inform further refinements to the pre-circulated options and, based on the outcome of the workshop and the completed matrices, a BPO was derived for identified areas within each sector (refer to Technical Reports 15 and 16, Volume 3 of the AEE).

[97] Includes all permitted development and planned consented upgrades in the project area

PART F: CONSULTATION AND ENGAGEMENT

10 Consultation and engagement

Overview

As the proposed Expressway design progressed, consultation and engagement was undertaken at local, regional and national levels, with two key consultation periods held at the main decision-making points.

Methods of consultation included two series of public open days ("EXPOs") held to signal the start of each consultation period, a project Information Centre in Coastlands Shopping Mall for the duration of the period, occasional newsletters to the community, one–on-one meetings and online material.

In addition, engagement with tangata whenua has been ongoing since the commencement of the Project, and regular engagement with the relevant regulatory authorities and other stakeholders was also undertaken.

10.1 Introduction

This Chapter outlines the strategy and methodology of consultation and engagement that was undertaken for the Project, and sets out the:

- Objectives of the consultation
- Statutory framework for consultation
- History of consultation
- Consultation phases
- Parties Consulted with
- Consultation methods
- Consultation reporting

The consultation strategy and methods that were adopted were developed to provide targeted and effective consultation with stakeholders and the public.

Further detail is included in the Consultation Summary Report in Technical Report 3, Volume 3.

10.2 Statutory framework

Resource Management Act 1991(RMA)

A consultation strategy was developed to assist progressing investigation and design development of the Expressway proposal. While there is no statutory requirement to consult when preparing an application for a NoR or resource consent under the RMA, it is considered best practice to do so, and it is in accordance with NZTA policy.

Land Transport Management Act 2003 (LTMA 2003)

Section 96(1) of the LTMA requires NZTA to exhibit a sense of 'social and environmental responsibility' in meeting its objectives and undertaking its functions. This is further detailed to include avoiding, to the extent reasonable in the circumstances, adverse effects on the environment. The LTMA also has a statutory obligation under section 18H to establish and maintain opportunities for Māori to contribute to the Agency's decision making functions. To enable this involvement the NZTA shall consider ways in which they can foster the development of Māori to contribute to decision making.

NZTA Public Engagement Policy 2008

This document sets out NZTA's engagement policy, and provides guidance for deciding when and how to engage the public. It explains the steps involved and provides a number of engagement resources. The NZTA Public Engagement Policy[98] identifies four key commitments to public engagement:

- Providing opportunities for public consultation;
- Ensuring people are informed;
- Adopting an inclusive and representative approach to public engagement; and
- Maintaining high professional public engagement standards.

The NZTA's Public Engagement Policy has been adhered to in undertaking consultation in relation to the proposed Expressway.

10.3 History of consultation

In May 2009, the Government identified SH1 between Wellington International Airport and Levin (referred to as the Wellington northern corridor) as one of seven RoNS. Government signalled the need for future investment in the northern corridor to provide for growing populations in Wellington and the Kāpiti Coast.

[98] NZTA Public Engagement Manual 2008 – Part 1

In November 2009, the NZTA began consultation on corridor options for a four-lane Expressway between Mackays Crossing and Peka Peka. The three options that were consulted on include were:

1. The Eastern option – Expressway following the rail corridor with local supporting roads;

2. The Western option – Expressway avoiding the Waikanae Town Centre with local supporting roads; and

3. The Western Link Road Expressway option – Expressway following the Western Link Road corridor.

Following the consultation, a preferred route largely following the Western Link Road Corridor was chosen. The MacKays to Peka Peka Alliance was established in 2010 and a second stage of consultation was undertaken on behalf of the NZTA in November/December 2010 to gain feedback on the preferred alignment within that corridor and the location of interchanges along the route. A third stage of consultation was undertaken in May/June 2011 to seek feedback on the preferred design of the proposed Expressway. Further information regarding consideration of alternatives is included in Part E, Chapter 9.

10.4 Objectives and purpose of consultation

Objectives for the 2009 Consultation Process:

The NZTA objectives for consulting on the proposed Expressway options in 2009 were to:

- Inform affected communities, key stakeholders, iwi and other members of the general public about the Expressway options;
- Provide an opportunity for these parties to provide feedback to the NZTA on the Expressway options;
- Provide the NZTA Board with an understanding of the views of the affected community, key stakeholders, iwi and general public regarding the three Expressway options; and
- Provide a method of community, stakeholder and general public engagement on the preferred route for a four-lane Expressway between MacKays Crossing and Peka Peka, which meets the requirements of the Land Transport Management Act 2003.

Objectives for the 2010 Consultation Process:

The consultation objectives that were set for the Expressway project in late 2010 / early 2011 were to:

- To comply with statutory requirements related to the planning and implementation of this project;
- Raise stakeholder awareness and understanding of the project;
- Engage early and effectively with iwi, key stakeholders and communities to enable them to communicate their concerns and objectives in order to inform the design and development of the proposed Expressway;

- Ensure stakeholders are advised as quickly as possible on all new developments, key milestones and planned activities on the project;
- Work with potentially affected property owners and occupiers in a sympathetic and fair manner at all times; and
- Maintain regular contact with stakeholders in order to continue to be aware of and address any potential issues.

Objectives for the 2011 Consultation Process:

The purpose of consulting on design development for the proposed MacKays to Peka Peka Expressway in mid-2011 was to:

- Inform the community of the decisions that have been made on the alignment including which options have been selected at the southern end and at Waikanae, and on interchange locations;
- Communicate what the community told the NZTA during the last stage of engagement and demonstrate how that feedback influenced the decisions made;
- Seek feedback on proposed design details which were not available at the last stage of engagement; and
- Explain the process for giving feedback, finalising this phase of the project, how the EPA process works and timing of the rest of the Project.

10.5 Consultation phases

2009 Consultation – Scoping and Corridor Assessment

NZTA began consultation for the MacKays to Peka Peka Project area in October 2009 with preliminary scoping and corridor assessment work. The options consulted on were based on the *Kāpiti Strategic Study* prepared by Opus International Consultants for the NZTA. A total of 4,446 submissions were received on the proposed Expressway options from MacKays Crossing to Peka Peka.

Feedback indicated that the preferred corridor for the proposed Expressway was the route largely following the WLR alignment. A summary of the consultation findings can be viewed separately in the *Mackays Crossing to Peka Peka Community Engagement Report 2009*.

2010 Consultation – Alignment and Interchange Options

An important phase of the development of the MacKays to Peka Peka Expressway was to re-engage with the community, one year after the original consultation held in October 2009. This was undertaken between 28 November 2010 and 4 February 2011. The purpose of this consultation was to obtain information and assist in refining the alignment and the location of interchanges, specifically:

- The route options between Waikanae River and Te Moana Road (Options 1 and 2);
- The southern connection around Poplar Avenue;
- The number and location of interchanges; and

- The northern connection at Peka Peka Road.

2011 Consultation - Design Development

The alignment of the proposed Expressway and the location of four interchanges along the proposed Expressway route were confirmed in May 2011. Following this announcement, further consultation was undertaken with the general public and key stakeholders on design development of the proposed Expressway and its surrounding environment.

Feedback was specifically sought on the following design aspects:

- Cycle ways, walk ways and bridleways;
- Local road connections;
- Possible mitigation measures, including earth bunding and landscape treatment for visual and noise mitigation;
- Noise, vibration and air quality;
- Stormwater/drainage and wetlands; and
- Ecology.

The diagram below (Figure 10.1) illustrates the investigation process undertaken thus far to develop the proposed Expressway design.

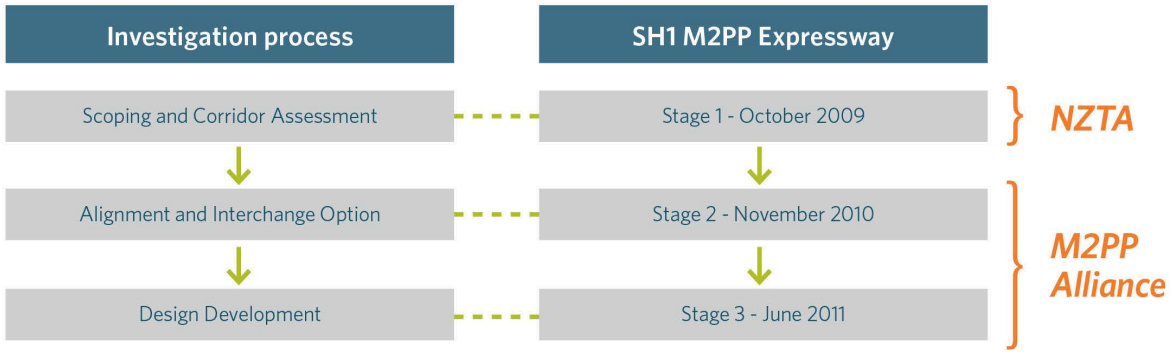

Figure 10.1: Investigation Process

10.6 Parties consulted

Methods used to engage with stakeholders included:

- **EXPO** – Open days that were held to inform residents of what the NZTA is seeking feedback on. Technical experts from the Alliance attended the open days to answer questions about the proposed Expressway project. Feedback was taken as part of the consultation.

- **Consultation Brochures** – Used primarily to update residents on key decisions for the proposed Expressway, and important upcoming dates.

- **Coastlands Information Centre** – A staffed tenancy in Coastlands Shopping mall (Paraparaumu), copies of information and maps for viewing on the latest stage of design were available.
- **Stakeholder letter** – A letter used to provide updates.
- **M2PP 0800 info phone line** and **info@m2pp.co.nz email address** – A port of call for any proposed Expressway related queries.

The following parties have been consulted as part of the proposed Expressway development process.

Table 10.1: Parties Consulted

Category	Stakeholder	Interest	Method of engagement
Political	Minister of Transport	▪ Any issues and progress of project.	▪ Briefings when required.
	MP for Ōtaki and Mana	▪ Any issues and progress of project.	▪ Briefings when required.
Local Authorities/ Organisations	Greater Wellington Regional Council	▪ GW Regional Council owned land along the proposed Expressway corridor. ▪ Implications as a consenting authority. ▪ Relationship to rail and bus public transport services.	▪ Meet as required and through programmed strategic and technical meetings as well as meetings as required to discuss specific issues.
	Manawatu-Wanganui Regional Council	▪ Implications for regional traffic demand.	▪ Stakeholder letter. ▪ Briefing as required.
	Horowhenua District Council	▪ Implications for regional traffic demand.	▪ Stakeholder letter. ▪ Briefing as required.
	Porirua City Council	▪ Implications for regional traffic demand.	▪ Stakeholder letter. ▪ Briefing as required.
	Kāpiti Coast District Council (Joined the Alliance in September 2010)	▪ Work with to develop and achieve common objectives for the proposed Expressway. Develop and maintain relationship. ▪ CEO on Project Alliance Board.	▪ Ongoing briefings, as required with Mayor and Councillors. ▪ Programmed strategic meetings and workshops with Council staff. ▪ Meet as required to resolve technical issues.
Statutory Agencies	Environmental Protection Authority (EPA)	▪ Develop and maintain relationship with EPA.	▪ As required and through programmed meetings.

Category	Stakeholder	Interest	Method of engagement
	Department of Conservation	■ QE Park wetlands and ecology generally.	■ Stakeholder letter. ■ Consultation brochure. ■ Briefing as required. ■ Meetings as required.
	Regional Public Health	■ Community health.	■ Stakeholder letter. ■ Consultation brochure.
	NZ Historic Places Trust	■ Sites of cultural or historical significance. ■ Archaeological authority approvals.	■ Stakeholder letter. ■ Consultation brochure. ■ Briefing as required. ■ Programmed meetings.
Transport Industry	Automobile Association	■ Regionally and nationally safe and efficient road networks.	■ Stakeholder letter. ■ Briefing as required.
	NZ Road Transport Association	■ Inform early ■ Keep informed by way of regular newsletter ■ Arrange meetings on request	■ Stakeholder letter. ■ Briefing as required.
	Road Transport Forum NZ	■ Keep informed by way of regular newsletter. ■ Arrange meetings on request.	■ Stakeholder letter. ■ Briefing as required.
	Wellington Regional Transport Committee	■ Keep informed by way of regular newsletter. ■ Arrange meetings on request.	■ Stakeholder letter. ■ Briefing as required.
	Passenger Transport Providers (e.g. Mana Coachlines)	■ Keep informed by way of regular newsletter. ■ Arrange meetings on request.	■ Stakeholder letter. ■ Briefing as required. ■ Consultation brochure.
	NZ Heavy Haulage Association	■ The width and clearance heights at bridges for over dimensioned and heavy vehicles.	■ Stakeholder letter. ■ Briefing as required. ■ Consultation brochure.
Business Groups	Wellington Regional Chamber of Commerce	■ Inform early. ■ Keep informed by way of regular newsletter. ■ Arrange meetings on request.	■ Stakeholder letter. ■ Consultation brochure.
	Kapiti Coast Chamber of Commerce	■ Inform early. ■ Keep informed by way of regular newsletter. ■ Arrange meetings on request.	■ Stakeholder letter. ■ Consultation brochure.
Community Interest Groups	Nature Coast Enterprise	■ Community response and feedback on the proposed Expressway project.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.

Category	Stakeholder	Interest	Method of engagement
	Paraparaumu-Raumati Community Board	■ Community response and feedback on the proposed Expressway project.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.
	Waikanae Community Board	■ Community response and feedback on the proposed Expressway project.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.
	Schools adjacent the corridor	■ Noise and air pollution from the proposed Expressway.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.
	Other interest groups (e.g. Cycle Aware; Highway Occupants Group (HOG), Friends of the Waikanae River and Wharemauku Stream and Waikanae on One (WOO)	■ Noise, air pollution, visual effects, stormwater/drainage, the effects of the proposed Expressway on traffic flows.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.
Emergency Services	NZ Police	■ East west connectivity across the proposed Expressway. ■ Access on and off the Expressway.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.
	NZ Fire Service	■ Access onto the proposed Expressway to quickly attend callouts.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.
	Wellington Free Ambulance	■ Access onto the proposed Expressway to quickly attend callouts.	■ Stakeholder letter. ■ Consultation brochure. ■ Meetings as required.
Community	Directly affected landowners and occupiers	■ Property ownership (homes and businesses affected).	■ Individually notified in week prior to Expo. ■ Consultation brochure. ■ Expos. ■ Individual meetings. ■ Individual and group meetings. ■ 0800 number and info@M2PP.co.nz email address.
	Owners and occupiers of land adjoining the Expressway	■ Construction - noise, dust, visual construction movements of heavy machinery. ■ Operational Expressway - noise, visual effects of bridge structures, stormwater and drainage.	■ Talking to individuals and hearing their issues and concerns. ■ Consultation brochure to precede Expos. ■ Expos. ■ 0800 number and info@M2PP.co.nz email address.

Category	Stakeholder	Interest	Method of engagement
	Wider community	■ How the proposed Expressway relates to their everyday activities. ■ The effect the proposed Expressway will have on local roads.	■ Coastlands Information Centre. ■ Consultation brochure. ■ Expos. ■ 0800 number and info@M2PP.co.nz email address.
Māori	**Manawhenua**: Te Āti Awa ki Whakarongotai Takamore Trust	■ Alignment of the proposed Expressway in relation to their sites of cultural significance. ■ Access to the Takamore Urupā area. ■ Focus on avoiding or mitigating any effects on significant sites.	■ Seek meetings prior to key consultation phases. ■ Assist Te Āti Awa in holding a wananga at early stage. ■ Consultation brochure to precede Expos. ■ Attend meetings as required. ■ Work towards a memorandum of understanding.
	Tangata Whenua: Muaupoko Ngāti Raukawa ki te Tonga Ngāti Toa Rangatira	■ Alignment of the proposed Expressway in relation to their sites of cultural significance. ■ Focus on avoiding or mitigating any effects on significant sites.	■ Seek meetings prior to key consultation phases. ■ Consultation brochure.
	Māori Interest Groups: Te Whakaminenga o Kāpiti (KCDC)	■ Alignment of the proposed Expressway in relation to their sites of cultural significance.	■ Convene prior to key consultation phases. ■ Consultation brochure.

10.7 Communication and engagement with directly affected landowners

10.7.1 2010 consultation – alignment and interchange options

On Thursday 25 November 2010, members of the Alliance visited all properties within the District that may have been required for the proposed Expressway alignment at that stage. These visits were undertaken prior to the commencement of public consultation on the alignment and interchange options. Not all property owners were home when visited but letters were also delivered on all visits, confirming that the property may be required and providing detail on how further information could be obtained. Subsequent site visits were arranged following this initial contact.

Where landowners did not live on the affected property, particularly those who lived outside the District, letters were sent to the landowners (at their alternative or postal address) on Thursday 25 November 2010. Best endeavours were made to contact all directly affected landowners prior to the commencement of the consultation on 28 November 2010.

In addition to the pre-consultation visits, directly affected landowners also received the consultation brochure detailing information about the upcoming consultation and postcards which were sent to all households within the Kāpiti Coast District advising of EXPO dates.

10.7.2 2011 consultation – design development

The announcement of the proposed Expressway alignment and the location of the four interchanges (which were finalised after feedback during the 2010 consultation) provided certainty as to which properties would be required. Members of the Alliance team made phone calls to landowners, on behalf of the NZTA, on 5 and 6 May 2011 to advise whether their properties were required for the proposed Expressway. Those property owners whose land was not required were also advised at this time.

A letter confirming the phone conversation was sent on 6 May 2011 to property owners. This letter was accompanied by an indicative map showing the site specific partial or full land requirement. Best endeavours were made to contact all directly affected landowners prior to the commencement of the consultation with the general public on Sunday 15 May 2011.

Following confirmation of property requirements, meetings were arranged to discuss the acquisition process under the PWA with the Crown's accredited suppliers (The Property Group and Opus International Consultants). These initial meetings set in train the process of property acquisition discussions with directly affected property owners who are willing sellers.

Communication with business owners and residents that adjoin the proposed Expressway

Members of the Alliance have had ongoing meetings with business owners and residents that work and live near the proposed Expressway to discuss the effects of the proposed Expressway on their properties and how access will be maintained. For a number of properties, the proposed Expressway will alter vehicle and pedestrian access and introduce traffic noise, earth embankments and bridge structures that were not previously part of the existing environment. Details of the proposed interchanges on Poplar Avenue, Kapiti Road, Te Moana Road and Peka Peka Road have been provided to nearby residents and businesses.

Communication with landowners where site investigations are required

Ground investigations have taken place along the proposed Expressway alignment to assist in developing a construction methodology for the Project. Investigations include:

- Drilling bore holes (geotechnical investigations) to understand the underlying ground substrate and measure the depth of the water table;
- Testing of sites that may be contaminated (for example, market gardens);
- Carrying out ground penetrating radar (GPR) investigations to identify sites that may have burial remains or taonga. The GPR work involves handheld radar equipment and no land disturbance occurred;
- Monitoring noise to collect data on the existing environment;
- Monitoring of air quality was undertaken on Raumati Road; and
- Measuring vibration from traffic in local conditions by installing vibration transducers in dwellings near the existing SH1.

Access onto properties was obtained through land entry agreements. In instances where the works may create some noise or will be highly visible (for example, drilling rigs working within road reserve) adjoining property owners were advised of the works in advance by receiving a letter. The letter informed them of the nature of investigations and when they would be undertaken. Advertisements were also placed in the Kāpiti /Mana News and the Kāpiti Observer newspapers advising of the dates and investigation activities that were scheduled.

10.8 Communication with key stakeholders

10.8.1 2010 consultation – alignment and interchange options

Letters were sent to all key stakeholders identified in the stakeholder list (Table 10.1) on Monday 29 November 2010. The letters informed the key stakeholders of the commencement of the public consultation period and where further information could be obtained. It also invited stakeholders to meet with the Project team, as the NZTA's representative, to discuss the proposal further.

10.8.2 2011 consultation – design development

A consultation brochure confirming the chosen alignment was sent to all key stakeholders on Friday 6 May 2011. The brochure explained the reasons behind the decision, with particular explanation provided on what were considered to be the two most contentious areas:

1. Raumati South – North of Poplar Avenue; and

2. North of the Waikanae River – Option 1 (west) or Option 2 (east) near Puriri Road, Kauri Road and the Takamore Urupā.

Meetings and discussions were held with key stakeholders within the public consultation period seeking feedback on the proposed Expressway design. KCDC provided detailed feedback on the design of the proposed Expressway and interchange locations. As required, relevant members of the Project team met with various groups and individuals.

10.8.3 Communication with Tangata Whenua

Purpose of Engagement

The purpose for engaging with the tangata whenua was to enable the iwi communities to meaningfully participate in the Project, the desired outcomes of that engagement were and are:

- to obtain feedback from the key iwi stakeholder groups;
- to assist in the identification of effects and appropriate mitigation; and
- to provide iwi with stakeholder participation throughout the Project.

To date, this process has largely been achieved through the application of an agreed engagement framework and methodology informed by matauranga Māori.

Iwi Consultation

In accordance with 'best practice' principles the NZTA adopted an engagement methodology underpinned by tikanga Māori in relation to consultation derived from New Zealand case law.

The Project team identified three stakeholder categories in relation to engagement with tangata whenua on the Project. This allowed for a better understanding of the nature of their interests in the project and the level of engagement required.

Category 1	Category 2	Category 3
Mana Whenua/Tangata Whenua	Interested Parties	Māori Land Owners

Category 1:

There are a number of iwi with traditional associations to the Kāpiti Coast, which broadly comprise the following tribal representative groups:

- Takamore Trust
- Ngāti Toa Rangatira
- Ngāti Haumia
- Te Āti Awa ki Whakarongotai
- Muaupoko
- Ngāti Raukawa

These iwi are considered affected parties and have been engaged throughout the various consultation pathways associated with the proposed Expressway. However, as identified earlier, Te Āti Awa ki Whakarongotai are regarded as the primary manawhenua group for the Project.

Category 2:

Wider but equally significant iwi interest groups engaged with included:

- Nga Hapu o Ōtaki
- Te Whakaminenga o Kāpiti – Kāpiti Coast District Council

Category 3:

Māori Landowners:

- Ngahina Ahu Whenua Trust - Ngarara West E being lots 2, 4 and 5 DP 72985 Block
- Takamore Trust - Ngarara West A Section 24 C Block

- Patricia Grace - Ngarara West A25B2A
- Ngarara West Ahu Whenua Trust - Ngarara West A25B2B & Ngarara West A25B2C

Note: Engagement with affected Māori land owners regarding impacts on parcels of Māori freehold land is subject to Te Ture Whenua Māori Act 1993.

10.9 Communication with the general public

10.9.1 2010- 2011 consultation

Distribution of information to the general public was carried out using a wide range of methods. The beginning of each consultation period was signalled with Project Expos, supported by consultation brochures, including links to the website and contact details for the Alliance. The methods of communication for both the 2010 and 2011 consultation period were generally the same.

Photo 10.1: Project Expo

10.10 Consultation and engagement methods

Different methods were used to provide information and seek feedback. The way in which consultation and engagement was carried out varied, depending on the specific interests of the parties involved. For each method of consultation, a summary is provided for each of the two consultation stages completed by the Project team. These consultation stages were:

- 2010 Consultation - Alignment and Interchange Options
- 2011 Consultation - Design Development

The methods were designed with the purpose of meeting the consultation and engagement objectives set by the Alliance (outlined in section 10.5 of this report). The type of consultation information provided, how this was accessed and the methods used to gain feedback are detailed as follows.

10.11 Consultation brochures and postcards

10.11.1 2010 Consultation – alignment and interchange options

A consultation brochure was mailed to all directly affected landowners, identified stakeholders, parties registered on the project mailing list, and every household in the Kāpiti Coast District (from Paekākāriki to Ōtaki) at the commencement of consultation in late November 2010. In total, approximately 21,000 consultation brochures were mailed out.

The brochure included background information on the project, detail on the alignment options being considered, the process and steps to follow, answers to frequently asked questions, and detail on how to get involved and provide feedback.

Copies of the brochure were also available on the project website, at the Council offices, libraries and the Expressway Information Centre in Coastlands Mall.

Postcards were also sent out to all Kāpiti households leading up to the consultation period to inform residents of the upcoming consultation dates and locations of the Expos.

10.11.2 2011 Consultation – design development

A consultation brochure confirming the proposed Expressway alignment was mailed out in May 2011. The mailing database was the same as that used for the 2010 consultation. Additional details of why this alignment was selected were provided, with a summary of commonly raised matters within submissions received in the first phase of consultation. Copies of the brochure were also available on the project website, at the Council offices, libraries and the Expressway Information Centre in Coastlands Mall.

A postcard was sent out to all Kāpiti households leading up to the design phase consultation period to inform residents of the upcoming consultation dates and locations of the Expos.

EXPO

A series of project Expos were held in 2010 and 2011 which signalled the start of each of the consultation periods. The Expos were held at Southwards Car Museum, Waikanae Memorial Hall, the Kāpiti Community Centre in Paraparaumu and Raumati South Memorial Hall.

Photo 10.2: Project Expo

The venue locations were dispersed within the communities along the route to enable each community to attend. The Expos were also held on both the weekend and a number of evenings throughout the week to allow flexibility for those attending.

The Expos provided the opportunity for people to find out more about the preferred alignment options being considered, to ask questions, request further information, and give feedback on the project. A number of Alliance technical experts were on hand for any specific questions, including but not limited to acoustic engineers, stormwater engineers, property advisers, roading engineers and landscape architects.

Detailed information panels, maps and plans were on display and members of the Project team were available to answer any questions and provide further explanation. Consultation brochures and feedback forms were also available at the Expos.

In addition, the opportunity was provided at the Expos for individual meetings to be held with directly affected landowners and members of the Project team as representatives for the NZTA.

Individual meetings

Meetings with landowners who had requested meetings, iwi and key stakeholders, including KCDC, GWRC, DOC, QEII National Trust, and various interested community and business groups were held during the consultation period.

Meetings with landowners were generally arranged to discuss either property purchase matters or to address specific questions and concerns with the proposed Expressway design development.

Focus meetings

Focus meetings were held with residents in the Te Moana Road, Puriri Road, Kauri Road and Leinster Avenue areas. These residential areas are particularly close to the proposed Expressway alignment and the purpose of the meeting was to engage with these residents to further understand their concerns and refine the proposed Expressway designs accordingly.

A meeting with a KCDC cycleway, walkway and bridleway reference group (CWB) was also held. The meeting was held to discuss the function and location of proposed pathways adjoining the proposed Expressway, and the specific needs for each of these groups.

Media releases

A number of media statements were released to announce the consultation timeline, publicise the commencement of consultation, remind people of the closing date and to thank the community for their submissions and involvement. A total of five media releases were issued during the 2010 consultation period. During the 2011 consultation, two media releases were issued to a wide range of Wellington and Kāpiti Coast media.

Advertising

An advertising campaign was undertaken using print and radio media. This advertising was part of the consultation process and advertised the location and dates of upcoming Expos. The advertising commenced early November 2010 and has extended throughout the consultation period.

Information Centre

The Expressway Information Centre is located in Coastlands Mall, Paraparaumu. It was opened on 30 July 2010 to provide information about the project. The information centre was staffed during the hours 9.30am – 2.30pm Monday to Friday and 10am – 2pm Saturday and was open to the public for viewing all other times the Mall was open.

The Information Centre was kept up to date with all the latest consultation information, including the material displayed at the project Expos. Staff also answered any queries, provided information and recorded general concerns or comments raised. Over 3,000 people visited the Information Centre during the course of the 2010 consultation period. A total of 2,750 people visited the information centre during the 2011 consultation period.

Project website

Information regarding the project and the consultation was available on NZTA's dedicated project website (www.nzta.govt.nz/projects/mackays-to-peka-peka). During the 2010 consultation period this site was recorded as being the highest use sub-site for NZTA.

The information available on the website included the consultation brochure, draft plans, Expo information panels, the feedback form, background material and resources, and contact details for enquiries and feedback. There was also the option provided to lodge feedback online. A total of 614 responses were received via the online feedback form during the 2010 consultation with 44 people lodging online feedback forms during the 2011 consultation period.

Project phone line

A dedicated project toll free phone line (0508 M2PP INFO (6277 4636)) was staffed by the Project team during standard business hours. Project team members answered questions, recorded enquiries and set up further meetings through this phone line. A total of 150 phone calls were made to the 0800 phone line over the course of the 2010 consultation period. The 2011 round of consultation attracted 74 phone calls to the 0800 phone line. The phone line was also answered in the weekend after Project Expos during the two consultation periods.

M2PP info email

A project information email address (info@m2pp.co.nz) was staffed by the Project team during normal business hours. Project team members replied to queries, supplied requested information, and set up further meetings through this email address. Within the 2010 consultation period, 150 email enquiries were received on the info email address. A total of 56 email enquiries were received on the info email address over the course of the 2011 consultation period.

10.11.3 Feedback form

As part of each consultation process feedback forms (together with the consultation brochures) were sent to every Kāpiti household seeking their feedback on the proposed alignment options and design development for the proposed Expressway. Copies of the feedback form were also available on the Project website, at the Council offices, libraries and the Expressway information centre in Coastlands Mall.

Information sought on the feedback form included contact details, the area where the submitter lived and comments on what the different aspects of the proposals meant to the submitter. Feedback forms were able to be lodged online, posted, or handed over personally at the Expos and Information Centre.

10.12 Submission methodology and analysis

10.12.1 Methodology

As detailed above, feedback forms were received online, at the Information Centre, at Expos, via email and by post. Every submission received was recorded in the project consultation database (using Darzin software). Details recorded included:

- Name and contact details of the submitter;
- The type/method of submission made;
- Opinions expressed; and
- A summary of the comments made.

From the data collected, issues, concerns and preferences were identified and recorded. An analysis of the summary of comments has been undertaken with a set of common submission themes being produced as a result (discussed under summary of submissions below).

In recording and summarising the content of the submissions, the following protocols were applied.

10.12.2 Form of submissions

Submissions were received in the form of the feedback form, letters and emails. In addition, comments provided on post-it notes, which were used as a communication tool at the Expos, were also recorded in the consultation database as feedback.

All of these different forms of feedback have been included in the submission summary and analysis contained in this section.

10.12.3 Anonymous submissions

Within the 2010 consultation period 23 submissions received were anonymous (in that they did not state the name of the submitter). A total of 8 submissions in the 2011 consultation were anonymous. All of these submissions have been recorded in the consultation database and are included in this report's submission analysis and summary.

10.12.4 Pro- forma submissions

A number of pro-forma submissions were received, being in the form of template submissions containing exactly the same content, but which were lodged or signed by individual submitters. These submissions were treated and summarised as individual submissions, recorded under the name of the undersigned.

10.12.5 Multiple submissions

In some cases, multiple submissions were received from one individual submitter i.e. different submissions lodged on different dates but from the same submitter with the same contact details. These submissions were treated and summarised as one submission entry, with each multiple submission being added onto the initial submission summary entry. However, submissions received from different members of the same family were treated as separate submissions. No petitions were received.

10.12.6 Late submissions

Up to 100 submissions were received after the 2010 consultation period which closed on 4 February 2011. Up to 31 submissions were received after the 2011 consultation period closed on 27 June 2011. All these submissions have been summarised in the consultation database and are included in this Chapter.

10.13 Consultation feedback 2010 - 2011

10.13.1 Summary

This section of the Chapter provides a summary of the feedback received during the November 2010 – February 2011 MacKays to Peka Peka Expressway consultation.

Overall, 1,617 submissions were received during that consultation period. A variety of concerns and matters were raised in the submissions, with 17 key submission theme areas being identified.

Feedback covered a wide spectrum of topics ranging from comments on the various proposed design and alignment options to environmental and community considerations.

The Southern end and Waikanae alignment options, as well as the proposed interchanges, generated a large amount of interest. In regard to the Southern end options, the largest proportion of submitters preferred the QE Park alternative over the Main Road proposal.

With respect to the Waikanae options, Option 1 (that being the option closest to the Urupā) generally was preferred by the largest proportion of submitters.

10.13.2 Expo 1

A series of project Expos were held at the following locations around the District at the start of the consultation period:

Table 10.2: Expo 1 Schedule

Date	Time	Location	Attendees (approx)
Sunday 28 November 2010	10am-4pm	Southward Car Museum, Otaihanga	617
Tuesday 30 November 2010	4pm-8pm	Kāpiti Community Centre	280
Wednesday 1 December 2010	4pm-8pm	Waikanae Memorial Hall	260
Thursday 2 December 2010	4pm-8pm	Raumati South Memorial Hall	220

10.13.3 Feedback analysis

The greatest number of submissions received by area was received from submitters located in the Waikanae area. The following graph shows the breakdown of the total number of submissions received by locality of submitter.

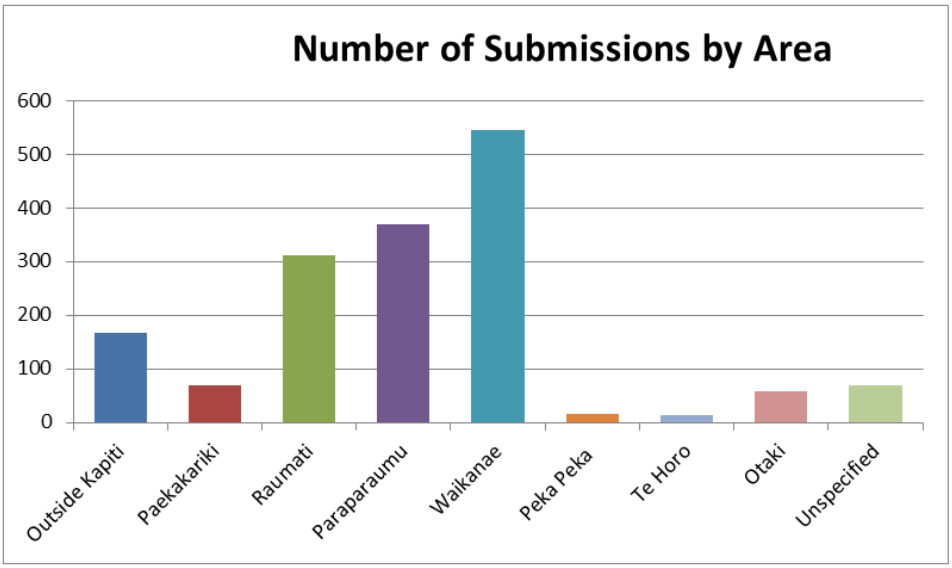

Figure 10.2: Number of Submissions by Area – Expo 1

10.13.4 Summary of submissions

An analysis of submission comments identified a number of common themes. For ease of reporting these have been grouped within 17 topic areas:

1. Support for proposals on which feedback was sought
2. Opposition for proposals on which feedback was sought

3. Design
4. Accessibility and Connectivity
5. Construction
6. Environmental Considerations
7. Social and Community
8. Health and Safety
9. Amenity and Urban Design
10. Culture and Heritage
11. Economic Factors
12. Property
13. Transportation
14. Local Network
15. Justification of Route
16. Other Route Options
17. Consultation

A summary of the common submission themes is provided as follows under each appropriate topic. The following is a summary of the common themes raised in submissions and is not a summary of every individual submission.

To understand the geographic areas feedback relates to, the following terminology has been used to describe the alignment options:

Table 10.3: Terminology for Alignment Options

Terminology used	Geographic Description
Raumati South	
South of Poplar Avenue:	The alignment that crosses through QE Park land.
North of Poplar Avenue:	The alignment that generally follows the existing SH1 alignment until it reaches the Leinster Avenue area where it deviates away from the existing SH1 towards the northwest.
Waikanae	
Option 1:	The western alignment option that crosses over the registered Wāhi tapu area.
Option 2:	The eastern alignment option through Puriri Road residential properties.

10.13.5 General support

Feedback supporting the proposal ranged from requests that the proposed Expressway be constructed as soon as possible, to general comment on the improvement to travel times on the local road network.

10.13.6 General opposition

Common reasons expressed in feedback for opposition to the proposals include views that the proposed Expressway is not necessary and that it will degrade the environment. Concern was expressed that it will sever communities and removes a number of homes. Concern was also expressed that it would have a high cost to build and have a negative impact on the businesses in the Waikanae and Paraparaumu town centres. A number of people believed funding for roads should be reallocated to public transport services.

10.13.7 Design options

Key areas addressed in submissions regarding the proposed design of the proposed Expressway related to the southern end options, the Waikanae options, the proposed interchanges, the local road and proposed Expressway crossings, the Waikanae river crossing, and local access. A summary of the feedback on these key design aspects is provided as follows:

Raumati South

The south of Poplar Avenue alignment option received the greatest proportion of supportive feedback. Feedback has been categorised into either support/opposition for the north of Poplar Avenue or support/opposition for the proposal south of Poplar Avenue.

Common reasons used by submitters supporting the north of Poplar Avenue option included:

- It will not divide the community;
- It will protect wetlands and ecological/bird corridors;
- It provides protection of public land for future;
- The option will avoid schools and retain walkways to the schools; and
- It will avoid earthquake damage through liquefaction in an area of deep peat.

Common reasons used by submitters opposing the north of Poplar Avenue option included:

- There is lack of credible evidence and a insufficient argument for the option;
- It is too expensive;
- Too many homes and residents will be affected;
- It will cut off the eastern end of Leinster Avenue and part of Main Road South (SH1);
- It will affect access to a future Raumati South train station;
- It will cut off access to existing walking tracks;
- Important ecological biodiversity and habitats will be destroyed;
- Concerns over functionality in a civil defence emergency; and
- There are peat issues for both options.

Common reasons used by submitters to support the south of Poplar Avenue option included:

- It will avoid disruption and removal of resident's homes;
- It is cheaper to address peat than compensate property owners;
- Existing schools can be moved or buffered;
- The subject land is unproductive;
- There is no public access to the park;
- Peat is a problem for either option;
- Construction will be faster;
- Cultural and environmental significance does not exist in this portion of the land; and
- NZTA can compensate any ecological loss with other land.

Common reasons used by submitters in opposition to the proposal south of Poplar Avenue included:

- Schools and the health and safety of children will be affected;
- Wetlands and Regional Park plans will be impacted;
- It will limit the areas for horse grazing in Kāpiti;
- The QE Park should be maintained for future generations; and
- The QE Park is culturally and environmentally significant.

Project team response

The issues raised were considered in addition to the technical specialist reports as part of the Multi Criteria Analysis (MCA). While more people favoured a route that diverts from the existing State Highway, south of Poplar Avenue, this alignment would have had a wide range of impacts which, when considered as a whole, had high significance under the RMA.

Waikanae

Feedback on the two options proposed for the Waikanae area of the proposed Expressway expressed greatest support for Option 1 (being the option closest to the Urupā). The feedback can be categorised into either support/opposition for Option 1, support/opposition for Option 2 (being the option furthest away from the Urupā), and suggestions of alternative routes.

Common reasons used by submitters to support Option 1 included:

- It affects fewer properties;
- Graves can be relocated (example used includes the Wellington Motorway and Bolton Street);
- It would be a straighter route; and

- Living people are important.

Common reasons used by submitters in opposition to Option 1 included:

- Iwi land should be protected under the Treaty of Waitangi; and
- It would have the greatest impact on the El Rancho holiday camp.

Common reasons used by submitters to support Option 2 included:

- It avoids wāhi tapu, the Maketu Tree and wetlands;
- Burial sites are more important than houses; and
- Wetlands and urupā cannot be relocated unlike houses.

Common reasons used by submitters in opposition to Option 2 included:

- It affects too many properties; and
- It would cost more.

Suggestions of alternative options included:

- Shift Option 2 further west to reduce the number of houses required;
- Consider an option through the eastern end of El Rancho;
- Proposed Expressway to overpass the iwi land;
- The optimum road corridor sits between the two current options; and
- Both options will have significant impact on the Greenaway Homestead and as such the Homestead should be relocated.

Project team response

The concerns expressed during feedback were considered as part of the MCA. It was identified that further work would be required to ensure that the design options addresses the cultural and archaeological significance of the area.

Interchanges

Of the submissions commenting on the interchanges, significant support was expressed for the interchanges as proposed, particularly the Kāpiti interchange. Feedback on the proposed interchanges can be categorised into feedback in relation to the:

- Location of interchanges;
- The number of interchanges;

- Full interchanges versus partial interchanges; and
- Comments on each of the individual interchanges proposed: i.e. at Poplar Avenue, Kāpiti Road, Te Moana Road and Peka Peka Road.

Common views expressed regarding the location of the interchanges included:

- Proposed interchanges are in the correct places;
- Provide interchanges at each end, with none in-between – this will separate local traffic from through traffic;
- Provide interchange at Mazengarb and Otaihanga Roads in addition to all those already proposed;
- Do not support interchanges at Mazengarb or Otaihanga Roads;
- One full interchange at Kāpiti Road is not enough, add others at Raumati and/or Otaihanga;
- Should have an interchange at Ihakara Street as opposed to Kāpiti Road – would avoid disruption to residents and services;
- Consider off ramps at Raumati Road/Raumati South, Paraparaumu suburbs and Waikanae – to avoid congesting Kāpiti and Te Moana Roads; and
- Do not support an interchange at Te Moana Road – Waikanae residents will have adequate connections via old SH1.

Common views expressed regarding the number of the interchanges included:

- The number of interchanges needs to be limited for the proposed Expressway to be effective;
- Support four interchanges; and
- There is the right number of interchanges in the proposal.

Common views expressed regarding the use of full interchanges versus partial interchanges included:

- All four interchanges need to be full interchanges;
- The Southern interchange needs to be a full interchange;
- Support the Peka Peka Road interchange as proposed due to growth pressures and to maintain the existing character of area;
- Support a full interchange at Peka Peka;
- Access is needed south at the Peka Peka Road interchange;
- Consider an off ramp for those heading north at the Peka Peka Road interchange;
- Too much land will be taken by full interchanges; and
- Make provision for full interchanges to be added in future.

Common views expressed regarding the Poplar Avenue interchange included:

- Support the proposed interchange;
- Requires a full interchange;
- Negative impact on Leinster Avenue access;
- Partial interchange will impact congestion on Kāpiti Road;
- Noise impacts for local residents; and
- It should blend in with the surrounding environment.

Common views expressed regarding the Kāpiti Road interchange included:

- Support for the interchange;
- Oppose the design of interchange as it will require removal of dwellings and create unacceptable noise levels for residents;
- Will result in more congestion on Kāpiti Road;
- Will improve future growth of the area; and
- Will support town centre development.

The Te Moana Road interchange generated the most comments. Common views expressed regarding the Te Moana Road interchange included:

- Support the interchange, it is essential;
- Will improve future growth of area;
- Not necessary;
- Do not support location, should be moved further north;
- Will divide the community;
- Impact on local traffic;
- Northbound interchange not required;
- Te Moana interchange should be in the form of a roundabout with the proposed Expressway passing over; and
- Significant impacts for residents if the proposed Expressway passes over Te Moana Road.

Common views expressed regarding the Peka Peka Road interchange included:

- Support for the proposed interchange;
- Reconsider interchange;
- Require a full interchange;
- A partial interchange will place pressure on Waikanae.

Project team response

There was a high level of approval of the number and location of interchanges which supported the technical assessment.

Local Road / Expressway Crossings

Consideration was sought on whether local roads (for example Kāpiti Road and Raumati Road) should travel over or under the proposed Expressway.

Feedback regarding the local road and the crossings included:

- Proposed Expressway should go underneath local roads to preserve the character of the area and ease of use;
- Proposed Expressway should cross over Kāpiti Road to reduce impacts on access to adjoining properties;
- Proposed Expressway should pass over Raumati Road to avoid disruption to pedestrian and cyclist traffic and adjoining properties;
- Issue of high water table where local roads cross under the proposed Expressway;
- Need to consider safety of underpasses; and
- Prefer that the proposed Expressway travels over the top of all local roads so that there are no height impediments for high loads.

Project team response

Both overbridge and underbridge options for local roads were considered as part of the MCA process. The aim is to keep the proposed Expressway low to blend in with the surrounding landscape, and that the connectivity provided by the District's east-west link roads should be unaffected as much as practicable

Waikanae River Crossing

Common feedback regarding the Waikanae river crossing included:

- The design and quality of the Waikanae bridge must recognise the important status it will have;
- Consider the treatment of land under the bridge;
- The bridge will need to be high to cross the Waikanae River flood plain;
- Access must be provided across the river for walkers and cyclists in the vicinity of the bridge and along the river corridor; and
- A second crossing over the Waikanae River for local access will also be needed.

Project team response

The importance of the design of the Waikanae bridge was acknowledged. An architect has been used to design the structure, with the aim of producing a quality design. Hydrological modelling defined the minimum heights of the bridge in a flood event. Walking and cycle tracks under the Waikanae bridge providing connectivity along the river corridor are to remain unaffected, with a new walking/cycling access across the River to be considered.

Local Access

A general concern regarding local access was that the proposed Expressway will not provide full access between some parts of Kāpiti, thereby requiring local trips on the existing SH1. As such there was a common request to keep east-west links and access in all directions for locals.

More specific feedback expressing concern over local access generally related to Kāpiti Road, Ihakara Street, Elizabeth Street and the southern end of the proposed Expressway as summarised below.

Feedback regarding Kāpiti Road included:

- Kāpiti Road is currently congested, there is concern that the Kāpiti Road interchange will worsen this situation;
- Additional local roads are required to alleviate future congestion of Kāpiti Road; and
- The Airport requires full connection with Kāpiti Road and a north-bound off ramp to Ihakara Street west.

Feedback regarding the southern end of the proposed Expressway included:

- Need to consider the effect on residents of the Leinster and Sydney Avenues by the closure of the eastern end of Leinster Avenue;
- Impact on access to the proposed Raumati South rail station; and
- Extra distance for emergency vehicles to travel if access to Leinster Avenue is cut off.

Feedback regarding Ihakara Street generally sought greater information on the extension of Ihakara Street, in particular when the extension would occur and if the option of a connection with Milne Drive was likely. Comment was also made that a connection of the Ihakara Street extension with the proposed Expressway was needed to provide an alternative access to the Airport.

Project team response

East/west local road connectivity has been considered in depth. The Kāpiti Interchange and Te Moana Interchange provide the main cross connection from east to west, and all main east-west roads would be unaffected. Volumes of traffic on local roads will generally be lower once the proposed Expressway is operational, which will release some of the current congestion on Kāpiti Road.

10.13.8 Accessibility and connectivity

A number of views were expressed in feedback with regard to accessibility and connectivity for other users within the District. Common views included:

- Safe and efficient provision of access to schools, library, parks, local centres, and services is requested;
- Need frequent access points for cyclists and walkers to the proposed Expressway, as well as east west access across the proposed Expressway;
- There should be a continuous cycling track from Poplar Avenue/Main Road interchange as far north as Te Moana Road Interchange;
- Doesn't provide a bridleway along the entire length;
- Existing pedestrian/cycle/horse tracks on both sides of the Waikanae River should be retained;
- Avoid underpasses for cycle/walkways – use overbridges instead;
- If using overbridges be aware of height limitations for large vehicles; and
- Add cycleway/footpath onto the old SH1.

Project team response

A walking and cycling survey was undertaken to ensure the most appropriate location of the cycleway/walkway to maintain existing levels of connectivity. Opportunities to maintain informal connections were also taken into account, with two pedestrian/cycle bridges to be provided at key points.

10.13.9 Construction

Common views expressed in relation in the construction of the proposed road include:

- Otaihanga to Waikanae; Kāpiti Road to Te Moana Road or; Te Moana Road Intersection should be built first;
- A new bridge over the Waikanae River should be a priority;
- Concern about the construction effects and disruption to local residents and businesses during construction;
- Concern about the effect of noise, vibration and dust impacts; and
- Concern about the effect on the local road of transporting in raw materials for construction.

Project team response

Comments regarding construction noise and dust have been taken into account in developing the construction environmental management plan (CEMP). Staging of construction has been considered taking into account areas that need to be pre-loaded first and sensitive land use in close proximity to the proposed Expressway.

10.13.10 Environmental considerations

A number of submissions commented on a range of environmental considerations, the common themes of which are summarised as follows:

Hydrology/Drainage

- Concern that there would be increased/continued ponding/flooding at the southern end and around Waikanae;
- There are significant stormwater management constraints at Te Moana and Kāpiti Roads.
- Concern about the impact of increased runoff and potential impact on the habitats of wildlife and waterways;
- Complex wetlands and flood paths are present along the route which need consideration; and
- Need for protection of aquifers.

Project team response

It is acknowledged that stormwater management on the Kāpiti Coast is a complex issue. Ground investigations have been undertaken at various points along the alignment; these findings were entered into the stormwater and drainage model. Liaison with both KCDC and GWRC has been undertaken to address stormwater and flooding aspects of the proposals and to develop appropriate mitigation measures.

Ecology

- Damage to wetlands;
- Loss of dunes;
- Needs to be minimal ecological damage to the fragile wetlands and local flora and fauna;
- Need to maintain ecological/bird corridors;
- Impact on green belts;
- Impact on the Waikanae river corridor;
- Impact on the Waimeha Stream which supports whitebait and long fin eel; and
- Damage to natural ecosystems should be off-set by enhancement of margins along the proposed Expressway.

Project team response

The Project team are aware of the decline of wetlands on the Kāpiti Coast and the significance of retaining existing areas of wetland. The alignment of the proposed Expressway was chosen to avoid all major wetland systems, including those in QE Park which maintains large areas of ecologically significance. Wetland features and swales within stormwater management areas will be used to improve the quality of stormwater before it discharges into stream and rivers.

Noise and vibration

- Need to do more than just the minimum mitigation;
- Use quiet roading surface materials;
- Consider topography of immediate area;
- Retain dunes for mitigation;
- Impact of increased traffic on through roads/local roads;
- Noise effects associated with the interchanges; and
- Mitigation measures need to be constructed early to also reduce construction effects.

Project team response

The relevant noise standards have been used to assess anticipated noise levels from the proposed Expressway with respect to surrounding land use. Dunes and landforms that provide screening will be retained where possible. Installation of noise mitigation prior to the start of construction activities beginning will be considered. The options for noise mitigation that have been considered are the use of smooth asphalt, noise barriers, landscape treatment and alignment changes to increase separation distances to sensitive land uses (i.e. schools, residential properties and churches). Vibration during the construction period will be controlled through the CEMP.

Emissions

- Impact on communities' health;
- Dust impacts on private property; and
- Impact from vehicle exhaust odours.

Project team response

Effects on air quality were considered against ambient air quality, which is affected by existing pollution sources (i.e. vehicle use and domestic fires). An air quality testing station on Raumati Road has been monitoring air quality to enable this assessment. National environmental standards guide the assessment of what is acceptable. The CEMP will address solutions to mitigating potential dust effects.

Hazards

- Vulnerable to natural hazards including sea level rise and tsunami;
- Will the proposed Expressway be able to withstand an earthquake event;
- Issues associated with peat; and
- Provision should be made for west-east evacuation routes in the event of an emergency.

Project team response

Flood, tsunami and earthquake hazard have been considered as part of the design development. Hydrological models have considered worst case scenarios for flooding, and the design of the proposed Expressway has taken a precautionary approach. Structures (in particular bridges) have been designed to NZ Standards to withstand ground shaking in the event of a potential earthquake event (required by the NZ Standard).

Mitigation

- Imperative that proper and robust mitigation of environmental impacts be carried out; and
- The road corridor should be wide enough to provide the highest level of mitigation to avoid noise and air pollution for the neighbouring properties.

Project team response

Wide ranging methods to avoid and mitigate adverse effects have been considered during the development of the proposed Expressway. The relevant standards for noise identify which properties require heightened levels of mitigation.

10.13.11 Social and community

Common community and social themes raised in feedback included:

- The design doesn't take into account the needs of the Kāpiti community;
- High social costs to community;
- Division of community socially, visually, culturally, and economically;
- The proposed Expressway will not divide the community any more than SH1 already does;
- Impact on coastal, rural and recreational lifestyles of residents and tourism;
- Impact on the amenity and community dynamics due to increased car usage;
- Kāpiti will become a commuter corridor with no heart; and
- Social, environmental and health costs have not been factored into the cost estimates.

Project team response

The impact on existing communities has been fully considered, taking into account feedback received during consultation and from meetings with community groups. This information has formed the basis of the social impact assessment.

10.13.12 Health and safety

Common themes raised in submissions regarding health and safety included:

- Consideration needs to be given to the safety of the community and their access to and crossing of the proposed Expressway;
- Increased traffic leading to fatal accidents;
- East-west access is needed for evacuation in times of emergency;
- Consideration needs to be given to mental health and wellbeing; and
- Consideration needs to be given to barriers for safety purposes at any bridge or structure, and interaction of cycleway/walkway and bridleway at interchanges.

Project team response

Individual concerns for vehicle access to and from properties have been raised within consultation feedback. As a result, meetings with landowners have been held to further understand the issues and to ensure good access is maintained. The safety of cyclists and pedestrians has been taken into account in the design of the proposed Expressway.

10.13.13 Amenity and urban design

Feedback commenting on amenity and urban design aspects of the proposal included the following common themes:

- Impact of raised interchanges on the character of the area;
- Need extensive planting around interchanges and along road verges to reduce visual effects;
- Impact on rural areas;
- Impact on existing views;
- Need to consider aesthetic treatment of abutments; and
- Need to consider impacts of lighting on surrounding areas.

Project team response

Concerns raised within submissions which relate to amenity and urban design have been considered as part of the Urban and Landscape Design Framework criteria, and urban design considerations have been integral to the development of appropriate mitigation measures.

10.13.14 Culture and heritage

The feedback included the following common themes in relation to culture and heritage:

- Options are culturally insensitive;
- Cultural significance of Waikanae and around the Waikanae River has not been fully respected in this project;
- Emphasis on avoidance of archaeological material is the preferred option;
- Te Moana Road to Peka Peka has the highest concentration of archaeological sites, but this has not been highlighted in public consultation documents; and
- Cultural and heritage values should be given equal consideration against other sectors of community.

Project team response

The Project team acknowledges the significant cultural history and archaeological importance of the Kāpiti Coast, and recognise that the area of greatest cultural significance is in Waikanae, near Te Moana Road. The chosen alignment option at Waikanae cuts through the corner of the Urupā area. This intrusion is substantially less than the previous WLR route, and any construction works will be carefully managed acknowledging this cultural significance. Engagement with iwi/hapu representatives has been ongoing since the commencement of the Project to understand their concerns and to address ways to avoid or mitigate effects on cultural heritage.

10.13.15 Economic factors

Common views provided in feedback regarding economic factors include:

- Enhances economics of region and country as a whole;
- Economic arguments are not transparent or acceptable;
- The cost/benefit ratio of the proposed Expressway is too low;
- It will destroy viable communities and town centres;
- Impact on SH1 businesses and dislocation of local business;
- Cost of the project on local economy and increased rates;

- The cost of the proposed Expressway will be much greater than that estimated;
- The cost of building the proposed Expressway will be far higher due to engineering issues such as building over wetlands, in flood areas and design for liquefaction; and
- Social, health and environmental costs have not been factored in.

Project team response

Impacts on local communities and their viability were considered as part of the MCA, and a separate economic impact analysis has been undertaken. While it is acknowledged there will be some adverse effect on some businesses, in overall terms it is anticipated that the Project would enhance the economic well-being of the District, and the removal of through traffic from the existing State highway would provide opportunities to enhance the town centres and urban environment.

10.13.16 Property

Concerns expressed in feedback regarding private property included:

- Impact on property values and compensation;
- Loss of peoples' homes cannot be compensated;
- Request that properties are bought quickly and outright when the final route has been decided;
- Require certainty about the property purchase process;
- Requests of compensation from adjacent properties owners for impacts including potential devaluation, noise, air pollution, and health risks;
- Need to subsidise the installation of noise protection for those who adjoin the proposed Expressway: and
- Excess land be put into public ownership, such as parks and reserves, and not sold to private landowners.

Project team response

As the proposed Expressway design has developed, greater certainty has emerged regarding properties that need to be purchased. Individual meetings have been held with all landowners to understand concerns and provide advice regarding acquisition of properties under the PWA. The Project has progressed to a stage where all required properties have been identified and a number have been now been acquired. The property acquisition process has been a priority, recognising the need to provide affected property-owners with certainty.

10.13.17 Transportation

Feedback included matters in relation to transportation, in particular car parking and public transport as summarised as follows:

Carparking

- Provide a Raumati South railway station car park;
- Provide commuter car parks at interchanges for carpooling; and
- Extend carriageway by 5m each side to provide space for parking and broken down vehicles, etc.

Project team response

The provision of a Railway Station is not part of this project. However, the proposed Expressway design does not preclude a future Railway Station and associated parking in the Raumati South area. The decision on whether a Railway Station will be established will be made by GWRC as the authority that controls the passenger rail network. Discussions were held with interested groups on this issue.

Public Transport

- Consideration needs to be given to accessibility to public transport and active transport networks;
- Prioritise sustainable public transport;
- Need to make using cars a less attractive option;
- It is not possible to have just rail and no Expressway; and
- Transfer road freight to sea/rail.

Project team response

The maintenance of networks has been considered. The existing public transport nodes in Waikanae and Paraparaumu will be maintained and serviced by the two respective interchanges and the existing SH1 (which will revert to a local road once the proposed Expressway is operational). The removal of through traffic from the existing State highway will enable enhanced connectivity to the principal public transport facilities, while the proposed Expressway itself will provide opportunities for new public transport routes.

10.13.18 Local Network

Feedback expressed a variety of concerns regarding the local road network. The common themes raised included:

- The existing SH1 is an integral part of the proposed Expressway project which needs to be considered and early on;
- The cost of upkeep of SH1;

- Maintenance of local roads in general;
- Substantial upgrading of local roads is required to handle increased traffic volumes;
- Need to upgrade Matai Road and Raumati Road intersection, which will get worse as a result of the proposed Expressway;
- Need to continue access from Rata Road to Raumati Road;
- When the proposed Expressway is built Park Avenue will become major feeder, however already concerns regarding the safety of this road; and
- Impact of increased traffic volumes and congestion on Te Moana Road.

Project team response

These comments have been tested against the traffic model and in the urban planning and design assessment. All existing east/west connections across the proposed Expressway are to be retained. The proposed Expressway will alter the operation of the existing local road network, increasing traffic volumes on some roads: however, once the proposed Expressway is operational, the volume of traffic on local roads will generally decrease.

Feedback regarding Elizabeth Street intersection from the existing SH1 in Waikanae included:

- Review and improvement of Elizabeth Street is urgent;
- An underpass is needed at Elizabeth Street;
- Better pedestrian access from Waikanae town centre across SH1 is essential; and
- Consider a full interchange at Elizabeth Street.

Project team response

Comments regarding traffic congestion in the Waikanae town centre have been considered. The volume of traffic on the existing SH1 will reduce once the proposed Expressway is operational. This will allow for future changes to the Waikanae and Paraparaumu town centres. Consultation has been undertaken on conceptual design plans for potential modification of the existing SH1. This work has been jointly undertaken by NZTA and KCDC.

10.13.19 Justification of route

Common views regarding the justification of the proposed route include:

- Justification of the route is needed;
- Question why the proposed Expressway is the investment priority when other areas need the money more;
- Limited benefits to travel time, traffic and locals;
- Traffic projections are over optimistic;

- The proposed Expressway will not solve the congestion problem; and
- It is unsustainable given sea level rise, global warming, future oil supplies and climate change.

10.13.20 Other route options

Two common alternative options were discussed in feedback, that being construction of the Western Link local road and the upgrade of State Highway 1.

Examples of reasons for supporting the Western Link Road option included:

- It is what the community expected;
- It would provide for the actual requirements of the District;
- Would not destroy the character of Kāpiti ;
- Would Will address traffic issues by removing local traffic from SH1;
- Would produce less noise impacts and be more environmentally sound;
- Would affect less property; and
- It would cost less.

Examples of common reasons for support of the State Highway 1 option included:

- This route would still achieve all the requirements for a fast unimpeded route;
- Combined with Western Link Road it would address the traffic issues;
- It would be less obtrusive;
- It would not divide community;
- It would cost less and be constructed quicker; and
- It would not impact homes.

Project team response

The decision to construct an Expressway between MacKays Crossing and Peka Peka Expressway in this route had already been made by NZTA prior to this consultation. A review of the alternative route options for an Expressway confirmed the benefits of the selected route compared with the other principal options, including significantly fewer property impacts, considerably less overall impact on the urban environment, and a much shorter construction timeframe.

10.13.21 Consultation

- Supports the consultation process undertaken;
- No more consultation is necessary, need to start the project;
- Community are not being listened to;

- Consultation process is not transparent;
- Lack of consultation with Peka Peka residents regarding the proposed interchange; and
- Request that more information be provided at Expo 2.

Consultation team response

A project phone line and email address was monitored during work days, and through the weekend during consultation periods. Project members have been available for meetings and general advice on the proposed Expressway project. The feedback from Part 1 consultation has been released in the form of a consultation report which outlines the process and methods undertaken to seek feedback.

10.14 Summary of key stakeholder consultation

A summary of feedback and submissions received from the following key stakeholders is provided below:

- Tangata Whenua (including: Takamore Trust and Te Āti Awa ki Whakarongotai);
- Greater Wellington Regional Council;
- Kāpiti Coast District Council;
- NZ Historic Places Trust;
- Waikanae Community Board; and
- Regional Public Health.

10.14.1 Takamore Trust

The submission of the Takamore Trust identified that they had been very satisfied with how the NZTA have entered into consultation with the Trust. The submission, however, noted that it was unfortunate the Trust had been required to deliberate on two options for the Waikanae area, both of which have an adverse impact on the Takamore wāhi tapu and their relationship with ancestral lands.

The Trust advised that within the context of being required to make that choice therefore, and for no other purposes, the Trust's position was:

1. Both Option 1 and Option 2 would have an adverse impact on the Takamore wāhi tapu, and with their relationship with their ancestral lands and taonga, including their obligations of kaitiakitanga or guardianship for the generations to come;

2. The Trust acknowledged that, in any choice of option for alignment, others in the community will also be affected and this is regrettable;

3. Of the two options made available by NZTA:

a. the Trust opposed Option 1 as being fundamentally detrimental to their values and tikanga; and

b. the Trust had not yet made any formal decision to accept or oppose Option 2, but the Trust did regard Option 2 as a more positive option in relation to which the Trust was prepared to engage constructively with NZTA to ensure that Takamore values and principles are respected as much as possible;

4. The Trust recorded that its position in the submission was without prejudice to its legal rights under the Resource Management Act in circumstances where the adverse impacts on the Takamore wāhi tapu were unable to be avoided, remedied or mitigated.

Consultation team response

It is acknowledged that both Options 1 and 2 are near the Wāhi Tapu area which is of great significance to the Takamore Trust. Consultation has been ongoing with Takamore Trust representatives to identify how these concerns can be addressed.

10.14.2 Te Āti Awa ki Whakarongotai

NZTA met with representatives from Te Āti Awa ki Whakarongotai a number of times throughout the consultation period. Discussions included identifying a clear process to work towards a memorandum of understanding (MoU) and preparation of a Cultural Impact Assessment (CIA).

Consultation team response

A series of meetings/hui and have been held and are on-going. These meetings/hui have helped inform the design process, and a CIA will be prepared by iwi to identify particular areas of cultural significance.

10.14.3 Greater Wellington Regional Council

The GWRC submission advised that it has a direct interest, as the administering authority, in any proposals that would impact on QE Park. As such, the submission identified that the GWRC had a strong preference for options that impact least on the overall integrity of the Park and consequently supported the proposed alignment at the Southern end.

The GWRC did, however, recognise that there is a wide range of community issues that would need to be taken into account.

In its feedback, the GWRC detailed potential impacts on the Park from an alternative route. In the event that an alternative alignment was chosen that impacted more significantly on the Park, the GWRC believed that significant mitigation would be required to both mitigate direct impacts as far as possible

and offset impacts by compensating for the loss of land and its inherent ecological and recreational values.

Greater Wellington Regional Council also noted that the proposed works will have a significant potential effect on rivers, land and the flood hazard environment that the GWRC holds responsibility over. The GWRC was happy to continue to work with the Project team to better understand the potential impacts of the proposed route and how any impacts can be appropriately mitigated.

Consultation team response

The comments regarding QE Park were factored into decision making for the southern Expressway alignment area. Consultation with GWRC has been ongoing in particular considering design options over rivers, streams and waterbodies.

10.14.4 Kāpiti Coast District Council

The submission of the KCDC advised of its position on a number of aspects of the proposal. A summary of its position on the more significant issues surrounding the proposal is provided as follows:

- Supported the proposed location and nature of the interchanges and highlighted a range of specific mitigation measures in regard to the likely effects from all four interchanges;
- In regard to Waikanae North, KCDC was not convinced that the east to west connections would be provided for as outlined in the Waikanae North development precinct plans. Given the urban development intentions for this area, road seal to minimise noise and appropriate lighting was advised;
- In regard to the two options in Waikanae, the KCDC recognises the complexities and the values associated with both; however, at that time, it was in support of the Eastern Option;
- The Waikanae River crossing should be carefully designed to reflect the gateway status and minimise adverse effects on the river and riparian environment;
- Otaihanga Road should fit the character of this rural area. To achieve this, it should be retained as a simple winding road;
- Between Kāpiti Road and the Waikanae River, access across the proposed Expressway needs to be maximised, particularly to employment areas;
- Between Kāpiti Road and Raumati Road, good access across the proposed Expressway needs to be maximised, particularly to the town centre. The Wharemauku Stream route and the quality of bridging remains a concern;
- In regard to the southern end of the route, KCDC required further clarity regarding the position of the DOC and GWRC;
- KCDC supported the preferred route based on the current information, with the view that NZTA could and should further minimise the potential property impacts;

- KCDC had concerns that the effects on the local network had not been addressed or modelled adequately;
- The design and undertaking of works on the existing SH1 should be brought forward in the work programme; and
- The dune system is highly valued by the community and all efforts should be made to protect it as a first principle.

Project team response

Support for interchange location options was noted. Future east/west connectivity in Waikanae North was further tested in the traffic modelling. The significance of the Waikanae bridge design has been reflected in the use of an architect to achieve a sculptural quality design. Minor changes to Otaihanga Road are proposed. Conceptual design work on modifications to the existing SH1 have begun as a separate joint project between NZTA and KCDC. The significance of dune features is acknowledged and the design aims to avoid these features where possible.

10.14.5 NZ Historic Places Trust

The NZHPT submission stated that overall there was insufficient detail for the Trust to form an opinion as to the relative merits of the proposed option in respect to the effects on historic heritage and in particular archaeological values.

The submission recommended that further archaeological assessment be carried out along the proposed roading corridor to inform the decision-making process, with an emphasis on the avoidance of archaeological material as the preferred option.

Nonetheless, all things considered, the Trust advised a preference for Option 2 in Waikanae in that it avoided the Takamore wāhi tapu area, although it is noted that the historic heritage values of the Greenaway Homestead should be recognised in the planning process and further consideration should be given to other options in discussion with the Historic Places Trust.

The Trust also recommended that the heritage values of the Stringer Wind Rain House at 224 Main Road, SH1, Paraparaumu, be investigated and established to inform the decision-making process at the Southern end of the project.

Finally, the submission noted that the Trust supported investigating other options that would avoid impacts on historic heritage.

Project team response

The recommendation that further archaeological survey and investigation work be carried out was noted. An assessment of the heritage values of Greenaway homestead was carried out in relation to whether the values would be more impacted by relocation.

10.14.6 Waikanae Community Board

The Waikanae Community Board submission advised that the majority of Board members did not support the proposed Expressway and preferred the option of reinstating the local Western Link Road and upgrading State Highway 1.

The Board's position as expressed in the submission was that no homes should be affected through Waikanae. They believed further negotiation over the wāhi tapu was required before Option 1 was discounted and homes affected.

The submission noted that an underpass at Te Moana Road was preferred over an interchange. The proposed interchange would impact on residents' quality of life by way of noise, visual impact and safety risk from increased traffic.

Finally it noted that residents need design and mitigation information at Expo 2 to better inform them. They requested detailed information regarding the environment, route, design, interchanges, construction, cultural impacts and a project review of the costs and benefits.

Project team response

There are a number of sensitive land uses in the Raumati South and Waikanae areas that were considered with regard to the final alignment location. Further information regarding mitigation during the consultation on design development will be provided.

10.14.7 Regional Public Health

The submission of Regional Public Health expressed strong support for:

- Local movement area surveys that aim to preserve or improve active travel and recreation routes for local residents;
- The planned separated walking/cycling path that is proposed to run alongside the proposed Expressway;
- The conversion of SH1 to a local road as an opportunity to create a more walkable and cycle friendly route across the district;
- Aims to reduce greenhouse gas emissions and increase the rate of active transport; and
- The approach KCDC has taken to plan for future growth of the District and remedy sprawl.

In its submission, Regional Public Health recommended that:

- Consideration be given to mental health and wellbeing and specifically suicide prevention with the design of the proposed Expressway. Appropriate barriers for safety purposes should be used for any bridge or structure; and
- The Project separating the walking/cycling pathway along Kāpiti Road to avoid the interchange.

Project team response

A number of the comments from Regional Public Health align with the Project design i.e. separated walking and cycle ways, conversion of SH1 into a local road and undertaking local movement surveys. Specific groups that are concerned with health and wellbeing will be consulted during the next phase of consultation (after design development in 2011).

10.15 Consultation feedback 2011

10.15.1 Summary

The alignment of the proposed Expressway and the location of four interchanges along the proposed Expressway route was confirmed in May 2011. Following this announcement, further consultation was undertaken with the general public and key stakeholders regarding the design development of the proposed Expressway and its surrounding environment.

Feedback on the following design aspects was sought:

- Cycle ways, walkways and bridleways;
- Local road connections;
- Possible mitigation measures, including earth bunding and landscape treatment for visual and noise mitigation;
- Noise, vibration and air quality;
- Stormwater/drainage and wetlands; and
- Ecology.

A total of 216 submissions were received. A variety of concerns and matters were raised in the submissions, with 10 key themes being identified. This section of the consultation and engagement Chapter provides an outline of the process undertaken and a summary of feedback received during the May–June 2011 consultation.

10.15.2 Focus group workshops

10.15.2.1 Waikanae design workshop

The purpose of this workshop in June was to discuss the proposed Expressway design, including the Te Moana Road interchange, and to provide an opportunity for the technical experts to discuss matters of interest with residents and provide advice including proposed mitigation of potential effects from the proposed Expressway. The project design team comprised acoustic engineers, stormwater/drainage engineers, urban designers, landscape architects, designers and planners attended a design workshop with residents of Puriri Road, Kauri Road and Te Moana Road. A number of site specific discussions resulted in the design team taking away feedback to consider in developing the design. Cross-section

plans and stormwater/flood modelling plans were provided to aid discussions. Key discussions and requests to the Project team that resulted from the workshop included:

1. General support for screening views of the proposed Expressway from residential properties;

2. Understanding how the flood plain modelling works;

3. Ensuring that the width of the underpass to EL Rancho is sufficient to provide room for buses, cyclist and pedestrians;

4. Consideration of the impact of increased heavy vehicle traffic on Te Moana Road accessing the supermarkets and shops in Waikanae;

5. Demonstration on the ground where the proposed Expressway will go; and

6. Ensuring that east/west connectivity is maintained.

10.15.3 Cycleway, walkway and bridleway workshop (CWB)

A workshop was held with an existing KCDC Cycling, Walking and Bridleways (CWB) reference group to discuss how the proposed Expressway design provides for cycling, walking paths and bridleways. The Project team presented the draft design plans. Discussion revolved around specific features that each user group wanted included in the design. Key discussions and requests to the Project team that emerged from the workshop include:

1. Separation between users is important, particularly for cyclists and horse riders;

2. Provision of safe CWB routes separated away from busy roads: for example, Kāpiti Road;

3. Consideration needs to be given to different subsets within each user group. The subsets all have slightly different needs i.e. mountain bikers, school children cycling home from school and road cyclists;

4. Landscaping is important on the edges of the tracks to provide visual screening from the proposed Expressway and enhance amenity; and

5. Lighting on the pathways should be low level and eco-efficient, with particular care taken in lighting the underside of bridges in urban areas to provide a safe environment for users.

10.15.4 Expo 2

A series of project Expos were held at the following locations around the District at the start of the consultation period:

Table 10.4: Expo 2 Schedule

Date	Time	Location	Attendees (approx)
Sunday 15 May 2011	10am-4pm	Southward Car Museum, Otaihanga	478
Tuesday 17 May 2011	4pm-8pm	Waikanae Memorial Hall	212
Thursday 19 May 2011	4pm-8pm	Kāpiti Community Centre	120
Friday 20 May 2011	4pm-8pm	Raumati South Memorial Hall	98

10.15.5 Feedback analysis

The greatest number of submissions was received from submitters located in the Waikanae area. The following graph shows the breakdown of the total number of submissions received by locality of submitter.

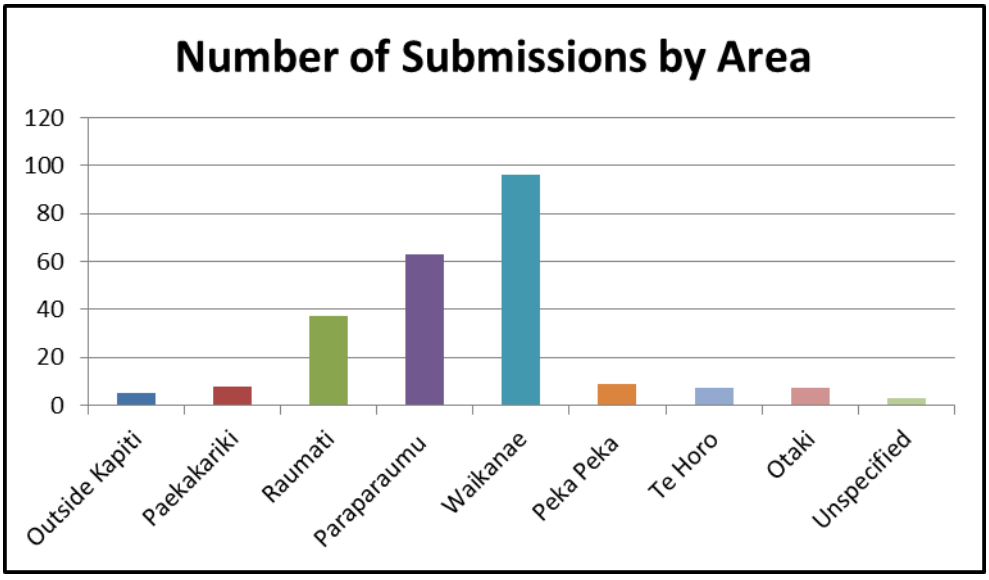

Figure 10.3: Number of Submissions by Area – Expo 2

10.15.6 Summary of submissions

An analysis of the submission comments identified a number of common submission themes. Although feedback was sought on specific design detail, many people commented on the overall Project. A high proportion of the feedback was supportive of the Project and had simple messages, including requests that the Project be fast tracked.

General opposition to the Project included views that the Raumati community in particular would be disrupted, that it would have a high cost to build and opposition to what were considered to be visually obtrusive bridge structures.

For ease of reporting, the feedback has been grouped within 10 topic areas and includes:

1. Accessibility for alternative forms of transport (non-motorised & public);
2. Environmental consideration;
3. Interchange design;
4. Health and safety;
5. Consultation;
6. Feedback concerning impacts on private property;
7. Feedback on design in general;
8. Road network operation;
9. Community in general; and
10. National economic feedback.

A summary of the common submission themes is provided as follows under each appropriate topic heading. It is noted that the following is a summary of the common themes raised in submissions and is not a summary of every individual submission.

10.15.6.1 Accessibility for alternative forms of transport (non- motorised & public)

Cycle ways

Common views held with regard to the proposed cycleway are summarised as follows:

- Support for a cycleway along the full length of the proposed Expressway;
- Cycleways need to have an asphalt surface for the full length;
- The cycleway needs to be an appropriate width;
- The cycleway needs to be of a high standard to get cyclists off the shoulder of the proposed Expressway ;
- Consider underpasses at Raumati Road and Kāpiti Road;
- The cycleway must have clear markings and signage;
- Consider cycleway connectivity for primary age school children, particularly at the Te Moana Road interchange;
- The cycleway needs to access recreation areas such as the Waikanae River;
- Safe crossings on local roads is important i.e. Raumati Road; and
- Support for a family friendly bike track through QE Park.

Walk ways

Common views expressed in feedback for the walkway design are summarised as follows:

- Not considered necessary or of any benefit;
- Safe pedestrian access across Kāpiti Road needs to be provided;
- Access for mobility scooters must be incorporated into the design, particularly on busy roads i.e. Kāpiti Road;
- Maintain remaining informal walking tracks in Raumati;
- Vertical walls are not supported in the design of walkway underpasses; and
- All local road bridges over the proposed Expressway in urban areas shall have footpaths on both sides of the road.

Bridle ways

Common views expressed in feedback forms regarding the design of bridleways are summarised as follows:

- Bridleways needs to be wide enough to accommodate horse riders;
- Must be separated from cyclist and pedestrian activity; and
- Not considered necessary or of any benefit.

Public transport

Common views regarding public transport in relation to the proposed Expressway are summarised below:

- There is no public transport around Leinster Avenue because people tend to walk to Coastlands Mall from Leinster Avenue; and
- NZTA should be encouraging alternative options to private vehicle use.

Project team response

A separate cycleway/walkway is planned for the full length of the proposed Expressway, with connections across waterbodies and onto local roads. Walkways will be separated from cycleways. Options for safe and attractive walkways under bridges have been considered. Access to public transport services will be maintained once the proposed Expressway is operational, and in some places such as the Paraparaumu and Waikanae town centres, will be enhanced. The interchanges at Kāpiti Road and Te Moana Road will facilitate both local east/west connection and efficient movement for bus services out of the Kāpiti District. Current passenger rail services will be maintained.

10.15.6.2 Environmental considerations

Landscape/Urban Design

Common views expressed in relation to landscape treatments and urban design features of the proposed road include:

- Provision for generous landscape treatment around the interchange on and off ramps is supported;
- The removal of mature trees in Raumati is discouraged;
- Planting on earth bunds should be fast growing, consideration should be given to non-native plants first to provide protection of native plant species. Removal of these non-natives once natives have matured;
- Earth bunds to provide visual mitigation in Raumati is supported;
- The proposed Expressway will blend into the landscape over time and people will forget about the construction disruption;
- Establish green areas along the proposed Expressway, particularly around cycle and walking tracks to mitigate the visual effect of hard built structures such as bridges;
- Support for the proposed Expressway being constructed as low as possible with local roads rising over the proposed Expressway;
- Quality bridge designs are sought, with safe attractive walking and cycling areas under the bridges; and
- Bridges should be designed to allow natural light to spill through.

Project team response

The importance of landscape treatment and quality urban design was acknowledged. A landscape plan was prepared which identifies the rehabilitation of earth bunds and excavated areas to construct the proposed Expressway. Where possible existing vegetation of ecological value will be retained. The interchange and bridge locations will be a focus for landscape treatment. To achieve a quality sculptural bridge design, architects were used to refine the aesthetics of the bridge structures. In urban areas where pedestrian activity is relatively high, bridges will include a gap between north and southbound lanes to allow natural light spill below onto the walkway/cycleway.

Noise and Vibration

Feedback with regard to noise and vibration included:

- Expressway traffic noise will be introduced to a number of domestic neighbourhoods;
- Request for noise mitigation measures for properties within 100m of the proposed Expressway;
- Support for low noise asphalt (OGPA) on the proposed Expressway;

- The road needs to be lower to reduce noise levels;
- Earth bunds to provide noise mitigation are supported;
- Noise walls and bunds should be established prior to construction;
- The prevailing north-westerly wind needs to be considered in noise modelling;
- Noise from heavy vehicles needs to be considered at on/off ramps and mitigated;
- Temporary construction noise is of concern to a number of residents adjoining the proposed Expressway;
- Traffic noise in quiet rural areas must be addressed;
- Noise mitigation walls should have regard to Crime Prevention through Environmental Design (CPTED) principles to provide safe walking and cycling routes;
- Compensation for houses near the proposed Expressway was requested as a result of heightened noise and visual effects; and
- Noise mitigation should be of suitable height (i.e. noise walls and earth bunding).

Project team response

Individual meetings have been held with property owners adjoining the proposed Expressway. Many of these meetings were requested through consultation feedback. The Project team noise experts provided advice and attended meetings to describe to property owners how noise is assessed, and likely noise levels that will be received on their property. Depending on the level of compliance with the NZ noise standards various noise mitigation options were considered: for example, noise walls, earth bunds and smooth asphalt road surfacing.

Air pollution

Feedback on potential air pollution included:

- A number of medical care businesses near the proposed Kāpiti Road interchange are concerned with the effects of air pollution from vehicles on their business;
- Concern for degraded air quality in residential areas near the proposed Expressway; and
- A number of submitters were unsure what effects the proposed Expressway would have on air quality and how these issues will be resolved.

Project team response

Air quality monitoring has been undertaken to gauge the existing air quality environment. An air quality assessment and the CEMP will address operational and construction matters related to air pollution.

Stormwater/drainage and wetlands

Common views regarding the stormwater/drainage and wetlands include:

- Interest in how stormwater from the road will be treated, especially near the Waimeha Stream;
- The design of the proposed Expressway needs to address the existing stormwater/drainage issues for properties on Puriri Road; and
- Concern that the principle of hydraulic neutrality is not being adhered to in the design.

Project team response

The existing stormwater and drainage issues resulting from the high water table in the Puriri Road area were investigated and modelled as part of the stormwater assessment. It is acknowledged that stormwater along the length of the proposed Expressway alignment is a complex issue, but that the principle of hydraulic neutrality is a key principle of stormwater management and flood risk management in the design of the proposed Expressway.

Lighting

Common views regarding the lighting include:

- Street lighting in rural areas should be avoided;
- Concern for light spill on adjoining residential areas; and
- Lighting needs to be low impact and energy efficient.

Project team response

Lighting on the proposed Expressway will be limited to the interchange areas and associated on and off ramps. An assessment on light spill has been undertaken.

Construction Effects

Feedback included concern in relation to construction effects such as wind-blown dust, noise and visual construction movements. The common themes raised included:

- Concern that it will be difficult to construct the road on peat and through wetland areas;
- There will be noise and dust nuisance during the construction period, which will affect sensitive residential land use;
- A number of home owners adjoining the proposed Expressway queried whether wind-blown dust would be cleaned from their houses; and
- Work must be carried out during normal working hours, with no work in weekends and holidays.

Project team response

A number of property owners adjoining the proposed Expressway have contacted the Project team regarding potential dust and construction noise. Both dust and noise effects related to the construction will be addressed as part of the CEMP.

Ecology

Common views with regard to the ecology included the following:

- The removal of large mature trees in Raumati will affect the bird life by removing their food source and shelter;
- Enhancement of wetlands on Puriri Road will improve the habitat for water birds;
- Ponding on the edges of the proposed Expressway would capture rubber and fuel runoff from the road, this contaminated ponding area may compromise bird and fish life; and
- Structures to assist movement of fish up stream must be incorporated into the design.

Project team response

Comprehensive ecological investigations have been undertaken to provide detailed information on the existing environment along the proposed Expressway alignment. The information provided a basis for ecological assessments, and the Project ecologists have been fully involved with the alignment and design process.

Cultural heritage

There was interest in the position of the local iwi with regard to the proposed Expressway alignment. The following view was recorded:

- A number of roading projects around the country have encountered Māori burials, the issues surrounding these significant sites are able to be resolved.

Project team response

The significance of cultural heritage along the length of the proposed Expressway alignment is acknowledged. Studies are ongoing to document sites of cultural significance and develop protocols on how to appropriately preserve these sites.

Natural Hazards

A number of submitters commented on the potential for natural hazards such as flooding and earthquake. Common feedback included:

- Concern about building an proposed Expressway on a fault line; and
- The dangers of liquefaction highlighted by the recent earthquake in Christchurch.

Project team response

Potential for earthquake events has been addressed within the proposed Expressway design, and a high standard of seismic design is required under NZTA policies to ensure a high level of network resilience.

10.15.6.3 Interchange design

Poplar Avenue interchange

A number of views were expressed in feedback with regard to the Poplar Avenue interchange design. Common views included:

- Disappointment that a full interchange is not proposed; and
- With population growth it was considered that NZTA will have to convert the partial interchange to a full interchange in the near future.

Kāpiti Road interchange

A number of views were expressed in feedback with regard to the Kāpiti Road interchange design. Common views included:

- The traffic lights on Kāpiti Road will interrupt the already congested Kāpiti Road;
- Supportive of the proposed Expressway going over Kāpiti Road;
- Property owners near the interchange are concerned that access in both directions along Kāpiti Road will be unsafe due to the volume of traffic that it will create; and
- The height and scale of the interchange will be dominant when viewed from nearby residential areas.

Te Moana Road interchange

A number of views were expressed in feedback with regard to the design of the Te Moana Road interchange, these included:

- Traffic lights at Te Moana Road are supported instead of the two roundabouts;
- The footprint of the Te Moana interchange should be reduced;

- The height of the Te Moana Road interchange should lowered to lessen both visual and noise effects;
- Concern about flood management around the Te Moana interchange,
- The embankments proposed for the interchange may 'dam' ground water and surface water during flood and storm surge events; and
- The interchange will sever the Te Moana Road community.

Peka Peka Road interchange

Common themes addressed in submissions regarding the Peka Peka Road interchange include:

- Disappointment that a full interchange is not proposed;
- Te Horo residents are unhappy that they cannot use the Peka Peka interchange to head south on the proposed Expressway;
- The omission of an off ramp driving north will impact on business for the local garden centre;
- A full interchange will enable emergency services to efficiently access the proposed Expressway for incidents south of Peka Peka;
- A full interchange will support future growth planned south of the Te Horo township; and
- The interchange design does not support the project purpose which includes – improving journey time reliability.

Project team response

The general arrangement of interchange location and configuration of on and off ramps was widely supported in feedback received. The confirmed design option provided the most effective connections into the two main townships (i.e. Waikanae and Paraparaumu) with use of the existing SH1 as a local road.

10.15.6.4 Health and safety

Feedback included matters in relation to health and safety. Comments are summarised as follows:

- The separation of traffic will significantly enhance road safety;
- Property owners adjoining the proposed Expressway are concerned that where the road is elevated over local roads, accidents may cause vehicles to enter private properties;
- Concern that school children will need to be deterred from crossing the proposed Expressway in areas where old shortcuts were i.e. Rata Road and Gabriel Road;
- Adequate barriers will be needed to separate the cycleway and walkways from the proposed Expressway; and

- Elderly people are seeking safe vehicle and pedestrian connections between townships, and to local emergency services.

Project team response

The safety of children, elderly and disabled is acknowledged as important when considering interchange design and connections to local roads. Local road movement surveys have been carried out to understand these movements and to maintain and improve pedestrian and cyclists safety at intersections and roundabouts. Separate cycleways and walkways are proposed.

10.15.6.5 Consultation

The following views were received with regard to public engagement:

- The way in which the Alliance has engaged with the public must be commended:
- A number of people still consider that the WLR should be an option;
- Support for less consultation and more action;
- Support for positive community involvement;
- Requests for a scale model of the proposed Expressway, showing detail;
- Many Te Horo residents had not been aware of the partial interchange proposal at Peka Peka;
- The project boundaries for MacKays to Peka Peka and Peka Peka to Ōtaki had created confusion; and
- Seek further consultation on detailed plans clarifying noise and visual mitigation.

Project team response

The consultation team has endeavoured to quickly respond to queries and provide further information where possible. Any queries that are related to the PP2O Project area have been managed appropriately with the PP2O Project team.

10.15.6.6 Feedback on private property impacts

Future land use

Feedback commenting on future land use included the following common themes:

- Raised interchanges will impact the character of the area; and
- The confirmed alignment will allow property developers to develop the sandhills in Raumati.

Property

Common feedback on property matters include:

- Concern that people will lose their homes;
- Unacceptable to remove homes instead of using unused QE Park land;
- The land bounded by Kāpiti Road, the proposed Expressway and Arawhata Road would be landlocked.

Project team response

The acquisition of private properties required for the proposed Expressway has been progressing with willing sellers. Some areas in Raumati South which were designated under the previous WLR proposal are no longer required for construction of the proposed Expressway, and the potential development of these areas will be managed by the provisions of the Kāpiti Coast District Plan.

10.15.6.7 Design feedback

Design in general

Common views provided in feedback regarding design in general include:

- Supportive of the northern corridor proposal (Wellington Airport to Levin);
- Too many lanes are proposed;
- Consider installing underpasses on the SH1 and Kāpiti Road intersection;
- Interest in a bridge over the Waikanae river being established and operational whilst the rest of the proposed Expressway is constructed;
- The alignment should seek areas were ground conditions are favourable, building a road on peat is expensive; and
- The proposed Expressway shall provide adequate clearance heights and width for over-dimensioned and overweight vehicles.

Local Roads

A number of submissions commented on local roads. These are summarised as follows:

- Straightening of Ngarara Road is requested;
- There needs to be provision for Ihakara Street being extended through to the airport;
- Performance of a north bound off ramp at Ihakara Street must be assessed;
- The local roads around the Paraparaumu and Waikanae shopping centres need to be reconfigured;

- Support for the proposed Expressway going over the local roads in Raumati;
- The local roads will become safer with through traffic being contained on the Expressway;
- Concern that a number of existing local roads will become extremely busy i.e. Park Avenue; and
- Requests for Otaihanga Road to be straightened.

Project team response

Comments on specific design have been considered by the Project design team. Discussions are ongoing with KCDC regarding requests to alter existing local roads once the proposed Expressway becomes operational. The design team have investigated ground conditions along the alignment to help identify appropriate construction methodologies.

Non- project design related comments

Common non-project design related issues raised in feedback include:

- A bottle-neck will be created at Paekākāriki; and
- The design of the proposed Expressway should not preclude establishment of a potential future railway station and associated car parking area in Raumati.

Project team response

Feedback that did not specifically relate to the proposed Expressway were forwarded on to the relevant project team or local authority (i.e. GWRC, Transmission Gully Project team (TG) and PP2O). There have been regular meetings between RoNS project teams to ensure there is consistency in the way that consultation is being carried out and to address common or related issues.

10.15.6.8 Road network operation

General comments received regarding road network operation can be summarised as:

- Providing traffic needs for the next 100 years is over the top;
- The design will enable people and freight to move faster, safer and more efficiently;
- Heavy vehicles should be made to use the proposed Expressway;
- East/west connectivity is essential;
- The Ihakara Street extension should be established prior to the completion of the Airport development; and
- The design needs to address future growth in the Ngarara/Waikanae North area.

Project team response

A large amount of feedback raised the importance of east/west connectivity. The design team focused on maintaining these connections. Traffic modelling shows a general reduction in traffic volume on local roads once the proposed Expressway is operational, which will enhance the efficiency and safety of local roads.

10.15.6.9 Community in general

General comments have been received regarding the community, these include:

- Impact on the culture and heritage of the area;
- The proposal will disturb many people;
- It will divide the community;
- Consider the needs of the elderly, they need to feel safe on the road;
- The proposed Expressway is important for the viability of the community;
- Interchanges as proposed will allow Paraparaumu and Waikanae to develop a town centre; and
- More consideration needs to be given to severance of residential areas, schools and shopping areas.

Project team response

The issue of severance has been considered by the Project team. Consultation feedback and focus group meetings have identified the main concerns from communities. This has been considered within the social impact assessment and economic assessment.

10.15.6.10 National/regional economic feedback

A number of people had concerns in relation to the state of the region and New Zealand's economy, this feedback included:

- The Government is irresponsible spending money on Expressways pushing the country further into debt;
- Consider future generations don't burden them with more debt;
- The proposed Expressway will promote regional economic development;
- Expenditure for roading projects in the wake of the Christchurch earthquake will increase pressure on the national economy;
- Additional costs on Kāpiti residents for maintenance of additional local roads: i.e., the former SH1; and
- The cost/benefit ratio does not support the project.

Project team response

These issues were considered by NZTA in deciding on the alignment of the proposed Expressway.

10.15.7 Summary of key stakeholder consultation

A number of key stakeholders provided feedback during the 2011 consultation and engagement period, and have been involved in ongoing discussions as the proposed Expressway design progressed. The key stakeholders are:

- Tangata Whenua (including: Takamore Trust, Te Āti Awa ki Whakarongotai, Ngāti Toa Rangatira, Muaupoko and Ngāti Raukawa;
- Greater Wellington Regional Council;
- Kāpiti Coast District Council;
- NZ Historic Places Trust;
- Waikanae Community Board; and
- Regional Public Health.

A summary of consultation and engagement with key stakeholders is listed below:

10.15.7.1 Takamore Trust

This phase of consultation included confirmation of the proposed Expressway alignment through Waikanae near Puriri Road. A number of meetings were held to discuss potential mitigation options with Takamore Trust representatives prior to this alignment decision being made. Presentations were provided by the Project team's technical experts (i.e. ecologists, archaeologists and stormwater engineers amongst others) to outline the factors that were being weighed up in deciding whether alignment Option 1 or 2 would be selected through Waikanae. In May 2011 Option 1 was confirmed this route travels over a portion of the Takamore Urupā and was the Trust's least preferred alignment as stated in their 2010 feedback. Further meetings and workshops were held with Takamore Trust representatives to explain why Option 1 had been chosen and to continue dialogue. The meeting dates and matters discussed are outlined in Appendix J of Technical Report 3 – Consultation Summary Report.

10.15.7.2 Te Āti Awa ki Whakarongotai

Similar discussions to those with the Takamore Trust were held with Te Āti Awa ki Whakarongotai representatives regarding the alignment options in Raumati South and through Waikanae. A draft cultural impact assessment was prepared by Te Āti Awa ki Whakarongotai to be considered by the Project team. Engagement with Te Āti Awa ki Whakarongotai is ongoing as outlined in the table of meetings included in Appendix J of Technical Report 3 – Consultation Summary Report.

10.15.7.3 Ngāti Toa Rangatira, Muaupoko and Ngāti Raukawa

Opportunity for engagement with Ngāti Toa Rangatira, Muaupoko and Ngāti Raukawa representatives was provided during this phase of consultation. Ngāti Toa signed a Memorandum of Understanding with NZTA as part of the Transmission Gully project in August 2011. This document outlines the relationship principles and protocols between the iwi and NZTA for all roading projects within their tribal jurisdiction, including the M2PP Expressway.

The main issues for Muaupoko and Ngāti Raukawa are being addressed by the Peka Peka to Ōtaki (PP2O) project team as most of their tribal interests pertain to this project area. Muaupoko and Ngāti Raukawa have met with representatives of the M2PP Project team throughout 2010 – 2011 and have established an agreement that they will be engaged in instances where their traditional interests may be affected throughout the investigative and construction phases of this Project.

10.15.7.4 Greater Wellington Regional Council

The Project team has had an ongoing series of meetings and on-going discussions with GWRC officers.

One particular area of interest raised during feedback (from Raumati residents) was whether the proposed Expressway alignment would still allow for a potential railway station at Raumati South: this feedback was passed onto GWRC as the authority who maintains and upgrades the rail network, to consider as part of its ongoing rail network planning.

Liaison over the Waikanae River crossing has been a significant component of the engagement with GWRC to date, particularly to ensure flood risks are appropriately addressed in the design of the proposed Expressway bridge.

Discussion regarding the design of walkways and cycleways through QE Park was also canvassed. A potential route for a cycleway/walkway connection from Raumati to Paekākāriki was raised as a potential option. The Project team has taken “an open door approach” to any questions GWRC officers may have throughout the course of the Project’s design development.

10.15.7.5 Kāpiti Coast District Council

The submission from the KCDC made particular comment on areas where it believed further investigation and design was required. Comment was also made on aspects of the project that are supported. The submission has been summarised under the following headings:

- Design of the interchanges;
- Sector commentary;
- Local road connections;
- Stormwater and flood management;
- Ecology;
- Cycleways, walkways and bridleways;

- Noise and lighting; and
- Design quality.

Poplar Avenue interchange

- KCDC was generally comfortable with the Poplar Avenue partial interchange configuration, although further investigations were requested to determine whether additional off street car parks would be required for a potential Railway Station park and ride in Raumati near the interchange. KCDC asked that this is part of the mitigation for the proposed Expressway; and
- Given the existing environment which includes a number of exotic trees, KCDC requested that exotic trees and planting be included in landscape plans for the Raumati area.

Kāpiti Road interchange

- The proposed interchange at Kāpiti Road was supported; and
- KCDC was of the view that provision for the Ihakara Street extension is dependent on the Airport development. However, sensitivity tests were sought to further confirm traffic modelling conclusions. It was requested that the methods of addressing flooding and stormwater issues were reported on back to KCDC when the work was completed.

Te Moana Road interchange

- Further testing was requested on the secondary flow paths through the Waimeha Stream in conjunction with Greater Wellington Regional Council;
- KCDC did not support any river corridor works being undertaken to minimise the need for adjustment to the proposed Expressway design. Once work on addressing flooding and stormwater issues was complete the Council would like to view these results; and
- Further detail was requested for vehicle access into the eastern and western side of the Ngarara Plan Change 81 area.

Peka Peka interchange

- KCDC supported the design of the Peka Peka interchange, including grade separation of the rail line;
- A full interchange was not supported for two main reasons. Firstly, in 2009 NZTA committed to the provision of three full interchanges through the Kāpiti District. Waikanae and Paraparaumu interchanges were seen as being important connections to the existing town centres. Secondly, a full interchange will have the effect of attracting services further north. This will create further pressure on urban development in the Peka Peka area.

Sector Commentary

Waikanae North and Smithfield Roads

- KCDC supported the closure of Smithfield Road and the creation of new access off Ngarara Road to service Ngā Manu. Key matters that still needed to be addressed included: Assurance that the road design protected the in-stream habitat and fauna, the design needed to explore walkway and cycle access along the stream edge, east/west connections must be consistent with the District Plan and Ngarara Road over the proposed Expressway is to be consistent in alignment and of a safe design;
- KCDC reinforced that the Ngarara Road area is intended for low impact urban development, and that further development was needed to address this intended use; and
- The Ngarara precinct plans had not been addressed in detail. There was an expectation that a low noise road seal will be used throughout the urban areas, it was not clear whether this was the case in the Waikanae North area.

Waikanae between Te Moana Road and the River

- Further investigation of overland flow paths, flooding, and potential gaps in relation to property access, cycleway, walkways and bridleways was requested in this area.

Waikanae River to Mazengarb Road

KCDC supported the retention of Otaihanga Road to a rural standard. Provision must also be made for non-vehicular trips around this area, linking the river and the Otaihanga Domain. Further detail of east/west Cycleway, Walkway and Bridleway (CWB) connections was requested. The following was requested for the Mazengarb local road connection under the proposed Expressway:

- Wide paths requested under the proposed Expressway;
- Quality lighting to provide a safe environment for school children that will use connection;
- Protection from vehicles and prevailing winds that the underpass will be exposed to; and
- Avoid steep/high embankments.

Mazengarb to Kapiti Road

- KCDC requested that the level of existing east/west connection be retained;
- Support was given to two crossing points – one linking Sovereign Way and Palmer Court and the other between Te Roto Drive and either Cypress or Elders Groves; and; and
- The proposed Expressway design must carefully address the positioning and length of noise walls near residential sites, particularly on the eastern side of the proposed Expressway.

Kapiti Road to Raumati Road

- More detail was requested on informal access points across the proposed Expressway;
- The quality of the bridge crossing over the Wharemauku Street was a significant concern; and
- Areas that are planned for stormwater and overland flow paths need to be assessed and understood as to what visual effects they will create on adjoining properties.

Raumati to Poplar Avenue

- KCDC advocates for inland CWB routes connecting Paekākāriki and Raumati rather than next to the proposed Expressway. This preference should not preclude the ability of cycling on the Expressway along the Raumati straight.

Future local road linkages

- Three areas in particular were affected by severance as a result of the Expressway alignment. The Leinster Avenue and Raumati South area, Te Moana Road and Ngarara Road area and the paper road extension of Ngarara Road outside the Waikanae Urban edge. KCDC sought inclusion of these areas as "projects" as part of the overall project.

Stormwater and Flood Management

- Clear agreement on future monitoring to address any long term effects including how any potential maintenance and operational issues would be resolved was requested;
- KCDC awaits the modelling results of how proposed Expressway stormwater runoff would be dealt with. The proposed Expressway should not block the residual flow path of the Waikanae River to Waimeha stream;
- KCDC sought long term monitoring of adjacent areas of interest to monitor any changes as a result of removal of peat. Compaction of dune sand will reduce the number of voids which allow ground water flows and potentially cause upstream effects; and
- A long term monitoring plan was requested to address any potential future issues. KCDC requested approved methodologies to address post construction settlement, management of sediment and disposal from dewatering operations.

Ecology

- KCDC sought reassurance that the design incorporates mitigation that goes beyond adequate and achieves best practice, particularly around El Rancho and the Takamore Trust site (Ecological Site K170). The requirement for hydraulic neutrality was reinforced.

Cycleway, Walkway and Bridleway (CWB)

- Support was provided for the cycleway to be predominantly on the western side of the proposed Expressway. This was particularly important at the Peka Peka end where shared paths connections to the PP2O are required;

- CWB links also need to be maintained between Leinster Avenue and Matai Road;
- All bridges (with the exception of rural areas) shall have paths on both sides; and
- Otaihanga Road over the proposed Expressway requires a CWB clip on or similar structure; and
- A review of the Otaihanga bridle path was needed, it was important this was not overlooked.

Noise and Lighting

- A recommendation that current noise levels were to be taken as a clear benchmark to address mitigation and not an assumption of an 'optimal' achievable noise level associated with the proposed Expressway;
- The Waikanae North area should be provided for with the use of non-chip seal;
- Use of natural landforms with planting were supported where possible; and
- Further detail was required to enable comment on provision for lighting.

10.15.7.6 NZ Historic Places Trust

More than twenty meetings of the Project team with NZHPT representatives informed NZTA's approach to RMA and HPA matters. The Project's archaeologist and RMA specialists had liaised closely with NZHPT to obtain necessary early authorisations under the HPA, to keep them informed as to investigations being completed, and to obtain written guidance confirming the suitability of the methodology and approaches followed. The Project team has been open to any questions and meetings with NZHPT throughout.

Project team response

During this consultation phase detailed design feedback was reviewed, challenged and tested. The final design of the proposed Expressway is described within the AEE including potential mitigation and conditions of the NoR, taking into account the matters raised by stakeholders during consultation.

10.16 Summary of issues

Reports were produced at the completion of each consultation period that summarised main feedback topics and allowed the design team to provide responses on how these topic themes are being addressed.

10.16.1 2010 consultation and engagement

The following topic areas and issues were raised during the design development submission period. The table below records the design response and relevant section of the AEE that addresses these key matters.

Table 10.5: Matters Raised by Submitters – 2010 Consultation

Topic Area	Issues	Design/Management Response	Relevant Section of AEE
Alignment	Support for an Expressway crossing through QE Park.	The alignment was reviewed, tested and challenged on 27/1/11. Considered in MCA process.	Part E, Chapter 9
	The preferred alignment in Raumati is unsubstantiated.	The alignment has been considered in the MCA. The three main reasons for the alignment north of Poplar Avenue in Raumati include: Severance of the community: the chosen option avoids separating approximately 100 homes between the proposed Expressway and the existing SH1, Visual: the alignment avoids raised structures would be highly visible from QE Park and parts of the Raumati South community, and Environmental: ecologically important wetlands and the largely unmodified dune system within QE Park would be maintained.	Part E, Chapter 9
	More community support for Option 1 (closer to the Urupā)	Reviewed/tested and challenged on 27/1/11.The Option 1 alignment has been confirmed. This option required 11 houses to be removed instead of Option 2 which required 25 houses. Work has been undertaken to ensure the design respects the cultural and archaeological significance of the area.	Part E, Chapter 9
	Consider effects of closing Leinster Avenue early when construction is about to begin.	To be reviewed, tested and challenged.	Part G, Chapter 12
	Local connections and local road upgrades are important to community.	Traffic volumes on the existing SH1 will reduce significantly once the proposed Expressway is operational, this will improve local road connections. East to west traffic connections will be maintained.	Part G, Chapter 12

Topic Area	Issues	Design/Management Response	Relevant Section of AEE
Interchanges	Concern that the Kāpiti Road interchange will worsen existing levels of congestion on Kāpiti Road.	Traffic modelling shows the traffic numbers around the Kāpiti interchange after it is operational will remain similar to the current numbers. The traffic volume decreases progressively on Kāpiti Road as traffic moves away in an eastern or western direction from the interchange.	Part G, Chapter 12
	Suggestions that Ihakara Street is used as an on/off ramp connection option to ease Kāpiti Road congestion.	The project team is working with KCDC to integrate with their future planned development including connections to the Paraparaumu Airport development.	Part G, Chapter 12
	General support for interchange locations as shown	Alternative interchange locations have been investigated. The Kāpiti Road location gave the most efficient arrangement.	Part G, Chapter 12
	Questions raised over the large footprint for the Te Moana Interchange.	The wide footprint 'dog-bone' local road configuration underneath the proposed Expressway will allow for generous landscape treatment. The planting in time will provide visual screening of parts of the proposed Expressway and local road infrastructure.	Part G, Chapter 12 & 17
	The operation of Elizabeth Street from the existing SH1 needs to be improved immediately.	NZTA are undertaking a study to decide on the appropriate action. The proposed Expressway will reduce traffic volume on the existing SH1, this will alleviate some of the congestion on Elizabeth Street.	Part G, Chapter 12
	Second bridge over the Waikanae River is needed immediately for local traffic.	A second bridge over the Waikanae River is planned as part of the proposed Expressway to be constructed early in the construction phase.	Part G, Chapter 12
	Full interchange suggested at Peka Peka or Otaihanga Road.	A full interchange has been considered by the design team and provides negligible benefits. A partial interchange will cost less, have reduced visual impact on neighbouring properties and directly affect fewer private properties. It also supports KCDC's urban growth strategy. The existing SH1 provides for movement southbound onto the proposed Expressway via Te Moana Road which will be better than present.	Part G, Chapter 12 & 16
Health and Safety	Safety is important when designing underpasses and bridges.	Both options have been considered within the MCA.	Part G, Chapters 12 & 19

Topic Area	Issues	Design/Management Response	Relevant Section of AEE
	Site specific concerns regarding the impact on local safety and accessibility i.e. Raumati Road/Matai Road intersections.	Concerns investigated, generally less traffic on local roads. Local roads not considered to be a safety concern.	Part G, Chapters 12 & 19
	Concerns for impacts on community health from vehicle emissions and air pollution.	Covered by construction management plans, and air quality analysis.	Part G, Chapter 20
	Concern over community safety (children, elderly, disabled and animals close to the Expressway).	Connectivity across the proposed Expressway is a safety concern for children, elderly, disabled and animals. Separate cycle ways and walkways are proposed these will be separated from the local roads. Barriers and landscape treatment are also being incorporated into the proposed Expressway and local road design to discourage pedestrians crossing at certain points.	Part G, Chapter 12
General Design	Congestion will not be improved unless other projects get started – i.e. Transmission Gully.	The proposed Expressway will reduce traffic volume on local roads. This will enable greater connectivity regardless of the timing of construction for the other Wellington RoNS projects.	Part G, Chapter 12
	Request for 6.5m height clearance at some local roads.	6m is a normal over dimension clearance This was investigated in preferred option design stage.	Part G, Chapter 12
	Raumati Railway station sought by Raumati residents.	Has been considered. The proposed Expressway design will not preclude a Railway station in Raumati or future car parking space for a park and ride facility.	Part G, Chapter 12
Visual Amenity, community character	Visual impacts must be mitigated. The proposed Expressway should be the least visible as possible.	Design will seek to make the road part of the landscape. Will demonstrate what proposed Expressway will look like with visual simulations.	Part G, Chapter 17
	Retention of coastal/rural character/ ambience important.	Focus group meetings held with residents Leinster Avenue, Puriri Road, Kauri Road and Te Moana Road areas. Design team and Landscape Architects considering planting and hard landscaping methods that will allow the proposed Expressway to blend into the existing rural, semi rural landscapes.	Part G, Chapter 17

Topic Area	Issues	Design/Management Response	Relevant Section of AEE
	Concern over division of the community.	The social impact assessment has considered social effects on community. The Project will result in a permanent alteration to community character especially in localised areas bordering the proposed Expressway structures, whereas wider community character effects are considered to be minor. Any social tensions/divisions within the community resulting from the Project are expected to reduce significantly following the completion of construction.	Part G, Chapter 30
Cycleway, Walkway and	Continue to provide walkways, cycle ways and bridleways.	The Project design includes walkways, cycleways and bridleways.	Part G, Chapter 16
	Walkways, cycleways and bridleways provide important connections to community facilities i.e. between schools, and retailing areas.	These connections particularly between schools and surrounding residential areas have been studied and measured by walkway, cycleway and bridleway route local area movement surveys.	Part G, Chapter 16
Noise and vibration	Significant number of concerns over noise and vibrations. Mitigation required at the time construction starts.	The proposed Expressway design will meet appropriate noise and vibration standards. Staging of construction to be considered. Proposed Expressway design likely to include low noise surfacing in urban areas (OGPA). Potentially establishing earth bunds and constructing fencing prior to construction. Noise and vibration considered with the CEMP.	Part G, Chapter 19
	Concerns over impacts on community health from noise and vibration.	Addressed within the CEMP.	Part G, Chapters 19 & 30
Construction effects	No justification for constructing a road over peat which will add to costs.	Investigations into the local conditions are on-going and will inform construction methodologies. Pre-loading and cut and fill methods will be adopted at appropriate locations along the length of the proposed Expressway.	Part G, Chapter 26
	Majority of numbers supporting the project request immediate construction.	Sequencing of construction being investigated and addressed in the CEMP.	Part G, Chapter 26
Natural Hazards	Concern for how road will function in a disaster i.e. earthquake.	Natural hazards and evacuation routes have been considered.	Part G, Chapter 26

Topic Area	Issues	Design/Management Response	Relevant Section of AEE
Stormwater/ Drainage	Explanation of runoff and spills from the proposed Expressway and how these would be mitigated.	Use of swales to filter runoff from the proposed Expressway.	Part G, Chapter 24
Ecology	Concern over specific wetlands, waterways, eco-corridors and dune landscapes.	Offset mitigation for bio-diversity to be addressed.	Part G, Chapters 21, 22 & 23
Property values	Concern over loss of property value for those living beside the proposed Expressway.	To be addressed by NZTA property managers/Crown agents.	Part A, Chapter 2
Economic	Division of opinion over regional economic benefits – transparency requested on cost/benefit ratios	To be investigated further. This is a RoNS project which has national importance.	Part G, Chapter 29

10.16.1.1 2011 consultation

The following topic areas and issues were raised during the design development submission period. The table below records the design response to various issues and relevant sections of the AEE that address these key matters in further detail.

Table 10.6: Matters Raised by Submitters

Topic Area	Issues	Design/Management Response	Relevant Section of AEE
Alternative forms of transport	Raumati residents want the proposed Expressway to provide space for a potential Railway station and car parking.	The design does not preclude this. Further investigation work is required from GW Regional Council to understand parking demand.	Part G, Chapter 12
Noise and Vibration	Concern for residents near the proposed Expressway – how will noise near these properties be mitigated?	Quiet road surfacing (OGPA) is likely be used near urban areas.	Part G, Chapter 19
Interchanges	Te Horo residents particularly interested in a full interchange at Peka Peka.	The partial interchange design is a result of traffic modelling and supports KCDC's urban growth boundaries as set out within the District Plan.	Part G, Chapter 12
	Property owners near the interchange on Kāpiti Road concerned that vehicle direct access on and off the proposed Expressway will make their sites unsafe for their clients.	Traffic lights at the interchange will control the flow of traffic and provide gaps for turning vehicles. A median strip is also proposed for cars to stack when waiting for a gap to turn into property entrances.	Part G, Chapter 12
	General comments that the height and footprint of the Te Moana interchange needs to be lower.	The current roundabout design provides the most efficient local road configuration.	Part G, Chapter 12

Topic Area	Issues	Design/Management Response	Relevant Section of AEE
Construction	Concern that construction will result in a large area of disturbed land, noise and dust effects.	There will be some disturbance of adjoining land. The construction management plan and conditions of consent will control construction activities.	Part G, Chapters 19 & 20
Design in General	General comments that more detailed plans should be made available for comment.	Design detail has been in continual development. Plans have been available for the general public. Where specific design information was requested technical experts have provided a response.	N/A
Lighting	Support for low level lighting to avoid light spill particularly in rural areas.	The design supports this.	Part G, Chapter 18
Local Roads	Concern for how local roads will cope with traffic from the proposed Expressway. Traffic modelling needs to address these concerns.	The traffic model includes analysis on local roads.	Part G, Chapter 12
Property	Concern for future residential development in Raumati after the proposed Expressway is established.	The District Plan is the appropriate mechanism to control land development in Raumati.	N/A
	The proposed Expressway needs to accommodate future growth areas such as the Ngarara land development.	Further traffic modelling was undertaken on this matter.	Part G, Chapter 12 & 16
Ecology	Enhancement of ecology in the Wharemauku Stream area is sought.	The design seeks enhancement of the stream and provision of a cycleway and walkway.	Part G, Chapters 21,22 & 23
Stormwater	Control and treatment of road runoff is requested to avoid adverse effects on adjoining wetlands.	Included in stormwater design and modelling.	Part G, Chapter 24
	Stormwater and flooding issues around the Te Moana Interchange need further investigation.	Modelling and design refinement is ongoing.	Part G, Chapter 24
	Council seeks a long term maintenance and operational plan to monitor and deal with any unanticipated stormwater issues resulting from the proposed Expressway.	To be addressed by NZTA as a long term issue e.g. not as part of the project AEE.	Part G, Chapter 24

10.16.2 Further consultation

Further consultation and engagement will be undertaken as part of the RMA statutory process once the notice of requirement applications have been lodged with the Environmental Protection Authority.

The NZTA also intends to maintain open lines of communications with the general public and key stakeholders once designations and consents are obtained to construct the proposed Expressway during construction. The methods and details of how this will be done are outlined within the Stakeholder Construction Management Plan.

10.16.3 Conclusions

This Chapter outlines the consultation and engagement carried out between 2009 and 2011. The objectives of consultation listed above in section 10.4 are considered to have been met by the Project team. Extensive and regular opportunities have been provided to stakeholders, iwi and the wider community throughout the process of identifying and assessing options for the alignment and design of the proposed Expressway, particularly at key stages in the decision-making process. A progress was on the development of the proposed Expressway, information on the Project has been provided, and, wherever practicable, the Project team has sought to be responsive to enquiries and concerns. The feedback received during consultation has been considered by the design team and has informed the alignment and design process.

PART G: ASSESSMENT OF ENVIRONMENTAL EFFECTS

11 Assessment methodology

Overview

The environmental assessment undertaken for the Project involved the collaborative input of a broad range of engineering, environmental, social and cultural specialists.

The Project team collaborated to identify potential adverse environmental effects of the Project along with associated measures to ensure that any such effects are appropriately avoided, remedied or mitigated and relevant Part 2 considerations addressed.

11.1 Introduction

The purpose of this Chapter is to outline how the Assessment of Environmental Effects (AEE) was undertaken for the Project and how previous environmental assessment work has been used. The structure for the remainder of Part G is also set out.

11.2 Purpose of the assessment

Under the RMA an assessment of the environmental effects of the proposed Project is required.

In addition to the requirements under the RMA, it is also part of the NZTA's environmental policy and its operating principles under section 96(1)(a) of the LTMA to:

> *"exhibit a sense of social and environmental responsibility, which includes -*
>
> *(i) avoiding, to the extent reasonable in the circumstances, adverse effects on the environment; …"*

The requirements of the RMA and the LTMA formed the basis for the assessment of effects undertaken for the Project.

11.3 Environmental assessment undertaken

11.3.1 Environmental assessment undertaken for the Project

Environmental assessment undertaken included the following inter-related processes:

- The identification and mapping of constraints;
- A multi-criteria assessment (MCA) of alternative route and alignment and associated interchange options;
- Expert technical analysis across a range of disciplines.

The constraints analysis included a detailed examination of the existing environment in the wider Project area that highlighted a number of environmental factors relevant to the development and consideration of Project options.

The MCA involved the application of non-cost and cost related criteria[99] to the Project options identified in order to comparatively assess their relative impacts, including environmental. The outcome of this process was the confirmation of a preferred alignment along with a preliminary indication of its potential environmental impact. These potential environmental impacts, in turn, were subsequently assessed in more detail by various experts through the AEE process, the results of which are reported in various Technical Reports and presented in Part G of the AEE.

11.3.2 Previous environmental assessments

A number of previous environmental assessments have been undertaken on the Kāpiti Coast that are also of relevance to the Project. These are:

- The AEE in support of the NoR lodged in 1997 by KCDC for the WLR; and
- Strategic studies undertaken in 2005 to inform the development of the Western Corridor Plan.[100]

In addition, the Project team drew on information and findings from a number of site specific environmental assessments, including those undertaken for Kāpiti Coast District Plan Change 80 (Ngarara).

In preparing this AEE, information from these assessments was considered and utilised where it remained relevant.

---

[99] Non-cost related criteria include movement, built environment, cultural/heritage, natural environment, social/community and economic, while the cost related criteria include actual costs and the benefit/cost ratio.

[100] Particularly the Planning Balance Sheet Assessment completed as part of the Western Corridor Transportation Study.

11.4 Assessment methodology

11.4.1 Alliance project team involvement[101]

The close working relationship between the Project designers (i.e. engineering teams) and the environmental assessment teams for the Project has resulted in a high level of integration between the design and mitigation processes.

In general terms, the approach has been:

- To modify the design of the Project to avoid, or reduce to the extent practicable, potential adverse effects;
- Where avoidance of adverse effects was not possible, to develop measures to adequately remedy and/or mitigate potential adverse effects; and
- Where mitigation and/or remediation is required, to co-ordinate development of measures between specialists as much as possible to promote optimal environmental outcomes.

Specific details about how particular potential adverse environmental effects are proposed to be managed are provided in Chapters of Part G and in Part H outlined in section 11.5.

11.4.2 KCDC involvement

In its role as a member of the Alliance, KCDC has been closely involved in contributing to Project shaping and providing input on options and mitigation measures identified. This has been particularly relevant to the Project as the Council acts in the following capacity:

- It is the relevant territorial regulatory authority;
- It is the owner of some of the land required for the Project;
- It is the designating authority for the existing WLR designation; and
- It is the owner and controlling authority for local roads that will connect to, or affected by, the proposed Expressway.

[101] Further information regarding the Alliance is included in section 1.3 of Chapter 1.

11.4.3 Stakeholder involvement

A wide range of stakeholders[102] were involved in the AEE development process in a number of different capacities. A description of the methods used to engage stakeholders is set out in Part F.

In general terms, stakeholders and individuals provided feedback on how they believed the Project would affect their interests. The engagement undertaken with the various stakeholders is discussed throughout the topic Chapters in Part G as relevant.

11.5 Structure of the assessment

Chapters in Part G describe the assessments undertaken for each topic. For convenience, each assessment topic is described in a separate Chapter, although interactions between topic areas are recognised and discussed where relevant. The topic Chapters, and the relevant technical reports (found in Volume 3 of the AEE), are shown in Table 11.1.

Table 11.1: Environmental effects assessment topics

AEE Report Chapter	Topic	Relevant Technical Report No.
12	Traffic and Transport	32, 33 & 34
13	Archaeology and Built Heritage	9 & 10
14	Tangata Whenua/Cultural Heritage	11 & 12
15	Network Utilities	-
16	Urban Form and Function	5 & 6
17	Landscape and Visual	7
18	Lighting	8
19	Noise and Vibration	15, 16, 17, 18 & 19
20	Air Quality	13 & 14
21	Terrestrial Ecology	26, 27, 28 & 29
22	Freshwater Ecology	26 & 30
23	Marine Ecology	26 & 31
24	Hydrology and Stormwater	22
25	Groundwater	21
26	Settlement	35& 36
27	Contamination	23 & 25
28	Water Quality	24
29	Economic	-
30	Social	5, 7, 11, 12, 13, 14, 15, 16, 18, 32 & 33

[102] These included affected property owners, Te Āti Awa ki Whakarongotai, the Takamore Trust and representatives from such organisations as Kapiti Cycling Inc, NZ Automobile Association, Coastlands, Kapiti Coast Chamber of Commerce, GWR Council, Raumati South Residents Association, Waikanae on One, Kapiti Riding Club, Southward Museum Trust, NZHPT, Friends of Queen Elizabeth Regional Park (Kapiti) Trust and Alliance for Sustainable Kapiti Inc. A detailed outline of the parties consulted is included in Chapter 10.

Each Chapter provides a summary of the key potential effects and the topic related mitigation proposed. In some instances the NZTA is offering to undertake measures to create positive benefits which are additional to mitigation of the adverse effects of the Project.

Further information about the assessment, including the assessment methodology used, is contained in the relevant technical report.

The basic structure for each assessment topic is:

- A description of the existing environment (in greater detail than that provided in Chapter 6, as relevant to the assessment matter);
- A description of the potential effects (both positive and adverse) resulting from the Project;
- A description of what measures have been undertaken, or are proposed to be undertaken, to avoid, remedy or mitigate potential adverse effects that have been identified; and
- A description of any measures that the NZTA is offering as part of the Project which create positive benefits relevant to that topic.

Part H sets out the framework by which effects (as identified throughout Part G) will be managed, including through conditions of the designation and resource consents. It also outlines the relationships between the recommended mitigation and proposed management plans.

12 Traffic and transport

Overview

The Project has significant positive traffic and transport effects (i.e. benefits) for the region and district, namely:

- improved safety for road users on SH1, and for communities using and adjacent to the existing SH1;
- improved route security through provision of a second Waikanae River road bridge crossing;
- provision of an alternative north / south route through Kāpiti linking to the Capital, and to key district facilities;
- reductions in congestion and in travel times for users of SH1, and for the majority of local road network users;
- improved travel time reliability;
- significant enhancement of the walking, cycling and bridleway network in Kāpiti;
- amenity, accessibility and connectivity improvements for communities along the existing SH1 route;
- improvement in access to bus and rail stations across the existing SH1, and enabling additional options for bus routes within Kāpiti.

These benefits are important for the movement of national and regional road-based freight, commuter and tourist traffic, and also for Kāpiti residents.

Modelling indicates that introduction of the proposed Expressway into Kāpiti's urban and rural fabric will have the effect of assisting local network functioning. Project design for interchange location and configuration (full or partial interchanges) has been informed by the modelling. Proposed Expressway induced demands will require the provision of mitigation works on the local network in the immediate vicinity of Project interchanges and these mitigation works form part of the Project. These additional works do not, however, remedy the District's existing on-going growth management related challenges. Current and future urban development will continue to put pressure on the local roading network due to the substantial development potential of land zoned in Kāpiti for residential and commercial purposes.

Residential communities at Paraparaumu and Waikanae will benefit from the Project as a result of reduced traffic volumes (especially commercial vehicle volumes) on the existing SH1, and associated reductions in community severance at these locations. Access and safety improvements will improve for local east / west movement to and from rail and bus stations, community halls and facilities and services located east of the existing SH1. There will also be significant reductions in traffic volumes on some local roads, especially at the eastern ends of Te Moana and Kāpiti Roads.

The Project will have significant positive traffic and transport effects overall, however during construction adverse traffic and transport effects on local communities will occur. These arise primarily

from increased construction traffic using local roads, and delays on local roads while bridges and related works are completed. The Construction Traffic Management Plan (CTMP) in Appendix O of the CEMP (Volume 4) is designed to manage and mitigate these effects to an acceptable level.

12.1 Introduction

This Chapter presents the key findings of the assessment of traffic and transport effects undertaken for the Project. This assessment is based on traffic modelling, the key results of which are described in Section 12.5.1. The key traffic and transport effects from the operation and construction of the Project are then described in Sections 12.8, 12.10 and 12.11 of this AEE, respectively.

Further details on the assessment of traffic and transport effects are contained in Technical Report 32 (Assessment of Transport Effects) and Technical Report 33 (Assessment of Temporary Traffic Effects) in Volume 3 of the AEE, while the results of the modelling work is provided in Technical Report 34 (Traffic Modelling Report), Volume 3.

12.2 Traffic and transport issues and objectives

The NZTA has specific Project objectives which are directly relevant to the traffic and transport assessment for the 18 km proposed Expressway between MacKays Crossing and Peka Peka (these are outlined in Part A, Chapter 2, Volume 2 of the AEE). The Project NOR and resource consents sought are for approximately 16 kilometres of this length. The balance length along the Raumati Straight to MacKays Crossing will be addressed by upgrading works within the existing designated SH1 corridor.

Improved safety, route security and reliability, and travel times are key objectives for the NZTA. The following sections describe the issues with the existing network in this regard. Summary descriptions of the traffic and transport network then follow, and sections on effects assessment and mitigation requirements.

12.2.1 Safety

Between 2006 and 2010, 413 crashes were recorded on SH1 from MacKays Crossing to Peka Peka, of which 4 involved fatalities. While safety improvement works on this section of SH1 have been instituted over this period, on-going traffic growth means there has been no discernible downward trend in the total number of crashes. From 2010 onwards a further 3 fatalities have occurred.

Of the 413 reported crashes, 43% occurred in urban 50km/h sections of SH1. The remainder occurred in peri-urban or rural 70, 80, or 100km/h sections of SH1. Over a third of crashes (35%) involved turning movements into or off of SH1 from or to the local network.

The scope for further reductions in the number of crashes through road improvements to the existing SH1 is constrained by the multiple access points from side roads and private properties along the existing SH1. Options for carriageway realignment and widening to rectify these deficiencies, including associated land take and financial implications have been considered and rejected in favour of the proposed Project.

The Project will address rising traffic demands (especially demand from commercial vehicles) by the provision of an alternative route which has been designed to modern safety standards.

Tables 12.1 and 12.2 summarise the reported crash history on SH1 from MacKays Crossing to Peka Peka.

Table 12.1: Annual Distribution of Crashes on SH1 MacKays Crossing to Peka Peka

Year	Fatal	Serious	Minor	Non-Injury	Total
2006	2	6	19	48	75
2007	1	3	15	68	87
2008	0	2	18	54	74
2009	0	2	17	66	85
2010	1	4	14	73	92
TOTAL	**4**	**17**	**83**	**309**	**413**

Table 12.2: Crash Type SH1 MacKays Crossing to Peka Peka

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	44	11%
Straight Road Lost Control/Head On	55	13%
Bend - Lost Control/Head On	41	10%
Rear End/Obstruction	114	28%
Crossing/Turning	145	35%
Pedestrian Crashes	9	2%
Miscellaneous Crashes	5	1%
TOTAL	**413**	**100%**

While a significant proportion of local traffic is expected to continue to use the existing SH1 route, through traffic is expected to use the new route. Without the Project, existing crash problems are likely to increase with an increase in traffic over time and this will have a further adverse effect on the reliability of travel times.

12.2.2 Route security

A key element of NZTA's Project Objectives is to provide a state highway network with good route security. Construction of the Project will provide better security of access into and out of the capital city. The northern access to Wellington is currently vulnerable to closure from a range of events. These include a significant earthquake, tsunami or storm event, or due to other events such as traffic crashes. This risk is compounded by the eastern access to Wellington (via the Rimutaka Hill section of SH2) also being vulnerable to closure, particularly due to slips after heavy rain, and during periods of high winds.

Current SH1 and SH2 vulnerabilities mean that closure as a result of significant damage in an extreme event could take several weeks or months to repair. Building resilience into the State Highway network lessens closure risks which would otherwise be extremely disruptive and result in lost productivity both regionally and nationally.

The MacKays to Peka Peka section of the existing SH1 has a particular vulnerability as it is currently the only road crossing of the Waikanae River and it is proximate to a fault line.

12.2.3 Time and congestion

Traffic congestion in the SH1 corridor results in increased travel times during weekday peak periods. In 2026, it is expected that, without the Project, this will be most evident for a northbound journey from MacKays Crossing to Waikanae. This would take 20% longer in the weekday PM peak than it does now.

During weekend and holiday periods severe congestion often occurs along the existing SH1 as a result of increased road traffic demands. In the event of an incident, such as a crash or natural event, the extent of disruption can be magnified significantly.

Traffic congestion not only increases total travel times but also the variability or uncertainty of travel times in the corridor. The planning of journeys within the corridor can become increasingly difficult, resulting in additional and unnecessary costs being borne by travellers and businesses.

The Project is predicted to significantly improve travel times for through traffic between MacKays Crossing and Peka Peka, reducing the projected travel time in 2026 by an estimated seven minutes in the weekday morning peak and over ten minutes in the weekday evening peak.

12.3 The existing transportation and traffic environment

SH1 is the primary strategic route within the Wellington region. The nearest alternative State highway connection to the Project area is SH58 19km south of the Project, which links with SH2. SH1 provides essential connectivity for the Kāpiti communities situated along it, and for longer distance traffic movements between Wellington and the north.

Approximately 50% of journeys that use one or more sections of the proposed Expressway are predicted to either originate or terminate outside the study area. This reflects the study area's importance to the overall operation of the Northern Corridor RoNS.

The existing transport environment for the Project is described below in terms of the:

- Existing State Highway and Local Network and its operation;
- Kāpiti pedestrian and cycle network; and
- Public transport system.

12.3.1 Existing State highway and local network

The existing road network layout and hierarchy is shown on Figure 12.1.

SH1 is the only continuous north-south arterial between MacKays Crossing and Peka Peka. SH1 is also the only road crossing of the Waikanae River meaning there is no alternative route for local traffic to use between Waikanae and Paraparaumu.

SH1 also provides an essential element of local connectivity, with numerous local road intersections and driveways between MacKays Crossing and Peka Peka.

A number of roads which are classified as secondary arterials intersect SH1:

- Poplar Avenue;
- Raumati Road;
- Ihakara Street;
- Kāpiti Road;
- Otaihanga Road;
- Te Moana Road;
- Elizabeth Street; and
- Ngaio Road.

All of these roads are east-west links. There is currently no local north-south arterial link through the district. The absence of an alternative north-south local arterial, combined with a significant amount of local access directly onto SH1, contributes to a significant amount of local traffic on SH1. At the Waikanae River crossing approximately 70% of traffic is “local” traffic.

In this sense, SH1 performs a local road function which erodes its ability to effectively perform its role as a mover of through traffic and freight. This adversely impacts on safety by mixing a high volume of local traffic making frequent turns onto and off the existing SH1, with passing traffic and freight attuned to and seeking open road speeds.

Figure 12.1: KCDC Road Hierarchy Plan & Proposed Expressway Route

12.3.2 Current State highway 1 environment

The existing road environment within the Project area is described for the State highway network, including local roads in the vicinity of the Project corridor.

The existing SH1 between MacKays Crossing and Peka Peka traverses mostly flat terrain and passes through a variety of both rural and urban environments.

a. **MacKays Crossing to Poplar Avenue** (RP1023/7.240 to RP1023/3.612)[103]

Between MacKays Crossing and Poplar Avenue, SH1 is a four-lane median divided highway with a 100km/h speed limit. Through this area SH1 is bounded by the NIMT Railway line on the east side and Queen Elizabeth Park on the west side.

b. **Poplar Avenue to Ihakara Street** (RP 1023/3.612 to RP1023/1.380)

From Poplar Avenue to Ihakara Street, SH1 remains 100km/h and passes alongside the Raumati South community. It continues to be bounded by the NIMT on the east side.

At Poplar Avenue, the two northbound lanes merge into one lane. Between Poplar Avenue and Ihakara Street, SH1 has two southbound lanes and one northbound lane. On the west side, SH1 provides access to a number of residential and commercial properties, as well as the intersections with Poplar Avenue, Leinster Avenue, Raumati Road, and Ihakara Street.

c. **Ihakara Street to Ventnor Drive** (RP1023/1.380 to RP1012/10.250)

At Ihakara Street, SH1 enters the Paraparaumu urban area. The posted speed limit drops to 70 km/h near Ihakara Street and again to 50 km/h near the entrance to the Coastlands shopping centre.

A second northbound lane starts approximately 300 metres north of Ihakara Street, resulting in SH1 being four lanes wide (divided) to the intersection with Kāpiti Road. Two access points to the Coastlands shopping mall are provided. Access points are also provided to fast food stores such as Burger King and McDonalds. Approximately 100 metres south of Kāpiti Road, a left-in / left-out only access to /from SH1 northbound is provided to the Kāpiti Lights shopping centre. On the southbound side of SH1, a left-in / left-out only access is provided to the Paraparaumu rail station.

Just north of the signalised intersection with Kāpiti Road, SH1 reduces to one lane in each direction with a 50km/h speed limit. Through the Paraparaumu urban area (generally between Kāpiti Road and Ruahine Street) SH1 provides direct access to many private properties. The SH1 rail overbridge (highway over railway) is between Amohia Street and Buckley Grove. The overbridge and approaches are particularly narrow with little or no shoulders and poor geometry. There is a footpath on the south side of the bridge.

[103] State Highway Route Positioning reference system

North of the intersection with Ruahine Street, SH1 traverses Ventnor Drive via a grade-separated intersection which provides access to the Lindale tourist centre and Nikau Valley.

d. **Ventnor Drive to Otaihanga Road** (RP1012/10.250 to RP1012/8.172)

At Ventnor Drive, SH1 leaves the Paraparaumu urban area and the surrounding land use environment has a more rural character. The posted speed limit increases to 80 km/h. SH1 provides access to a number of rural residential properties along this stretch. There is a stop-controlled intersection at Otaihanga Road, where SH1 curves to/from the northeast.

e. **Otaihanga Road to Waikanae River Bridge** (RP1012/8.172 to RP1012/5.160)

North of Otaihanga Road, the SH1 posted speed limit increases to 100km/h speed limit and then widens to four lanes to accommodate a passing lane in each direction. A number of rural residential properties are accessed via SH1 in this area. Just south of Kebbell Drive, the passing lanes end and SH1 resumes as a two-lane highway. SH1 passes under the rail overbridge (rail over highway) just south of the Waikanae River Bridge. Due to crash fatalities in late 2011 a 50 km/h limit has been put in place for portions of this stretch of road.

f. **Waikanae River Bridge to Hemi Street** (RP1012/5.160 to RP1012/3.810)

At the north end of the Waikanae River Bridge, the posted speed limit on SH1 reduces to 70km/h and then again to 50km/h as SH1 enters Waikanae Town Centre. Here SH1 again runs alongside the NIMT, which is along the eastern side of SH1. There are two signalised intersections in Waikanae, one with Te Moana Road and another with Elizabeth Street. Between the two intersections, SH1 is five lanes wide to accommodate two lanes in each direction with a centre right turn lane / median.

On-street parking is accommodated on the west side of SH1. On the east side, north of Elizabeth Street, SH1 provides vehicular access to the recently upgraded Waikanae rail station and a new parking area.

North of the priority-controlled intersection with Ngaio Road, SH1 reduces to two lanes (one lane in each direction with a centre flush median). Approximate 80 metres north of Ngaio Road is the priority-controlled access to the New World supermarket on the west side of SH1. The speed limit increases to 70km/h around Martin Street. At Hemi Street, SH1 leaves the Waikanae urban area and the posted speed limit increases to 100km/h.

g. **Hemi Street to Peka Peka Road** (RP1012/3.810 to RS1012)

Between Hemi Street and Peka Peka Road, SH1 is a 100km/h two-lane (one lane in each direction) highway. A southbound passing lane was recently constructed south of Peka Peka Road. The NIMT bounds SH1 on the eastern side, with rural land on the western side of SH1.

12.3.3 Pedestrian and cycle routes

There are currently no cycle lanes on the existing SH1 between MacKays Crossing and Peka Peka. Cyclists ride in the shoulder, where available. The Paraparaumu rail overbridge and the Waikanae River Bridge are particular pinch points for cyclists, as both bridges are very narrow and cyclists are effectively forced to ride in the SH1 traffic lane.

Footpaths, generally separated from the road carriageway by a kerb or berm, are provided along various sections of the existing SH1 where it travels through urban and suburban areas.

The *Coastal Cycleway Guide*[104] identifies a cycling route between Paekākāriki and Peka Peka, running mainly along residential streets and also through Queen Elizabeth Park and along the Waikanae River. The proposed Expressway does not cross this Route.

Two existing cycle and walking routes are crossed by the proposed Expressway. These are the Wharemauku Trail which follows the Wharemauku Stream; and, the Waikanae River Trail connecting Waikanae to Waikanae Beach and Otaihanga to Waikanae. The Waikanae River Trail runs along both sides of the Waikanae River. Connections to these Trails by a new north to south cycleway / walkway are proposed as part of the Project.

Other existing pedestrian and cycle facilities on local roads in the vicinity of proposed Expressway interchanges are:

- **North side of Poplar Avenue**, an off-road gravelled path for use by pedestrians and cyclists, which runs for approximately 100 metres east and west of Te Ra School.
- **Kāpiti Road** in the vicinity of the proposed Expressway where there is a footpath and an on-road cycle lane on the north side and a shared use pedestrian/cycle way on the south side.
- **North side of Te Moana Road** where there is a footpath separated from the edge of seal by a grassed berm (approximately 2.5 metres wide). This footpath connects to other footpaths along Te Moana Road away from the proposed Expressway corridor and provides a pedestrian connection from Waikanae town centre to Waikanae Beach. There is no footpath on the south side of Te Moana Road and no cycle lanes.
- There are **no footpaths or cycle lanes on Peka Peka Road or Hadfield Road** in the vicinity of SH1 or the proposed Expressway area.

12.3.3.1 Information on pedestrian and cycle movements

Pedestrian and cycle counts were undertaken by the Project team at four locations in the study area in June 2011 to assist with design and to inform effects assessments. The results of these surveys indicate the volumes of pedestrians and cyclists travelling along Kāpiti Road and Te Moana Road through the proposed Expressway interchange locations. The surveys also informed the Project team on the use of

[104] http://kapiticoast.govt.nz/Documents/Downloads/Kapiti-Coast-District-Coastal-Cycleway-Guide.pdf

the Wharemauku Trail and Waikanae River Trail and showed these to be well utilised, especially in the weekday afternoons.

Further information is included in Technical Report 32, Volume 3.

12.3.4 Public transport

The Kāpiti Coast District is well serviced by public transport with rail and bus services. Figure 12.2[105] below shows the bus and rail network services which currently operate in the project area.

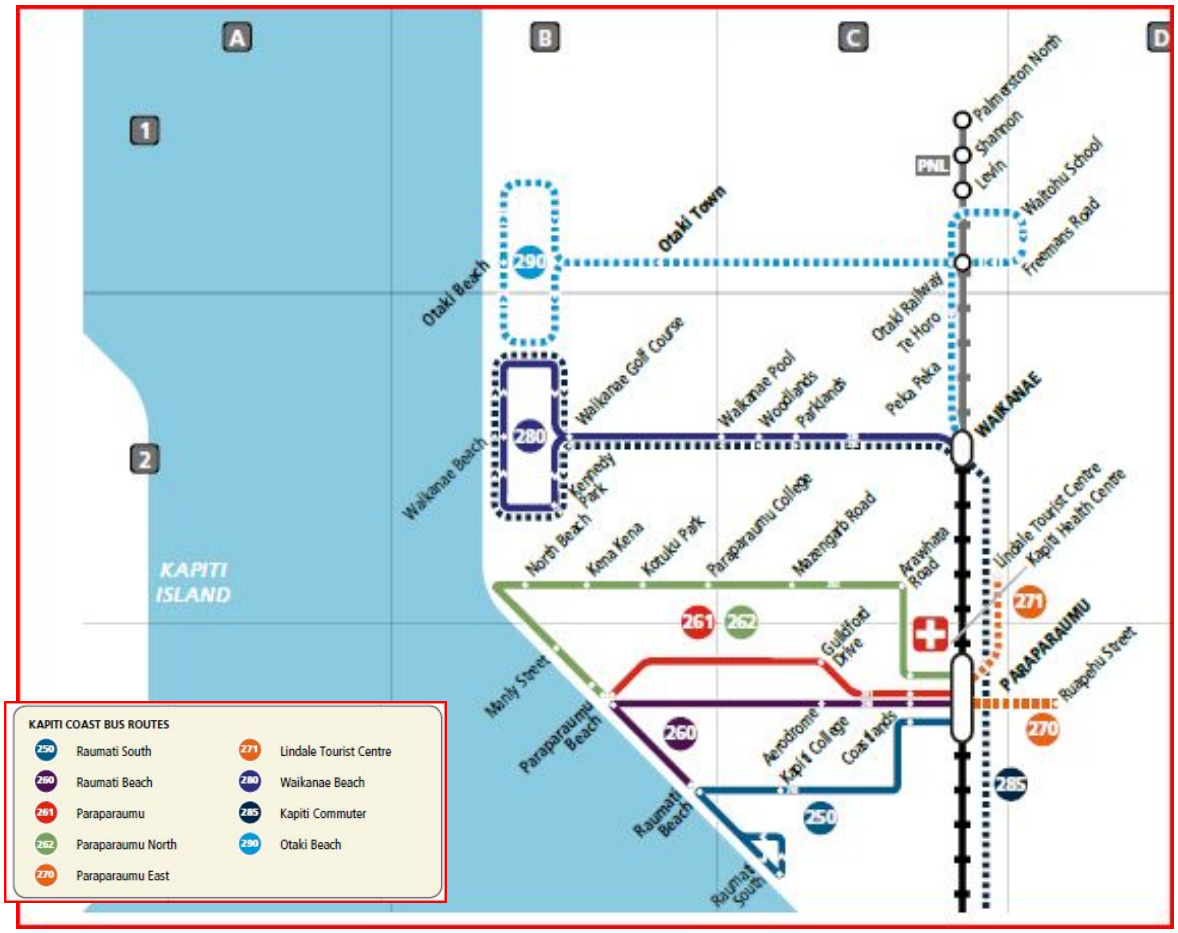

Figure 12.2: Project Area Public Transport Network Map

Effects assessment has also been informed by KCDC's policy and transport strategy, and recognition of public transport management and review processes overseen by Greater Wellington Regional Council.

[105] Source: Greater Wellington Regional Council's public transport website: www.metlink.org.nz

12.3.4.1 Rail

The NIMT rail line runs north-south through the Kāpiti Coast District. Within the Project area there are rail stations at Paraparaumu and Waikanae. The Project area is well serviced by passenger rail services. A major capital works upgrade project including double tracking and rail station upgrades has been completed over the last 5 years. GWRC's TranzMetro service provides numerous rail services to Wellington at these stations generally at frequencies of:

- 20-25 minutes during the weekday peak periods;
- 30 minutes during the off peak;
- 60 minutes in late evening and night (between 7pm and 12am); and
- 30 minutes during the weekend.

Additional information on services is detailed in Technical Report 32, Volume 3.

GWRC has previously identified long term potential for additional future railway stations in the Project area, and the proposed Expressway design has sought to ensure these options are not precluded long term. In particular, community interest in car parking space for a possible station at Raumati South was recognised. A design analysis indicated that the Project would not preclude opportunities to provide car parking in that location[106].

12.3.4.2 Buses

There is a network of bus services on the Kāpiti Coast, as illustrated in Figure 12.2. The bus services are generally scheduled to meet trains at Paraparaumu and Waikanae rail stations.

Bus services generally run at 20 – 25 minute frequencies during the peak periods, and on weekends and off peak the bus routes generally operate on a one hour frequency. Location of bus stops relative to the proposed Expressway has informed Project alignment and design considerations.

The Project will enable service providers and GWRC to consider the viability of loop services using the current Waikanae River Bridge crossing with access to and from the full interchanges at Paraparaumu and Te Moana Road[107].

12.3.4.3 Local roads crossed by Project

There are a number of local existing east-west roads and arterials which are crossed by the Project (or will be connections to the Project). These are identified and the nature of crossing described. From south to north:

[106] 2011 Project Team and GWRC officer discussions

[107] 2011 Project Team and GWRC officer discussions

- Poplar Avenue - remains at grade, with the proposed Expressway crossing the local road by bridge overhead and south facing connections provided;
- Leinster Avenue – cul-de-sac formed;
- Raumati Road – local road remains at grade, with the proposed Expressway crossing by bridge overhead;
- Kāpiti Road - remains at grade, with the proposed Expressway crossing by bridge overhead and north and south facing connections provided;
- Mazengarb Road - remains at grade, with the proposed Expressway crossing by bridge overhead;
- Otaihanga Road - remains at grade, with the proposed Expressway crossing by bridge overhead;
- Te Moana Road - remains at grade, with the proposed Expressway crossing by bridge overhead and north and south facing connections provided;
- Ngarara Road - bridge at grade, with the proposed Expressway crossing beneath;
- Ngarara Road (paper road) – cul-de-sac of paper road formed;
- Smithfield Road – cul-de-sac formed, with a new local road bridge provided above the proposed Expressway; and
- Peka Peka Road – new local bridge provided above the proposed Expressway, and north facing connections provided to it.

The proposed Expressway also crosses a potential extension of Ihakara Street. This future link is identified in the KCDC District Plan as an east / west connection between the Paraparaumu Town Centre and Airport. The proposed Expressway design enables this link to be provided at a future date.

Project planning for the proposed Expressway has included consideration of KCDC planned future urban growth, particularly in Waikanae North, which are envisaged to have new local roads, including new east-west link roads.

12.4 Traffic flows and travel times

12.4.1 Traffic counts and profiles (2010)

Average Annual Daily Traffic volumes[108] and heavy vehicle percentages for various locations on the existing SH1 from MacKay's Crossing to Peka Peka are summarised in Table 12.3 below:

[108] Source: *State Highway Traffic Volume Data Booklet (NZTA) 2006-2010*

Table 12.3: Average Annual Daily Traffic Volumes on SH1

Count Location on SH1	Average Annual Daily Traffic Volume (2010)	Percentage Heavy Vehicles
Marycrest (north of Peka Peka)	16,798	8%
North of Elizabeth Street (Waikanae)	21,537	7%
North of Ihakara Street (Paraparaumu)	25,923	7%
South of MacKays Crossing	25,012	8%

Average weekday traffic volumes on Kāpiti Road and Te Moana Road in the vicinity of the proposed interchanges are:

- Kāpiti Road: 21,931 vehicles per day, with 4% HCVs; and
- Te Moana Road: 7,429 vehicles per day, with 3% HCVs.

For SH1 count sites, the afternoon peak is larger than the morning peak at both locations.

12.5 Methodology for assessing effects

The effects assessment was informed using outputs from regional and district level models. These models have been subjected to rigorous processes of calibration, validation and peer review to ensure that the resulting forecasts are reliable.

Together, these models provide forecasts of travel demands by mode, traffic volumes and conditions on road sections and the detailed performance of intersections, all representative of 'typical' average weekday AM peak, inter-peak and PM peak periods.

The Project effects assessment involved use of a hierarchical modelling system involving the following three components below:

- A strategic multi-modal demand model that relates land use (such as population and employment), to person travel patterns at a strategic, region-wide level (see Technical Report 34, Volume 3);
- A project assignment model, which is smaller in area than the demand model but has a more refined network in the project area. This model loads the vehicle trip patterns predicted by the demand model onto the road network to test various options and investigate the traffic effects at a more detailed level; and
- An operational model, which uses micro-simulation to look at specific intersections and connections in even greater detail.

12.5.1 Modelling methodology and outputs

Modelling has been carried out to enable effects to be assessed between what would occur without the Project and with the Project.

Travel demands in the models are based upon household interview survey information, census data and demographic and economic forecasts.

The modelling assessments have been based around two principal scenarios, a Do Minimum scenario without the Project in place, and a 'with Project' scenario. The assessments focus upon the evaluation of conditions in 2026, a few years after the expected completion of construction in 2017/18.

In addition to these two scenarios, "sensitivity testing" has been undertaken to assess the extent to which the traffic demand modelling results for the two scenarios may be sensitive to changes in some of the key assumptions for these scenarios. The sensitivity testing is described in Technical Report 34, Volume 3 and is not considered to alter the conclusions of the effects assessment.

12.5.1.1 Do minimum scenario 'without Project'

The Do Minimum represents a realistic future scenario to 2026, but without the Project in place. This has been developed to provide a baseline against which the effects of the Project can then be assessed. Details on the scenario are set out in Technical Report 34, Volume 3.

The Do Minimum includes the land use changes forecast by the GWRC and KCDC, consistent with the assessment of other transportation projects across the region. Transport projects which have not yet been constructed, but are expected to be completed by 2026, regardless of whether the Project goes ahead are included in the Do Minimum. This is based on input from KCDC and GWRC as to an appropriate Do Minimum scenario.

Modelling includes a comparison of the baseline 2010 traffic flows with the forecast "Do-Minimum" traffic flows (i.e. without the Project) in 2016 and 2026. The estimated daily two-way directional traffic flows on SH1 under the Do Minimum scenario are shown in Table 12.4 below.

A percentage change is shown to compare the traffic growth from 2010 to the future 2016 and 2026 years based on the Do-Minimum models (without Project).

Table 12.4: Do Minimum 'Without Project' 2010, 2016 and 2026 Daily Flows on SH1 (Two-directional Vehicles per Day)

Location	2010	2016 Do Min	2010 - 2016 DM Change	2026 Do Min	2010 - 2026 DM Change
South of Poplar Ave	22,700	23,000	1%	26,400	16%
South Kāpiti Road	27,000	29,100	8%	31,900	18%
South of Otaihanga Road	22,400	22,700	1%	25,800	15%
South of Te Moana Road	26,900	27,500	2%	31,900	19%
South of Peka Peka Road	17,000	18,100	6%	20,500	21%

There is a limited amount of growth (less than 10%) predicted to occur between 2010 and 2016, with a greater amount of growth (15 – 21%) predicted to occur to the year 2026 due to projected demographic and economic factors.

The wider network effects of the traffic growth under the Do Minimum (without project) from 2010 to 2016 and 2026 respectively are shown in Table 12.5 below. This information provides a basis for assessing Project effects compared with the Do Minimum scenario.

Table 12.5: Do Minimum 'Without Project' Comparison of 2010 with 2016 and 2026 Daily Flows on Selected Local Roads (Two- directional Vehicles per Day)

Location	2010	2016 Do Min	2010 - 2016 DM Change	2026 Do Min	2010 - 2026 DM Change
Poplar Ave, East of Matai Rd	2,500	3,000	20%	3,300	32%
Matai Rd, South of Raumati Rd	4,300	4,400	2%	5,900	37%
Raumati Rd, West of Rimu Rd	13,000	15,200	17%	17,800	37%
Rimu Rd, South of Kāpiti Rd	19,600	19,500	-1%	16,100	-18%
Kāpiti Rd, West of SH1	16,200	16,300	1%	18,600	15%
Kāpiti Rd, West of Arawhata Rd	24,900	27,200	9%	29,400	18%
Kāpiti Rd, West of Te Roto Dr	15,600	17,500	12%	20,800	33%
Arawhata Rd, North of Kāpiti Rd	7,800	7,800	0%	6,500	-17%
Te Roto Dr, North of Kāpiti Rd	10,300	11,700	14%	12,400	20%
Realm Dr, North of Guildford Dr	2,900	3,200	10%	4,100	41%
Mazengarb Rd, East of Guildford Dr	5,300	6,100	15%	6,200	17%
Ratanui Rd, North of Mazengarb Rd	7,200	7,700	7%	7,800	8%
Otaihanga Rd, West of SH1	6,500	7,300	12%	8,600	32%
Te Moana Rd, West of SH1	10,700	10,600	-1%	13,000	21%
Te Moana Rd, West of Walton Ave	5,200	5,800	12%	8,100	56%
Park Ave, North of Te Moana Rd	1,800	2,900	61%	4,500	150%
Paetawa Rd, South of Peka Peka Rd	900	1,000	11%	1,300	44%
Peka Peka Rd, West of SH1	1,100	1,200	9%	1,300	18%

12.5.1.2 Traffic Model Forecasts 'With Project'

The 'With Project' scenario is the same as the Do Minimum, except that it also includes the Project and associated changes to existing SH1 and the local network.

With the Project constructed, the predicted difference at 2026 in daily traffic between the Do Minimum and Project in 2026 is shown across Kāpiti District in Figures 12.3 and 12.4 below.

Positive (green) shows where the traffic is predicted to increase compared to the Do Minimum. Negative (blue) indicates where traffic is expected to decrease.

Width of lines denotes the level of volume change. This is also detailed in Table 12.6.

As it is not possible to present comparisons where the network differs, flows along the proposed Expressway (which would be positive) are not displayed. What can be seen is the magnitude of the change in flows along SH1 and other local roads within the study area, such as Te Moana Rd and Otaihanga Rd, as a result of opening the proposed Expressway.

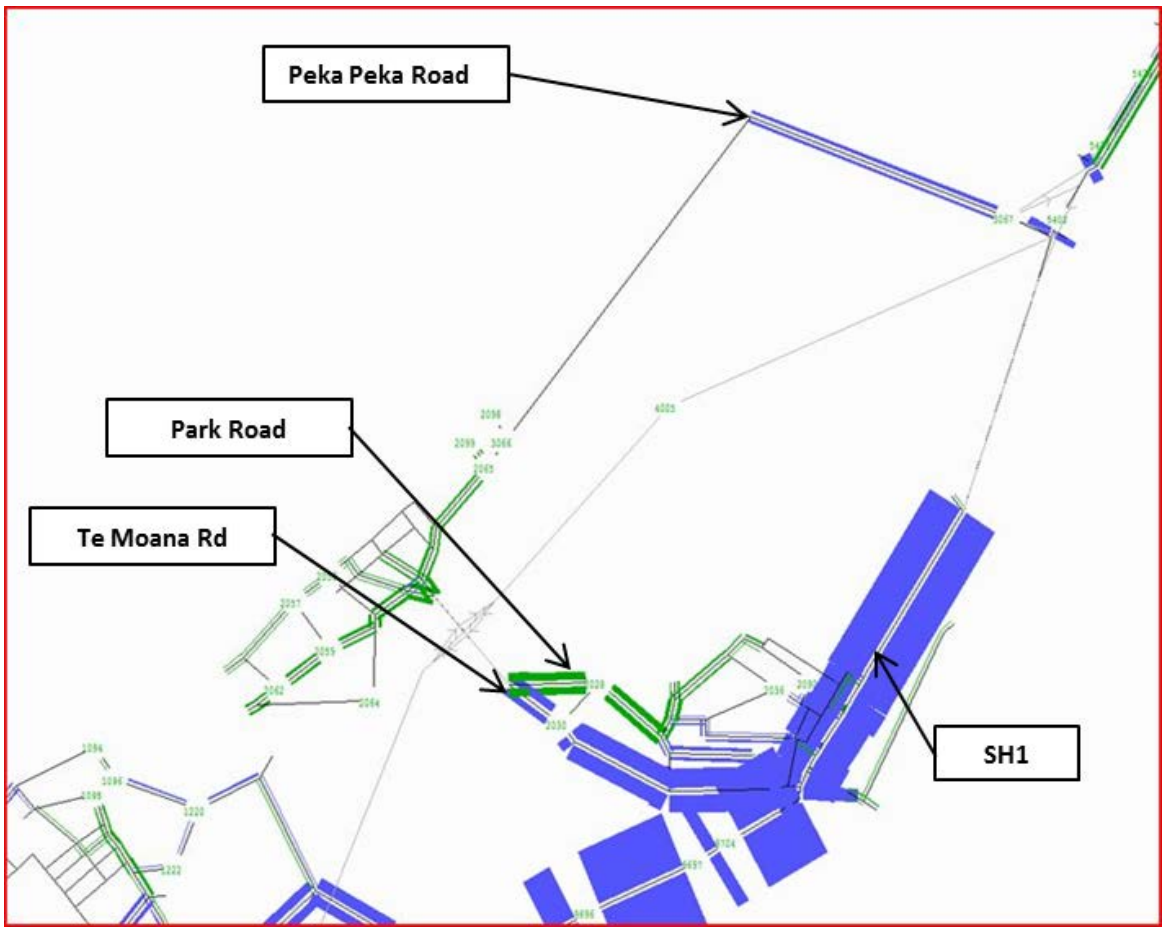

Figure 12.3: Predicted difference in daily flows at Waikanae: Do Minimum vs Project at 2026

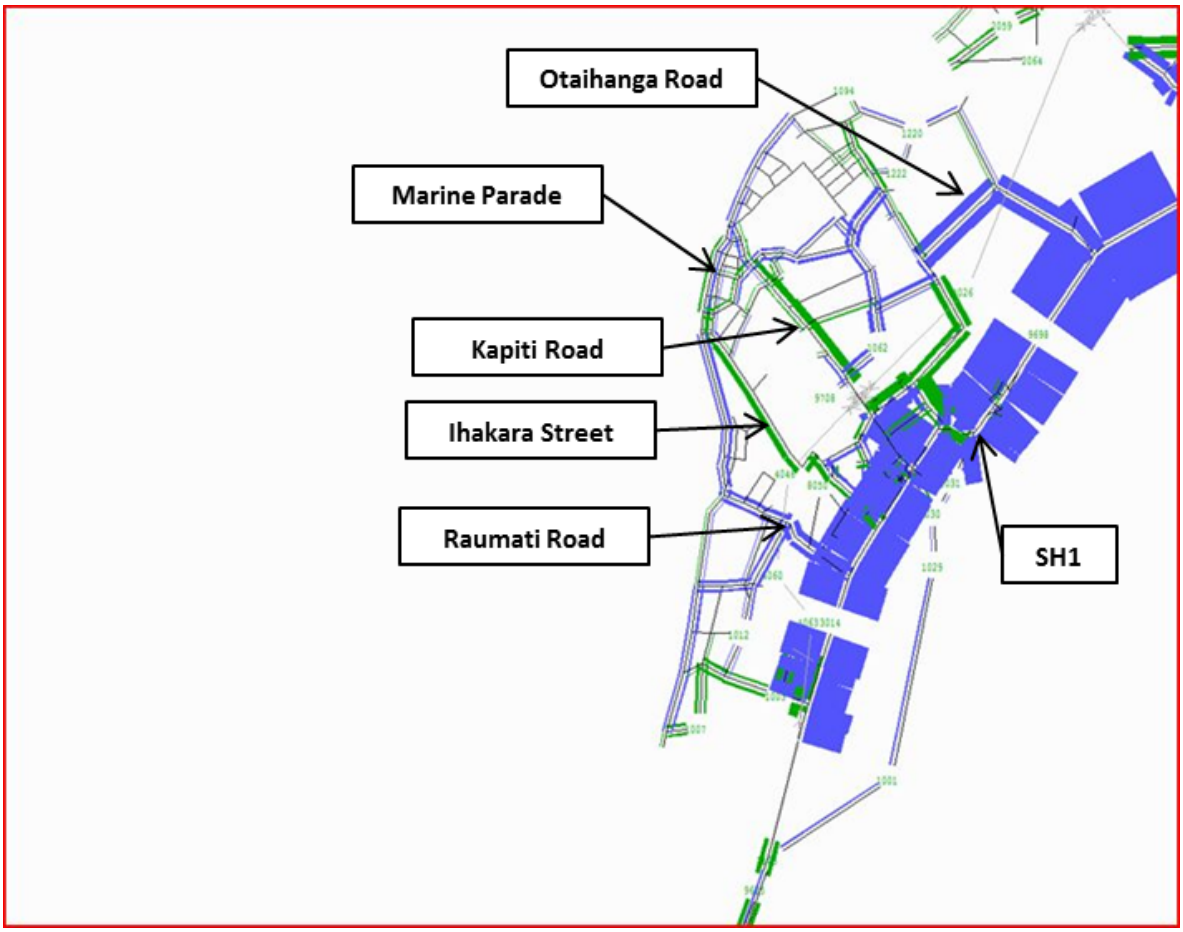

Figure 12.4: Predicted difference in daily flows at Paraparaumu: Do Minimum vs Project at 2026

The Traffic Modelling Report also evaluates travel demands by mode, and traffic volumes by road section.

In summary, the modelling indicates that there will be significant changes in patterns of transportation and traffic demands throughout the District arising as a result of the Project. Many of the changes are positive, and where new pressures relate to the proposed Expressway, upgrading work in the immediate vicinity of interchanges for the Project address these.

Table 12.6: Comparison of 2010, 2016 and 2026 Do Minimum with 2016 and 2026 Project Daily Flows on Selected Local Roads (Two- directional Vehicles per Day)

Location	2010	2026 Do Min	2026 Project	Change b/w 2026 Do Min & 2026 Project
Poplar Ave, East of Matai Rd	2,500	3,300	3,800	15%
Matai Rd, South of Raumati Rd	4,300	5,900	5,300	-10%
Raumati Rd, West of Rimu Rd	13,000	17,800	16,300	-8%
Rimu Rd, South of Kāpiti Rd	19,600	16,100	15,500	-4%
Kāpiti Rd, West of SH1	16,200	18,600	13,700	-26%
Kāpiti Rd, West of Arawhata Rd	24,900	29,400	29,700	1%
Kāpiti Rd, West of Te Roto Dr	15,600	20,800	22,000	6%
Arawhata Rd, North of Kāpiti Rd	7,800	6,500	6,300	-3%
Te Roto Dr, North of Kāpiti Rd	10,300	12,400	12,200	-2%
Realm Dr, North of Guildford Dr	2,900	4,100	3,400	-17%
Mazengarb Rd, East of Guildford Dr	5,300	6,200	5,700	-8%
Ratanui Rd, North of Mazengarb Rd	7,200	7,800	4,800	-38%
Otaihanga Rd, West of SH1	6,500	8,600	5,500	-36%
Te Moana Rd, West of SH1	10,700	13,000	6,200	-52%
Te Moana Rd, West of Walton Ave	5,200	8,100	5,500	-32%
Park Ave, North of Te Moana Rd	1,800	4,500	6,200	38%
Paetawa Rd, South of Peka Peka Rd	900	1,300	1,200	-8%
Peka Peka Rd, West of SH1	1,100	1,300	700	-46%

12.6 Summary of changes in traffic flows

The Project is predicted to change traffic flows on local roads as follows:

- In the majority of cases traffic volumes on local roads are predicted to decrease as a result of the Project. In particular, Kāpiti Road west of SH1, Otaihanga Road, Realm Drive, Ratanui Road, Te Moana Road, and Peka Peka Road west of SH1 are all predicted to have significant decreases in traffic volume as a result of the Project;
- Traffic volumes on Matai Road, Raumati Road, Mazengarb Road, and Paetawa Road are also expected to decrease as a result of the Project;
- Traffic volumes are expected to increase by around 6-9% on Kāpiti Road in the vicinity of the Kāpiti Road Interchange. However, the increase in traffic volume is not expected to significantly adversely impact on the operation of Kāpiti Road;
- Poplar Avenue, east of Matai Road, is expected to experience an increase in traffic of 13-15%. While significant in percentage terms, this results in an increase of only 400-500 vehicles per day due to the relatively low volume of traffic on Poplar Avenue, and will not alter the current nature and character of the road environment, nor cause any significant increase in delay or queuing.

- Traffic volumes on Park Avenue, north of Te Moana Road, are predicted to increase by 38% (1,700 vehicles per day) by 2026, due to Park Avenue being a direct route to the Te Moana Interchange from the Ngarara and Waikanae North development areas. The increase in traffic is not expected to result in any significant delays or queuing. However, it is recognised that the road environment is primarily residential in character with regular property access points. The change in traffic volume could have an impact on the character of the road environment.

Effects on the transport network are outlined in the following sections and are described in detail in Technical Report 32, Volume 3.

12.7 Effects based assessment methods

The two scenarios described above, and the outputs from the models, have been assessed across a range of criteria measuring performance of the transportation network. The traffic and transport models have been used to provide quantitative forecasts to assist in this process.

The criteria assessed are:

- changes in trip patterns (distribution, length, trip induction, mode transfer, time of day);
- traffic impacts analysis (traffic volumes, travel times, overall network performance, interchange performance);
- heavy vehicles (volumes by road sections, travel times);
- route security and trip reliability;
- public transport (patronage, trip patterns, volumes);
- walking and cycling (opportunities, impacts); and
- safety (changes in frequency, severity and location of crashes).

These effects are assessed by identifying conditions for the Do Minimum (without the Project) and then assessing the changes which would occur with the Project in place. Particular attention is given to traffic congestion and traffic volumes, as traffic congestion both increases the total length of travel, and the variability or uncertainty of travel times in the corridor. This means that the planning of journeys becomes increasingly difficult due to uncertainty, resulting in additional and unnecessary costs being borne by travellers and businesses.

The change in traffic volumes on the road also gives an indication of the potential effects on for safety improvements – i.e. the number of crashes predicted due to vehicle exposure.

Some of the traffic and transport information has been used to inform analyses of other effects undertaken by other technical specialists, including acoustics (traffic noise and vibration), air quality (vehicle emissions) and water quality (discharges to the stormwater system from road runoff).

12.8 Operational traffic and transport effects

In 2026, over 20,000 vehicles per day are predicted to use the proposed Expressway between Kāpiti Road and Te Moana Road. The Project will have a number of significant positive effects by 2026, including the following:

- It is forecast that the proposed Expressway will result in a seven minute average improvement in southbound travel times between Peka Peka and MacKays Crossing in the AM peak and a ten minute average improvement in the opposite direction in the PM peak;
- Of the traffic using the proposed Expressway, 88% is predicted to be existing traffic that has migrated to the proposed Expressway, with 12% is predicted to be 'induced traffic '(new travel) forecast as a result of the Project. Traffic volumes on the existing SH 1 and a number of other local roads are predicted to reduce;
- 12-20% of the traffic using the proposed Expressway is predicted to be Heavy Commercial Vehicles, which is consistent with the character of an Expressway and is well within its capacity. It is expected that there will be a significantly reduced volume of HCVs on existing SH1;
- Although not directly forecast by the models (which predict average journey times), travel time variability is known to increase as traffic levels approach the capacity of the network, as expected in the Kāpiti corridor without the Project. Therefore the significant increase in capacity provided as part of the Project is expected to significantly improve journey time reliability;
- Greatly improved travel time reliability arises from reduced congestion, meaning that travellers will have more certainty regarding their expected arrival times at their destination, especially important for freight movements.
- The proposed Expressway is predicted to lead to substantial improvements in journey times across a wide range of routes within the Kāpiti Coast District;
- In the majority of cases, traffic volumes on local roads are predicted to decrease as a result of the Project;
- With the proposed Expressway in place, daily two-way traffic volumes along the existing SH1 between Peka Peka and MacKays Crossing are predicted to reduce by approximately 37% to 46%;
- The proposed Expressway between MacKays Crossing and Peka Peka is predicted to operate at Level of Service B in 2026 (Level of Service B will be achieved if the maximum flow [passenger cars per hour per lane] is less than 1,100 for a facility with a free flow speed of 100kph – see Technical Report 32, Volume 3 for further details).
- Proposed Expressway interchanges at Poplar Avenue, Te Moana Road and Peka Peka Road are all predicted to operate at Level of Service B or better. Analysis indicates that the proposed Expressway interchange with Kāpiti Road will operate at Level of Service C.
- The delays experienced at priority-controlled intersections such as Poplar Avenue, Raumati Road, and Ihakara Street are predicted to reduce significantly;
- Delays experienced by traffic turning onto the existing SH1 from side roads such as Raumati Rd, Rimu Rd and Otaihanga Rd are predicted to substantially reduce as the proposed Expressway draws traffic off the existing State highway, reducing traffic congestion along this route;

- The Project will have neutral to adverse effects by 2026, including the following:
- Traffic volumes are expected to increase by around 6-9% by 2026 on Kāpiti Road in the vicinity of the Kāpiti Road Interchange. The increase in traffic volume is not expected to significantly adversely impact the operation of Kāpiti Road;
- Poplar Avenue, east of Matai Road is expected to experience an increase in traffic of 13-15% by 2026. While significant in percentage terms, this results in an increase of only 400-500 vehicles per day, comparing the Do Minimum scenario with the Project, due to the relatively low volume of traffic on Poplar Avenue. The additional traffic volumes will not alter the current nature and character of the road environment, nor cause any significant increase in delay or queuing;
- Traffic volumes on Park Avenue, north of Te Moana Road are predicted to increase by 38% (1,700 vehicles per day) by 2026. This is due to Park Avenue being a direct route to the Te Moana Interchange from the Ngarara and Waikanae North development areas. The increase in traffic is not expected to result in any significant delays or queuing. However, it is recognised that the road environment is primarily residential in character with regular property access;
- The volume of heavy vehicles is predicted to increase on Park Avenue and Paetawa Road by 60 and 10 vehicles per day respectively. These small predicted increases on Park Avenue and Paetawa Road are not expected to adversely impact on the function of these local roads;

12.8.1 Effects on total travel demand and mode of travel

The Project will result in a number of changes in travel behaviour, arising from reductions in the costs of road travel, improved trip reliability, and improved accessibility. Trip movements which are currently suppressed due to the effects of congestion and lengthy journey times are likely to be released (forecast at 12% of the predicted traffic volumes for the Project), leading to an overall increase in road traffic activity. These are called 'induced' trips and can be viewed as a benefit through individuals valuing the improved accessibility, time savings and / or trip reliability provided by the Project. Technical Report 32 (Volume 3) discusses this in more detail.

The forecast volumes of major travel movements in the corridor for 2026 (summarised in Technical Report 34, Volume 3) indicates that there would be some increase both in the total volume of travel in the corridor and also in the proportion of the travel which is undertaken by road, as a result of the Project.

It is important to note that the effects above would occur because the improved accessibility provided by the Project allows people to travel to the destinations they wish, at the times and using the mode of transport which is most convenient to them. All of these responses have an associated benefit to the travellers concerned and in aggregate, to the region as a whole.

12.9 Effects assessment conclusions

Based on the above effects assessment and mitigation proposed, it is considered that the Project is consistent with the Project Objectives in that:

- The Project is predicted to enhance journey efficiency, safety, and journey time reliability;
- The Project balances inter-regional and local traffic movements, with the proposed Expressway providing significant benefits for both through traffic and local traffic movements;
- The proposed Expressway is predicted to operate at Level of Service B in 2026;
- With the proposed Expressway in place, travel times within the overall network would significantly improve;
- The Project significantly reduces the volume of traffic on SH1, enabling reductions in congestion in the Paraparaumu and Waikanae town centres, and safety benefits;
- All existing principal east-west local link roads would be maintained by the Project, and there are opportunities for providing future linkages across the proposed Expressway.
- The Project has the effect of improving network resilience by providing a second road crossing of the Waikanae River;
- The Project provides a dedicated walkway / cycleway along the proposed Expressway corridor which will enhance connectivity between local communities; and,
- The proposed Expressway provides opportunities to enhance access to rail and bus stations, and options for alternative routes for bus services
- In general the construction traffic effects of this Project are expected to be able to be mitigated acceptably provided the procedures outlined by the CTMP are followed.
- The effects are not anticipated to be significantly greater or unusual compared with other major road construction projects completed in the Wellington region in the last five to ten years. As such, the NZTA has considerable experience and a strong track record of successfully managing the effects of construction on traffic that will be carried through onto the MacKays to Peka Peka Project.

12.10 Measures to avoid, remedy or mitigate actual or potential adverse effects

Project design has incorporated measures and features to avoid, remedy or mitigate actual or potential traffic and transport effects on the wider local and State highway road network.

12.10.1 Pedestrians and cyclists

The Project provides a dedicated walkway / cycleway along the proposed Expressway corridor which will enhance connectivity between local communities. This enhancement is consistent with KCDC's Cycling, Walking, Bridleways Strategy, as well as the Project Objectives. Pedestrian and cycle facilities will be provided at each of the proposed Expressway interchanges to facilitate movement through these key movement nodes.

12.10.2 Public transport

The Project is predicted to result in travel time improvements across the road network which will also be experienced by buses. The proposed Expressway would also provide the potential for new bus routes, such as an opportunity to establish a bus route between Waikanae Beach to Paraparaumu via the

proposed Expressway (along the former WLR route), which is considered to be consistent with KCDC's *Sustainable Transport Strategy* in supporting and promoting modal choice.

The location of existing bus stops on Kāpiti Road and at Peka Peka will be affected. Further design work will be undertaken to develop new, suitable locations for these bus stops as part of CEMP process.

Pedestrian access to rail stations can be assisted once the proposed Expressway is opened, taking advantage of the reduced traffic flows along the existing SH1, which provide the potential for a reduced speed environment to be instituted, and scope for improvements at crossing points along that route.

12.10.3 Property access

The proposed Expressway will affect existing access to a number of properties. The proposed Expressway has been designed to mitigate adverse effects on adjoining properties. The Project design includes provision for alternative access.

12.11 Managing operational traffic effects

While the Project will have significant traffic and transport related benefits to the overall transport network, there are actual and potential adverse effects that may arise from the operation of the network with the Project in place which require management.

Processes for managing these effects are provided primarily through the Land Transport Management Act and implemented by KCDC, GWRC or NZTA.

12.12 Construction traffic and transport effects management

There will be some adverse effects associated with the Project, primarily of a temporary or short term nature, during construction. The following section outlines the measures identified to avoid, remedy or mitigate actual and potential adverse traffic and transportation effects during construction.

During construction, adverse effects arise from construction traffic using local roads for access. The specific routes and locations that may be affected (depending on the chosen construction methodology) have been identified and assessed. Construction traffic effects are set out in more detail in Table 12.8 below.

12.12.1 Construction Traffic Management Plan (CTMP)

In all cases, potential effects will be managed using a CTMP, supported by a number of Site Specific Traffic Management Plans (SSTMPs). Finalisation of these SSTMPs will occur on a case by case basis.

The proposed designation conditions set out the requirements for construction traffic management, and the required contents for the CTMP. The CTMP prepared for this application (refer to CEMP Appendix O, Volume 4) sets out the objectives and procedures required to produce SSTMPs and to manage the actual and potential effects of construction traffic. It details the standards to be adhered to, identifies the objectives in developing SSTMPs and the issues that must be considered, and how the effects of traffic

management methods, and construction traffic on local roads could be managed. Key team members' roles and responsibilities are also included.

The CTMP details the following objectives and methods for the delivery of Temporary Traffic Management (TTM) during the construction of the Project:

- Compliance with the NZTA's Code of Practice for Temporary Traffic Management (COPTTM), 2004. A method for situations where practicably non-compliance or departures from the standard are unavoidable is set out in the CTMP.
- The use of leading industry standards with regard to TTM and safety.
- Minimising disruption on the State highways and local roads, wherever practicable.
- Limiting, where practicable, the number of construction vehicle trips on local roads and obtain access from arterial roads and State highways.
- Maintaining existing flows and travel times on State highways and local roads adjacent to the work site as far as is practicable within overall project needs for safe, efficient and timely construction.
- Minimising the impact of works on vulnerable road users such as pedestrians and cyclists so far as practicable.
- Minimising the effects of construction traffic on local roads used for access so far as practicable.
- Minimising the impact of construction parking so far as practicable.
- Developing SSTMPs having consideration for all key stakeholders (i.e. residents, GWRC and KCDC, emergency services, iwi, and businesses).
- Identifying all issues and have a planned SSTMP submitted to and approved by both KCDC and the NZTA's network management consultant at least five days before implementation is required.
- Providing effective communication to affected parties.
- Implementing TTM that provides stakeholders with information in terms of functionality and clarity of direction of travel through roadwork sites.

These objectives are to be achieved through implementation of the CTMP which manages construction effects, with dust and noise from construction traffic managed through a Construction Noise and Vibration Management Plan (CNVMP) and a Construction Air Quality Management Plan (CAQMP).

Specific means available through the CEMP and CTMP are set out in Table 12.7.

Table 12.7: Proposed methods to manage construction traffic effects

Potential effect	Possible method to avoid, remedy or mitigate potential effect
Passing traffic slowing to view works (i.e. 'Rubbernecking) thereby increasing delays.	■ Screens might be installed to avoid or reduce views of construction work available to passing motorists.
Reduction in capacity on existing roads, increasing travel times and, in some cases, reducing inter-regional travel for short periods of time.	■ For road capacity reduction activities, the timing of these would seek to be targeted to low flow conditions. Where road closures take place targeted communication of these closures and diversions would be undertaken.
Construction traffic on local residential roads leads to potential amenity and safety concerns	■ Utilise the designation alignment as a haul road as far as practicable. ■ Construct alternative access ways where required and practicable. ■ Use minibuses for construction staff access. ■ Manage noise and air quality through appropriate management plans to address amenity concerns. ■ Restrict heavy vehicle movements to avoid school drop off and pick up times. ■ Minor safety improvements implemented where required, such as improved delineation, temporary speed restrictions, and inter-visibility improvements. ■ Restrict heavy vehicle access at uncontrolled intersections of SH1 due to safety deficiencies (visibility and geometric alignment). ■ Develop a maintenance intervention strategy with KCDC as Road Controlling Authority (RCA).
Increased construction traffic movements of both light vehicles and heavier vehicles have adverse amenity and safety effects on local roads.	■ Implement the CTMP. ■ Control construction vehicle movements – for example time of day, day of week etc. Use of the Main Alignment as early as practicable for construction vehicles. ■ Provide controls for traffic movements around shift start / finish to avoid intensive traffic movement periods, including using mini buses to get workers travelling through to construction sites. ■ Upgrade some local roads to accommodate construction traffic. ■ Minor safety improvements / upgrades to local roads in key locations (in consultation with RCA).
Construction traffic may cause shoulder or road closures.	■ Use CTMP to manage traffic, alternative routes and communication.
Construction traffic may cause damage to local roads.	■ Carry out a condition survey of local roads which will be used for access prior to commencement and post-commencement. Work with the KCDC as RCA to identify any necessary repairs prior to the completion of construction contract(s).
Disruption to regional cycle and pedestrian networks during construction, including at Raumati Straight / Main Road, and the Waikanae River Trail.	■ During construction, provide temporary safe and convenient alternative routes for cyclists and pedestrians, which are well sign-posted.
Potential for disruption to pedestrian movements along local roads running east to west across the Project alignment (e.g. Raumati Road, Kāpiti Road, Mazengarb, Te Moana Road).	■ During construction, provide temporary safe and convenient alternative routes for pedestrians, which are well sign-posted.

Table 12.8 identifies matters which will arise over the construction period and into the commissioning period for the proposed Expressway.

Table 12.8: Methods to manage traffic effects related to proposed Expressway commissioning

Identified effect	Method to avoid, remedy or mitigate potential effect
Disruption of property access	■ Design work carried out to finalise detail for alternative access to properties whose existing access is affected by the Project
Bus stops disrupted on Kāpiti Road and at Peka Peka.	■ Detailed design work undertaken to replace bus stops on Kāpiti Road and at Peka Peka. Further design work is necessary to develop suitable alternative locations for these bus stops
Park Avenue residential character changes due to increased traffic volumes.	■ A post-construction survey within two years after commissioning to determine if any traffic calming measures are warranted.
Reduced safety and amenity of the regional cycle network around the tie-ins / intersections including at Poplar Avenue, and SH1 at Peka Peka.	■ Further detailed design to address this by detailing pedestrian and cycle tie-ins with local roads and the dedicated walkway / cycleway as part of CEMP process.
Loss of pedestrian and cyclist accessibility at mid- block locations at Poplar Avenue to Raumati Road, and the Kāpiti Road to Mazengarb Road sections of the Project.	■ Project provision of pedestrian and cycle overbridges for locations where accessibility would otherwise be cut off by the proposed Expressway. NZTA will work with KCDC to put these overbridges in place prior to opening of the proposed Expressway. Overbridges are to be formalised and vested with KCDC.

13 Archaeology and built heritage

Overview

Construction works associated with the proposed Expressway will damage or destroy 20 recorded archaeological sites located within the Project designation, comprising mainly middens, pits and terraces. In addition, construction is likely to result in the modification, damage or destruction of unknown or yet to be identified archaeological sites in discrete areas along the proposed Expressway alignment.

To address the effects on these sites arising from the Project, an integrated and comprehensive set of mitigation measures is proposed, which include archaeological investigations (which comprise systematic site investigations, construction monitoring and an Accidental Discovery Protocol), a detailed geophysical survey of the Takamore urupā and the detailed recording of any archaeological discoveries. Information derived from the archaeological investigations will contribute to an increased understanding of the history of occupation and settlement on the Kāpiti Coast.

With regard to built heritage, adverse effects on listed structures (either scheduled in the Kāpiti Coast District Plan or registered by the New Zealand Historic Places Trust) or on unlisted structures with known historic heritage values resulting from either the construction or operation of the proposed Expressway will be negligible to minor. Further, any effects that might arise during construction will be addressed through the Construction Environmental Management Plan.

13.1 Introduction

Detailed investigations have been undertaken to profile the existing environment in relation to archaeology and built heritage, and to assess the Project's potential impacts on these sites and structures. The reports that contribute to this overall assessment are:

- the Archaeological Scoping Report (Technical Report 9); and
- the Assessment of Built Heritage Effects (Technical Report 10).

These technical reports are included in Volume 3 of this AEE.

Technical Report 9 presents an archaeological assessment of the proposed Expressway and includes sites of Māori origin. This report does not constitute an assessment of Māori cultural values, as there are sites of significance to Māori for their spiritual and traditional values that have no physical remains and therefore cannot be assessed in terms of archaeological value. Information relating to sites of cultural value has been obtained from the Takamore Trust and Te Rūnanga o Āti Awa ki Whakarongotai and is contained in the associated Cultural Impact Reports (Technical Reports 11 and 12 respectively) and discussed in Chapter 14, Volume 2 of this AEE.

13.2 Existing environment – archaeology and built heritage

Within the broad physical setting of the Project, 286 recorded archaeological sites and 10 listed built heritage structures have been identified.[109] However, of this total only 20 recorded archaeological sites are located within the Project designation and no listed built heritage.

13.2.1 Māori occupation and settlement[110]

As discussed in more detail in Chapter 14 of this AEE, various tribal groups, such as Waitaha and Muaupoko, moved into and out of the Kāpiti Coast region up until about 1822, after which point the region was occupied and settled by Te Āti Awa and Ngāti Toa. The period of pre-European occupation and settlement along the coast is predominantly characterised by the following archaeological site types:

- Middens[111] - the area was recognised by early Māori as an environment rich in kaimoana. This is evidenced by the high occurrence of recorded midden and ovens on the sand dunes along the coast, a fact that appears to reflect the major contribution that kaimoana made to the subsistence economy that existed prior to European settlement; and
- Burials[112] - a number of burial sites have been recorded in the area. These are largely located within sand dunes and range from sites where individuals are interred through to more extensive urupā.

The area comprises a number of sites where some excavation or modification of the ground surface has already occurred.[113] These include pits, terraces and platforms largely thought to be used by Māori for habitation or crop storage purposes.

The area north of the Waikanae River, to the west of Greenaway and Te Moana Roads, is an area of historical and cultural significance and contains several sites of archaeological and cultural significance, including:[114]

---

[109] These archaeological sites represent the total number recorded on the New Zealand Archaeological Association's Archaeological Site Recording Scheme database (ArchSite) between Paekākāriki and Peka Peka Road, while the heritage structures represent entries included on the Kāpiti Coast District Plan Heritage Register and the New Zealand Historic Places Trust Register of Historic Places that are situated within one kilometre either side of the centre line of the proposed Expressway alignment.

[110] Further information relating to Māori occupation and settlement is also included in Chapter 14 and Technical Reports 11 and 12.

[111] Middens account for 65% of the total number of recorded archaeological sites within KCDC's boundaries.

[112] Burial sites account for 5% of the total number of recorded archaeological sites within KCDC's boundaries.

[113] Earthworks account for 18% of the total number of recorded archaeological sites within KCDC's boundaries.

- Takamore urupā - the urupā is a burial ground located on a dune ridge top and is part of the larger Takamore wāhi tapu area, an area of high cultural significance to iwi;
- Maketu tree - this is a large macrocarpa growing on the grave site of the tupuna Maketu; the headstone (erected towards the end of the 19th century) is within the bolus of the tree;
- Tuku Rakau village - the village was established by Wiremu Parata in 1849 and occupied until 1886 when it was relocated to Waikanae; and
- Takamore wāhi tapu area - an area of high cultural significance to iwi, which includes the Takamore urupā.

The Takamore Wāhi Tapu Area is registered by the New Zealand Historic Places Trust (NZHPT) and included in its Register of Historic Places, Historic Areas, Wāhi Tapu and Wāhi Tapu Areas.[115] The Maketu Tree, urupā and wāhi tapu are also included in the Kāpiti Coast District Plan Heritage Register.[116] The impact of the Project on the Takamore Wāhi Tapu Area and associated mitigation is discussed in Chapter 14 of this AEE.

13.2.2 European settlement

Prior to the construction of the Wellington-Manawatu Railway in 1886, the Kāpiti Coast was relatively isolated and, as a consequence, European settlement was somewhat limited. Settlement commenced with mission stations such as those that established in Waikanae and Ōtaki in the 1840s, followed by the growth of flax production and sheep farming and the emergence of Ōtaki and Paekākāriki as rural service centres in the 1850s.

The construction of the railway facilitated better access to the Kāpiti Coast, thereby enabling more intensive European settlement to occur at a time when Māori land in the region was being divided into individual titles. A significant proportion of the listed built heritage within the wider Project setting comprises structures and objects from the post-railway construction period onwards.

Of this built heritage, two structures are located in the near vicinity of the proposed Expressway alignment:

- the Greenaway Homestead, 14 Kauri Road, Waikanae – a house constructed in 1911 that was designed by notable architect Cyril Mountfort for Leonard Greenaway, an early settler in the area; and

---

[114] Additionally the sites and places within the precinct are known to be of high cultural and spiritual value to the iwi as discussed in Chapter 14 and Technical Reports 11 and 12.

[115] In January 2012 the NZHPT confirmed an extension of the physical boundaries of the registered Takamore wāhi tapu area in response to an application for review lodged by the Takamore Trust.

[116] This register forms Part I of the District Plan, with entries included on the register protected by associated objectives, policies, rules and standards contained in Parts C and D.

- the former St. Luke's Church at El Rancho, Kauri Road, Waikanae – a timber church constructed in 1896 in the Carpenter Gothic style that was used by the Anglican congregation of Apiti (Manawatu) as a place of worship until relocated to the El Rancho Christian Holiday Camp in 1990.

Both structures are listed on the KCDC Heritage Register, although neither is included on the NZHPT Register of Historic Buildings, Historic Areas, Wāhi Tapu and Wāhi Tapu Areas.

In addition, a further contemporary structure, the Stringer 'Wind Rain' House,[117] was identified by the NZHPT as being of potential historic heritage value. It is located in Raumati and is sited in close proximity to the proposed Expressway alignment.

Although the structure is not currently listed in either the Kāpiti Coast District Plan Heritage Register or the NZHPT Register of Historic Buildings, Historic Areas, Wāhi Tapu and Wāhi Tapu Areas, it has been assessed by an architectural conservator and is considered to have local to regional significance (in terms of architectural and technological values) as the second of two vernacular 'Wind Rain' houses on the Kāpiti Coast designed by well-regarded Auckland architect Nigel Cook.

13.3 Assessment of effects on archaeology and built heritage

Adverse effects on archaeology will occur as a consequence of the construction and operation of the proposed Expressway. The actual or potential effects of these activities on built heritage, particularly the Greenaway Homestead and the former St. Luke's Church, has been assessed as negligible to minor with the exception of the Stringer 'Wind Rain' House, which is located within close proximity of the proposed Expressway.

Actual or potential adverse effects on archaeology and built heritage arising from the Project that have been identified are:

- the destruction, modification or damage of archaeological sites arising from construction of the proposed Expressway; and
- noise, visual, vibration and amenity effects on built heritage arising from the construction and operation of the proposed Expressway.

[117] 'Wind/Rain Houses' are buildings designed around a glazed, environmentally controlled central core. The core, expressed as a courtyard, is both the living and circulation space for the house and air-flow is controlled by a computer through externally located sensors that monitor the weather, temperature and humidity. The glazed cladding provides protection from the wind and rain, hence the name.

13.3.1 Archaeological site destruction or damage

Construction works will result in the 20 recorded archaeological sites located within the Project designation being damaged or destroyed. The sites affected are as follows:

Site No.	Location	Description
R26/369	Mazengarb Road to Waikanae River	Possible pit and terraces
R26/370	Mazengarb Road to Waikanae River	Midden and two possible terraces
R26/409	Mazengarb Road to Waikanae River	Midden/oven
R26/455	Mazengarb Road to Waikanae River	Possible terrace
R26/368	Waikanae River to Te Moana Road	Midden
R26/281	Waikanae River to Te Moana Road	Te Rakau village site
R26/38	Te Moana Road to Ngarara Road	Midden
R26/39	Te Moana Road to Ngarara Road	Midden
R26/363	Te Moana Road to Ngarara Road	Midden
R26/365	Te Moana Road to Ngarara Road	Group of 6 terraces, possible pit and dense midden
R26/429	Te Moana Road to Ngarara Road	Platform
R26/431	Te Moana Road to Ngarara Road	Midden
R26/430	Te Moana Road to Ngarara Road	Pit and midden
R26/433	Te Moana Road to Ngarara Road	Platform, pits and terraces
R26/70	Ngarara Road to Peka Peka Road	Midden
R26/366	Ngarara Road to Peka Peka Road	Midden and possible terrace
R26/373	Ngarara Road to Peka Peka Road	Platform and midden
R26/377	Ngarara Road to Peka Peka Road	Terrace and depression
R26/447	Ngarara Road to Peka Peka Road	Terrace
R26/448	Ngarara Road to Peka Peka Road	Eel channel

Significant efforts were made to avoid known and recorded archaeological sites during the process of identifying and designing the proposed Expressway alignment. However, absolute avoidance was not practicable given the requirements of the Project and the archaeological profile of the Kāpiti Coast, one which is characterised by a concentration of archaeological sites throughout the area's extensive dune system.

In addition, the predictive model developed as part of the archaeological assessment of the Project indicates that construction is also likely to result in the damage, modification or destruction of unknown or yet to be identified archaeological sites in certain areas along the proposed Expressway alignment (for example, the area between Te Moana Road and Ngarara Road).

Again, total avoidance is not practicable as:

- the likelihood that unknown and unrecorded archaeological sites are present in the dunes within these areas is high; and
- the precise location of these sites is not known as they are not visible on the ground surface.

13.3.2 Effects on built heritage

The construction and operation of the proposed Expressway will generate noise, visual and vibration effects that may affect the amenity values of the surroundings of the three structures of recognised historic heritage values: the Greenaway Homestead, the former St Lukes Church and the unlisted Stringer 'Wind Rain' House.

In respect of the first two structures, factors such as topography, the extent of existing on and off-site vegetation and proposed landscape planting and noise bunding will collectively contribute towards mitigating the effects of the proposed Expressway on the amenity values of these buildings and their surrounds. Further, any noise or vibration effects that might arise during construction will be avoided or mitigated through the CEMP (Appendix F). While the presence of the proposed Expressway will be noticeable from these sites, the effects would have negligible to minor effects on the historic heritage values of the buildings.

In regard to the Stringer Wind Rain house, the building is located approximately 5 metres from the edge of the designation and 25 metres from the edge of the proposed Expressway. Consequently, the ambience and general amenity associated with the house and its setting will be compromised due to traffic noise and the loss of a large part of the garden for proposed Expressway purposes.

13.4 Measures to avoid, remedy or mitigate actual or potential adverse effects on archaeology and built heritage

To address the effects on archaeology and built heritage identified in Sections 13.3.1 and 13.3.2 of this AEE, a range of measures are proposed. In addition, archaeological authorities under Part 1 of the Historic Places Act will be sought for the Project prior to construction and an archaeological management plan is likely to be required as an associated condition of these authorities.

13.4.1 Archaeological site destruction or damage

As the adverse effects of the Project on actual and potential archaeological sites within the proposed designation will be significant, an integrated and comprehensive set of mitigation measures is proposed as follows: [118]

a. Archaeological investigations

Archaeological investigations are likely to be a condition of any authorities granted for the Project under Part 1 of the Historic Places Act, and will help to inform associated archaeological mitigation measures implemented under the RMA. Two types of archaeological investigation are proposed to be undertaken during the course of the Project:

[118] Further complementary measures are also outlined in Chapter 14.

- **Systematic investigations of discrete sections of the proposed Expressway that have a high archaeological probability**. The investigative work would be undertaken by a team of archaeologists and take place prior to construction. It would comprise an extensive and detailed analysis of archaeological features present within each of the relevant sections of the proposed Expressway. The information derived will facilitate an increased understanding of the physical, spatial, temporal, social and functional relationships between all the sites within an area. The associated value of this type of investigation is that it enables data to be gathered from a large number of archaeological sites, and for the values of these sites to be analysed on a collective as opposed to sporadic site–by-site basis; and
- **Monitoring** during the course of constructing sections of the proposed Expressway that have a low to moderate archaeological probability, and where archaeological site density is not anticipated to be high. Such monitoring would enable any archaeological sites encountered to be recorded and sampled during construction although not to the same level of detail as the systematic investigations referred to above.

Additionally, work in areas of very low archaeological probability will be undertaken under the direction of an Accidental Discovery Protocol for the Project developed in consultation with the NZHPT, Te Āti Awa ki Whakarongotai and the Takamore Trust.

b. Roadside interpretation

A series of fixed interpretation panels are proposed to be developed in conjunction with iwi that reflect the story of the history of human occupation of the Kāpiti Coast, as seen through the archaeological resource and cultural tradition which are linked visually to the landscape (for example, the Takamore cultural precinct, sand dunes and wetlands). The intention is that the panels will be placed at significant or strategic locations along the proposed cycleway/walkway to enhance the experience of users.

However, where individual archaeological site investigations yield significant information specific to that place it may also be appropriate to include additional panels at or near to these locations.

c. Travelling stories

In addition to the fixed interpretive panels a set of complementary portable panels relating to the history of occupation on the Kāpiti Coast are also proposed. As these panels are intended to be moveable they have the potential to be displayed in a variety of community locations, such as marae, schools, or the local library or civic centre.

d. Geophysical Survey and Recording at Takamore Urupā

Subject to the agreement of the Takamore Trust, a detailed geophysical survey could be undertaken at the Takamore urupā. Such a survey would facilitate the following:

- The identification and physical marking of currently unmarked burials of tūpuna. These could be marked on the ground surface with pegs or similar to indicate their location and the extent of unused ground that could be made available for further burials; and

- the precise cadastral boundary of the urupā to be marked out on the ground with tape or similar instead of relying on the current fence line as a proxy.

13.4.2 Noise, visual, vibration and amenity effects

The effects from noise, dust and vibration associated with the construction of the proposed Expressway on the amenity values of the surroundings of the two listed buildings will be managed through the implementation of the CEMP. The adverse noise, visual, vibration and amenity effects of the operation of the Project on the surroundings of the two listed buildings will be mitigated through the acoustic and landscape treatment measures proposed along that section of the proposed Expressway.

In regard to the effects on the amenity values on the surroundings of the Stringer 'Wind Rain' House, there are a number of options available:

- Demolition;
- A change in its use to an activity that is not as sensitive to noise; or
- Its relocation, preferably to another location on the Kāpiti Coast.

The NZTA is proposing to work with the NZHPT to identify the best outcome, assessing the costs of the options with the relative values of the building.

14 Tangata Whenua and cultural heritage

Overview

An environment rich in natural resources with a benign climate, the Kāpiti Coast has long been an area of Māori settlement. The proposed Expressway traverses a significant cultural landscape, containing wāhi tapu and areas and features of cultural importance.

The NZTA has been engaging with Kapiti Coast iwi, hapu and whanau groups as well as affected Māori land owners to seek Māori perspectives on the proposed Expressway. This engagement has been premised on the principles of the Treaty of Waitangi; in particular, the principles of good faith, cooperation. The feedback received during this engagement informed decisions made on the alignment options, the proposed design and associated mitigation measures.

Te Āti Awa ki Whakarongotai are the predominant tribal group (tangata whenua) within the affected area, their tribal boundary extends from the Whareroa Stream (in QE Park) to the Kukutauaki Stream (Peka Peka). The NZTA has developed and maintained a strong working relationship with Te Rūnanga o Āti Awa ki Whakarongotai Inc who are the mandated iwi authority for Te Āti Awa ki Whakarongotai and the administrative body of iwi estates and assets. Te Rūnanga also deals with political and public issues of national and local interest through the management of relevant activities such as Treaty of Waitangi claims, resource management matters, and relationships with central and local government.

The NZTA has also developed a strong working relationship with the Takamore Trust, the body mandated to manage the interests of Te Āti Awa ki Whakarongotai in regard to the Takamore wāhi tapu and the wider cultural values of the vicinity (referred to as the Takamore Cultural Heritage Precinct).

This Chapter is an articulation of the impacts on cultural heritage values as set out in the two cultural impact assessments prepared for this Project. This Chapter is also informed by the feedback received through the extensive engagement process undertaken by NZTA with iwi on the Kapiti coast. The Chapter will conclude with an overview of the mitigation proposed to ameliorate these impacts.

Over the course of developing and designing the proposed Expressway, the NZTA has also consulted with representatives of other iwi groups, including Ngāti Toa, Ngāti Raukawa and Muaupoko.

14.1 Introduction

This Chapter provides an overview of the NZTA's engagement with ngā iwi Māori o te tai o Kāpiti (iwi of the Kāpiti Coast) in identifying and assessing the impacts of the proposed Expressway on cultural heritage values to inform the process of selecting alignment options, developing the proposed Expressway design, and determining appropriate mitigation.

It draws on the information and findings of the cultural impact assessments (CIA's) prepared by Te Rūnanga o Āti Awa ki Whakarongotai Inc and the Takamore Trust, which record their information, values and views of the M2PP expressway which in turn has informed the NZTA's development and selection of the proposed alignment, design and mitigation measures for the Project. The CIAs have also helped to identify the effects of the Project on cultural values and to inform the assessment of those effects under the RMA

The NZTA has developed strong working relationships with the iwi representative groups affected by this proposal and has developed a number of mitigation proposals to address the impacts of the Project on culturally sensitive sites and places. The process of engagement is ongoing, and has been assisted by the input of delegates from the iwi appointed working groups, in particular the Te Rūnanga o Āti Awa ki Whakarongotai Inc and Takamore Trust. This relationship will continue through the subsequent phases of the Project.

This Chapter provides an overview of the engagement process that has been followed to date, the identified impacts and proposed mitigation measures.

14.2 Existing cultural environment

14.2.1 Background

The proposed Expressway described in Part D of the AEE has been presented to and discussed with the following iwi groups:

- Ngāti Toa Rangatira
- Ngāti Haumia
- Te Āti Awa ki Whakarongotai
- Takamore Trust
- Muaupoko
- Ngāti Raukawa
- Nga Hapu o Ōtaki

The NZTA recognises Te Āti Awa ki Whakarongotai as the manawhenua (traditional/ contemporary tribal authority) in the Project area, and that the proposed Expressway will affect the traditional tribal takiwā of Te Āti Awa ki Whakarongotai, the detail of which is outlined in the sections that follow.

The tribal takiwā contains an area of particular cultural significance, upstream from the estuary of the Waikanae River in the vicinity of Puriri Road, part of which is registered under the HPA as the *Takamore Wāhi Tapu* Area.[119] The Takamore Trust is mandated to represent tribal and beneficial interests within

[119] In January 2012 the NZHPT confirmed an extension of the physical boundaries of the registered Takamore wāhi tapu area in response to an application for review lodged by the Takamore Trust

this area.[120] To address the potential impacts of the proposed Expressway on this wāhi tapu area, the NZTA independently engaged with the Takamore Trust. The respective jurisdictions of each of these groups is illustrated in Figures 14.1 and 14.2.

Te Āti Awa ki Whakarongotai and the Takamore Trust were commissioned to prepare two separate Cultural Impact Assessment (CIA) reports which outline the specific concerns of the groups respectively in relation to the proposal:

- Cultural Impact Assessment – MacKays to Peka Peka Expressway, Te Rūnanga o Āti Awa ki Whakarongotai Inc, July 2011, prepared by Daniel Mullen; and
- Cultural Impact Assessment – MacKays to Peka Peka Expressway, Takamore Trust, July 2011, prepared by Ben Ngaia (Trust Chairman).

These assessments are included as Technical Reports 11 and 12, Volume 3 of the AEE. They were prepared to assist the NZTA to understand the perspectives of iwi from a cultural/kaupapa Māori standpoint and to address the following issues:

- Impacts on cultural heritage;
- Environmental impacts;
- Cultural health effects; and
- Impacts on Māori land.

14.2.2 The cultural landscape

14.2.2.1 Māori settlement history[121]

Māori tribal connections with the Kāpiti Coast are founded on relationships formed out of occupation, settlement and use of the ancestral landscape over hundreds of years. The Kāpiti coast has always been a highly desirable place to live because of its abundant natural resources and benign climate, and, although the exact date of the first people living on the coast is not known, radiocarbon dating suggests people were present on the Kāpiti Coast by the 14th century.

In Māori tradition, it is recorded that the voyager Kupe came to Te Whanganui a Tara (now known as Wellington Harbour) as part of his extensive travels.

Among the earliest of indigenous inhabitants of New Zealand, and ancestor of the northern iwi that would migrate and settle on the Kāpiti Coast, was the renowned explorer Whatonga. Whatonga was the grandson of Toi who, like his grandson, is attributed in many tribal narratives as having explored and named many of the areas and landscape features throughout New Zealand. Settlement of the lower

[120] The Takamore Trust is a customary trust formed pursuant to s333 of *Te Ture Whenua Māori Act 1993*

[121] For a more comprehensive overview of Māori settlement on the Kapiti Coast refer to Technical Report 11, Volume 3 of the AEE

North Island was undertaken by peoples who claimed descent from Whatonga. These included Ngai Tara, Rangitane, Muaupoko and Ngāti Apa. These iwi extended out from Wellington over to Porirua Harbour and along the western coast of the lower North Island. At the beginning of the nineteenth century, the Kāpiti Coast was generally occupied by the Muaupoko and Ngāti Apa peoples.

Whatonga had a son named Tara who migrated from his birth place in the Hawke's Bay to the Wellington region. Tara established his settlements in and around the harbour, and it is from him that the name for Wellington is taken – Te Whanganui a Tara - the great harbour of Tara.

The descendants of Tara – Ngai Tara were later joined by Ngāti Ira a related iwi group from the East Coast. These iwi were later joined by Muaupoko a sub-tribal group of the Rangitane and also descendants of Tara. Muaupoko resided mostly in the northern areas of the harbour and were settled along the Kāpiti Coast at the time of the migrations of Taranaki iwi from the west coast of the North Island in the early 1800s.

By the late 1820s, Ngāti Raukawa, who had close links with Te Rauparaha, came to the Horowhenua coast from Waikato and, in 1832, other northern Taranaki people also moved south. The increased numbers of people and their various interconnections created tension among the Kawhia and Taranaki groups located on the western coast, especially as Ngāti Raukawa had traditionally been enemies of northern Taranaki iwi.

The phases of migration from Taranaki to the Kāpiti Coast according to Ngāti Awa tribal tradition are as follows:

1821	Te Heke Tahutahu
1822	Te Heke Tataramoa
1824	Te Heke Niho Puta
1827	Te Heke Taranaki
1828	Te Heke Whiri-Nui
1832	Te Heke Tama – Te Uaua
1833-34	Te Heke Paukena, Te Heke Hauhaua
1835	Te Heke Mutunga – Te Puoho

As a result of the successive migrations of Taranaki iwi to the Kāpiti Coast, the population swelled. This resulted in pressure on the availability of natural resources, which in time culminated in tensions and warfare between the tribal groups in the Kāpiti and Horowhenua regions.

By 1834, these tensions erupted into a battle (referred to as Haowhenua) which took place in the Ōtaki district between Ngāti Raukawa and Taranaki iwi. These groups were assisted by several others including different Ngāti Toa hapu on each side. Although the outcome of the battle was inconclusive, it signalled the end of the general alliance that existed between the northern migrants.

By 1839 intertribal warfare between the Kawhia and Taranaki groups was reignited on the Kāpiti Coast. The impetus for the resurgence of hostilities was an exchange of insults between Ngāti Raukawa and Ngāti Awa following the death of a ranking Ngāti Toa chieftain – Waitohi. This was preceded by some

members of Ngāti Ruanui being killed when a party of Ngāti-Raukawa came to stop them building a house at Whanganui and a fight ensued. The chiefs of the former tribe killed were Te Pu-takarua, Te Matoe, and Te Hau-maringi, and many were taken as slaves—men, women, and children. Many lives on both sides were lost in the battle of Te Kuititanga, much of the fighting occurred in and around the Pā - Kuititanga and Kukutauaki north of the Waimea River (now the Waimeha Stream). At the conclusion of the battle, the Ngāti Raukawa invaders were repulsed and returned to their settlements in Ōtaki.

The battle of Kuititanga was observed and events recorded by Colonel William Wakefield onboard his ship – *Tory*, which at the time was anchored off the Kāpiti Coast.

14.2.2.2 European settlement on the Kāpiti Coast

The *Tory* was a New Zealand Company vessel dispatched to New Zealand for the express purpose of purchasing land from Māori and facilitating settlement of British settlers. In the late 1830s the *Tory* was anchored off the Kāpiti Coast and, amongst its passengers were New Zealand Company officials such as Colonel William Wakefield and his nephew Jerningham Wakefield who were actively negotiating land sales with Kāpiti Coast iwi. Many iwi were eager to sell tracts of land at this time as exchange for new technology and weapons such as muskets, both of which were regarded as critical to the advancement and protection of their communities. By the 1840s, the Kāpiti Coast had become a highway for the transportation of goods, services and people between Wellington and northern settlements. Trade was conducted on a mutually beneficial basis between iwi and European migrants; it was at this time that missionaries were also actively converting Māori to Christianity.

The battle of Te Kuititanga was followed by the arrival of a very important figure in the history of the Kāpiti Coast; in 1840, Octavius Hadfield of the Church Missionary Society was dispatched from Wellington to the Kāpiti Coast to assist in settling hostilities between resident iwi groups and to convert their willing tribal members to Christianity. By late 1841, he was ministering to about 7,000 Māori on both sides of Cook Strait and in charge of 18 mission schools. Often resolving disputes among Māori, he became widely respected.

Hadfield was also instrumental in facilitating engagement between Crown representatives and Kāpiti Coast iwi regarding the signing of the Treaty of Waitangi, and from 1840 to the 1860s became a principal advocate for Māori Treaty rights. He resided in Kenakena Pa and, in 1849, with the assistance of Te Āti Awa built the first church at Kenakena, to the south of the Waikanae River estuary.

14.2.2.3 Schedule of significant sites and places

The Te Āti Awa ki Whakarongotai and Takamore Trust Cultural Impact Assessments identify a series of sites of cultural heritage significance within the Project area, a number of which are either directly or indirectly affected by the route of the proposed Expressway. The values associated with these sites are either of a tangible or intangible nature, some of which are of wāhi tapu significance. Although many of these sites or places are either no longer identifiable or are not recorded in the New Zealand Archaeological Association (NZAA) site recording scheme (ArchSite), they are still afforded a high level of collective recognition and value by local iwi, hapu and whanau.

The following lists identify the types of sites and places potentially affected by the proposed Expressway:

Traditional Settlements – Pā and Kainga

- Whakarongotai Marae - Waikanae
- Tuku Rakau Village
- Kaitoenga Pā
- Arapawaiti Pā
- Peka Peka Pā
- Waikanae Pā
- Waimea Pā
- Kuititanga Pā
- Pikeho Pā
- Kaiwarehou Pā
- Kaitoenga Pā
- Taewapaharahara Pā
- Te Rere Pā
- Upokotekaea Pā
- Taiwapirau Pā
- Te Maumaupurapura Pā

Cultivation Areas

- Pukekawa and Te Rere cultivation areas – Waikanae

Wāhi Tapu Areas – Urupā

- Takamore Urupā
- Takamore Registered Wāhi Tapu Area
- Maketu Tree
- El Rancho Christian Holiday Park – burial sites
- St Luke's Church and Urupā – Waikanae

Ecological Areas/Features

- QE Park – significant dune features and undisturbed centre of settlement and cultivation
- Ngā Manu Nature Reserve – Native forest and swamplands
- Wi Parata Reserve – Kohekohe Forest
- Lindale – Nikau Forest

Figure 14.1: Sites and Areas of cultural significance to Māori within the Project area

These sites and places are regarded as spiritually important to the iwi, hapu and whanau of Te Āti Awa ki Whakarongotai. As such, the iwi promote the protection of the cultural values ascribed to these sites (wāhi tapu, wāhi taonga, mauri) and their sustainable and collective management in perpetuity.

14.2.2.4 Wāhi Tapu/Wāhi Taonga values

Throughout 2010 and 2011, the Project team met regularly with representatives of Te Āti Awa ki Whakarongotai and the Takamore Trust to discuss the Project and associated impacts on sites and places of cultural heritage significance. Engagement with Te Āti Awa ki Whakarongotai has been ongoing since 1997 following KCDC's announcement that the Wellington-Foxton motorway designation (instituted in 1956) would be used for a two lane local purposes road. The requirement for designation of the Western Link Road was issued by KCDC in December 1997. This recent series of engagements for the proposed Expressway has included meetings with the Te Āti Awa ki Whakarongotai Kaumatua Committee, the Te Āti Awa ki Whakarongotai Expressway Committee, and the Takamore Trustees as well as hui a iwi (general tribal meetings).

The general feedback from iwi representatives at these meetings centred primarily on the impact on sites of cultural heritage importance during the construction phase of the proposed Expressway, as well as the cumulative effects on other important sites and places within the wider landscape. Of particular concern was the effect that the Project might have on the spiritual attributes of these sites and places, and if this was a factor to be considered by the decision makers in assessing environmental effects.

There was a general concern among iwi that the spiritual implications of the proposal had not been properly assessed to date, and a strong view expressed on this inadequacy that the assessment of effects must afford consideration of the impacts on spiritual health – te taha wairua – and its corresponding impact on cultural/physical health – te taha tinana.

What underlies these concerns are the fundamental concepts within the Māori worldview that govern the rules and regulations for the appropriate use and exploitation of natural and physical resources, including the following:

- **Whakapapa** (defining the relationship between people and the environment)
- **Mauri** (the life-force of all animate and inanimate things)
- **Wairuatanga** (spiritual wellbeing)
- **Whanaungatanga** (relationships between people)
- **Manaakitanga** (support and care for people)

These concepts and values, in turn, exist within a cultural framework of knowledge and understanding which can be defined as follows:

- **Te Taha Tinana** – The material or physical state (matters which are observed and identified);
- **Te Taha Hinengaro** – The mental or intellectual state (requires consideration of the whole system, with all processes, as opposed to parts in isolation);

- **Te Taha Wairua** – The spiritual state (concerns matters not measured by conventional means – the spiritual dimension); and
- **Te Taha Whanaunga** – The related/associated state; matters which are understood through experience (trial and error).

The potential impacts of the proposed Expressway on these values relative to the sites and places of significance to iwi within the Project area were explored with representatives of Te Āti Awa ki Whakarongotai and the Takamore Trust throughout 2011, as were possible measures to address such impacts. A progressive series of mitigation proposals were developed over that period which seek to ameliorate impacts on tangible sites of importance to local iwi, hapu and whanau and to address the broader effects on intangible values. An important principle behind such considerations was how to protect or enhance the relationship of iwi with their wāhi tapu and wāhi taonga. The methodology for developing these mitigation measures was informed by Matauranga Māori.

14.3 Assessment of effects on Tangata Whenua

14.3.1 Background

This assessment of effects on cultural heritage values is supplementary to, and draws upon, the CIAs prepared by Te Rūnanga o Āti Awa ki Whakarongotai Inc and the Takamore Trust. In particular, it:

Identifies tangata whenua considered likely to be affected by the Project;

Assesses how the proposal could affect the relationships and values of identified Tangata whenua, based on the issues identified in the CIAs, as well as feedback provided through consultation and engagement with iwi; and

Outlines how measures to avoid, remedy or mitigate the potential effects were considered in the options assessment process used to determine the final alignment and design of the proposed Expressway.

In addition to the CIAs, sources of information used in this assessment included a review of existing literature and other documentation from published and unpublished sources. Information was also obtained through site visits and a marae noho, held in August 2010 at Whakarongotai marae, Waikanae.

14.3.2 Methodology

Identifying the physical impacts of activities associated with road construction on cultural heritage sites and places is a relatively straight forward process. However, understanding the implications of these impacts on cultural heritage values necessitates a comprehensive analysis of the framework of knowledge that defines these values otherwise known as Matauranga Māori.

As identified in section 14.3.2, the proposed Expressway will affect, to varying degrees, a number of sites and places of cultural heritage significance. It is important to note that, from a matauranga Māori standpoint, these sites and places are inextricably interlinked and comprise a highly significant cultural landscape. In assessing the effects of the proposed Expressway, great care has been taken to

acknowledge that each individual site forms part of a network of interconnected sites that, like a jigsaw, piece together the settlement history and traditions of local iwi, hapu and whanau.

As discussed above, in identifying the impacts of the proposed Expressway on cultural heritage values, the Project team undertook extensive engagement with tangata whenua.

The following activities were identified as concerns by the tangata whenua:

- disturbance or modification of traditional and ancestral sites, including Tuku Rakau village;
- construction activities near marae or kainga (settlement) – Whakarongotai marae;
- activities near or on urupā – Takamore, Maketu Tree and the urupā at St Luke's Church
- discharges (particularly of waste) to water and air;
- other activities potentially compromising the purity or mauri (spirit / life-force) of waters (inland, coastal or offshore);
- any activities potentially compromising the integrity of or access to food resources (mahinga kai) and food gathering areas, wetlands, rivers and tributaries;
- any activities potentially compromising access to natural resources, such as timber, stones, flax, and fish ; and
- any activities that disturb indigenous flora and fauna, such as the clearance of bush or damming or diversion of waterways.
- Any incursions into the registered Takamore wāhi tapu area.

Subsequently, constraints maps were prepared that identified and located a series of significant cultural heritage sites, and Te Āti Awa ki Whakarongotai and the Takamore Trust were contracted by NZTA to prepare separate CIAs for the Project: the Te Āti Awa ki Whakarongotai CIA addressed impacts within their tribal jurisdiction (refer Figure 14.2), whereas the Takamore CIA focused on those impacts specifically within the area of land referred to as the Takamore Cultural Heritage Precinct (see Figure 14.3). The information derived from these assessments was then used to inform the decision-making processes on alignment and design options.

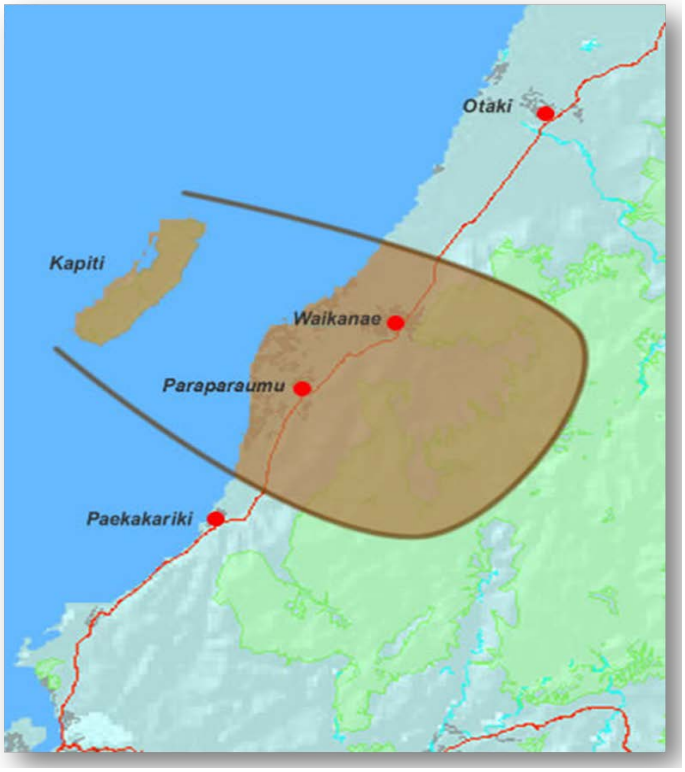

Figure 14.2: Te Āti Awa ki Whakarongotai – Traditional Tribal Takiwa

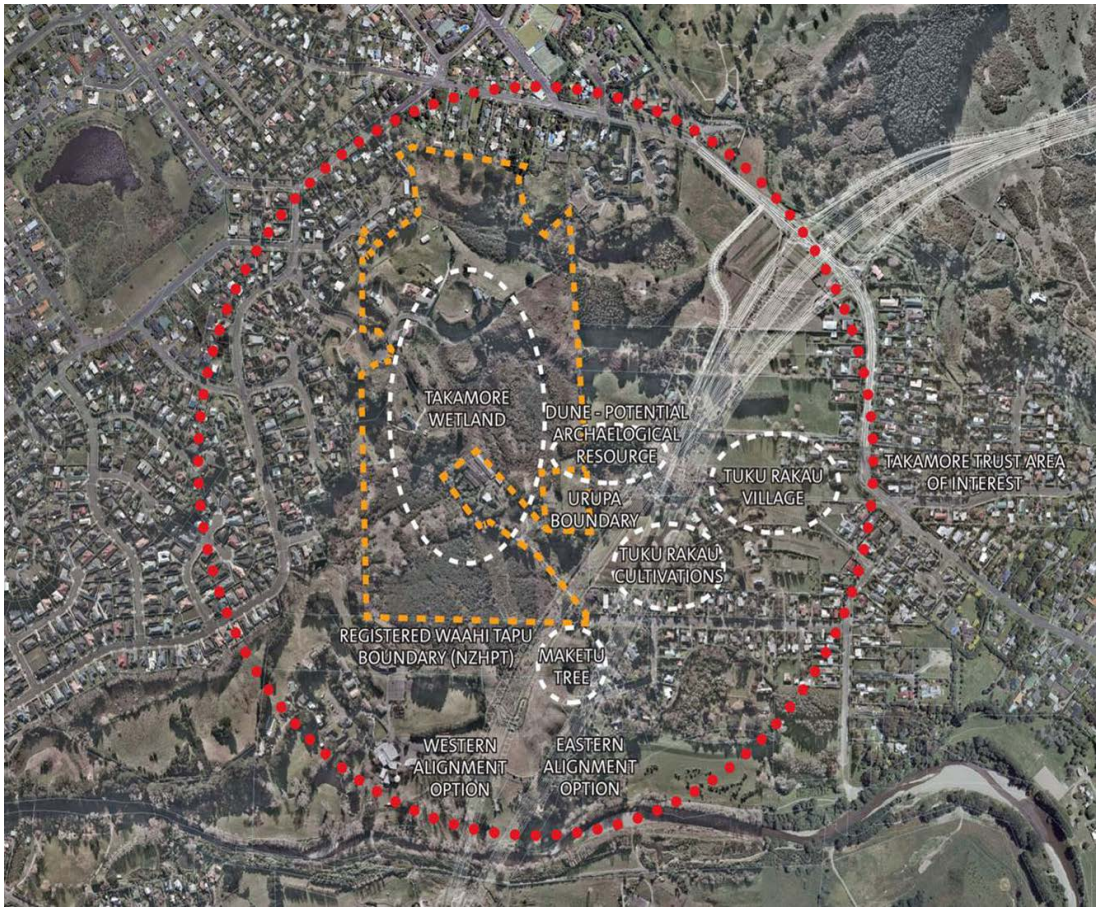

Figure 14.3: The Takamore Cultural Heritage Precinct

The framework for assessing the potential cultural health impacts of the Project was through the application of Professor Mason Durie's model for the assessment of health impacts titled *Te Pae Mahutonga*.

In 1999 Ta Mason Durie (Assistant Vice Chancellor Māori, Massey University) submitted a paper to the *Health Promotion Forum of New Zealand Newsletter* titled *Te Pae Mahutonga – A Model for Māori Health Promotion*. In this article, Professor Durie explored the connections between environmental health and the well-being of Māori communities generally. Professor Durie suggests that the key determinants of cultural health such as identity, environment, and economics are inextricably interlinked and must be understood as a whole when assessing the status of Māori health in contemporary New Zealand society.

Professor Durie's model was applied and appropriately tailored to assess the impacts of the proposed Expressway route and alignment options. Durie's model for assessing the status of Māori cultural health comprises the following key concepts:

Table 14.1: Māori Concepts of Health

Mauriora Strong Cultural Identity	Mauriora rest on a secure cultural identity. Good health depends on many factors but among indigenous the world over cultural identity is considered to be a critical prerequisite. De-culturation has been associated with poor health, whereas acculturation has been linked to good health. A goal of health promotion therefore is to promote security of identity.
Waiora Environmental Protection	Maintaining high standards of environmental protection and quality are linked to both individual and community good health. Therefore, health promotion must take into account the nature and quality of the interaction between people and their surrounding environment.
Taiora Physical Health/ Wellbeing	Taiora relates to reducing risks to health from various real and potential impacts, this may include; ensuring water is free from pollutants, air can be breathed without fear of inhaling irritants or toxins, noise levels are managed, people can freely engage with the environment.
Te Oranga Participation Engagement Development	It is well recognised that health promotion is interlinked with socio-economic circumstances, whilst identity and environmental quality are important to cultural health it is the ability to engage and input into decisions that affect ones community that strengthen ones sense of well being. Health promotion is about enhancing the levels of wellbeing, te oranga, through increased participation in society.[122]

The various impacts that were identified throughout the engagement process with Tangata Whenua included:

[122] Health Promotion Forum of New Zealand Newsletter - Te Pae Mahutonga- A Model for Māori Health Promotion. (M. Durie)

Table 14.2: Cultural Impacts

Cultural Landscape	Heritage	Environment	Construction
Landscape features Natural heritage Reserves	Wāhi tapu Wāhi taonga Archaeology	Water Wetlands Ecology Bio-diversity	Visual Noise Dust Vibration Sedimentation
Treaty Claims	**Land**	**Communication**	**Engagement**
Existing claims New claims	Māori freehold General land	Protocols Relationship agreements	Current and future Opportunities

14.3.3 Cultural landscape

In order to fully appreciate the concerns of manawhenua (ahi kaa) and tangata whenua, regard must be given to the cultural landscape and the connection between environmental features and cultural identity. In accordance with matauranga Māori, all things both animate and inanimate are infused with a life force (mauri) and are bound though a web of kinship (whakapapa). The ability to connect to one's surroundings and to identify with landscape features is fundamental to Māori culture and traditions. The cultural heritage of Te Āti Awa ki Whakarongotai and wider iwi interest groups is tied to the land and water of the Kāpiti Coast. The footsteps of their ancestors (ngā tapuwae tipuna) are recalled in the traditions of the people and identifiable by the remnants of prior occupation in the landscape.

Recorded and unrecorded archaeological sites are only one layer of the cultural landscape, and not "the" cultural landscape. Wāhi Tapu (scared sites), Wāhi Whakahirahira (sites of significance) and Wāhi Taonga (treasured sites) are amongst some of the key indicators of the wider cultural landscape. Manawhenua is the ability to walk one's rohe and name the places and recite the korero (history) back to "discovery". While other iwi may have an interest/s in a rohe, it does not automatically accord them Manawhenua status.

Potential effects of the Project on the cultural landscape include:

- Noticeable changes to natural forms in the landscape; and
- Severance from sites and places of cultural importance.

14.3.4 Cultural heritage – archaeology

The proposed Expressway traverses a landscape of high cultural value as there are numerous recorded and unrecorded archaeological sites that relate to prehistoric and early historic settlement of the Kāpiti Coast. Numerous archaeological sites have been recorded in the NZAA site recording scheme (ArchSite) which include burial grounds, pā, midden and artefact finds.

Ground disturbance associated with the construction of the proposed Expressway will include excavation for the installation of new structures and pipes within proximity to recorded archaeological sites. It should be noted that, while there are a number of known sites affected by the proposed Expressway, there is also an associated risk of accidental discovery of unrecorded archaeological sites.

Potential effects on archaeology are discussed in further detail in Part G, Chapter 13, Volume 2.

14.3.5 Cultural heritage – Wāhi Tapu/Wāhi Taonga

The key differentiator between heritage sites of an archaeological and cultural nature is the methodology for assessing their value. Western methodologies identify and categorise sites and places through scientific methods whereas matauranga Māori (the Māori framework of knowledge) defines the significance of a site or places based on its historical relationship to its communities.

There are a number of significant sites and places along the proposed Expressway alignment that are of significant cultural importance; these are sites described by local iwi as wāhi tapu (sacred sites) or wāhi taonga (treasured places). In particular, the Takamore Cultural Heritage Precinct, including the registered Takamore Wāhi Tapu Area, contains a cluster of interconnected sites and places of both wāhi tapu and wāhi taonga importance.

Potential effects of the Project on wāhi tapu/wāhi taonga are:

- physical severance of, and disconnection between, a number of these important places including the Takamore urupā, the Maketu Tree, and the former Tuku Rakau Village;
- Destruction of wāhi taonga sites (for example, Pukekawa cultivation grounds); and
- Disturbance of koiwi tangata (human remains).

14.3.6 Environmental impacts

The impact of the proposed Expressway on the environment represents a continuation of modification of the natural landscape of the Kāpiti Coast. The cultural impact assessments prepared for this project identify various matters of concern in relation to the direct and cumulative impacts of the Project on the environment: of particular concern to tangata whenua are the potential effects of the proposed Expressway on water quality.

The mauri of water is often compromised by the mistreatment of natural water sources through contamination of springs, groundwater, and the coastal environment by way of uncontrolled discharges. This in turn can have a significant impact on marine and aquatic life traditionally sourced for food and other cultural purposes.

Maintaining an appropriate level of water quality in the environment is fundamental to Māori spiritual values (te taha wairua) and iwi are concerned that the discharge of stormwater into local rivers and streams may have potential impacts on local marine and aquatic life. Moreover, their concerns relate to the ability to undertake customary activities such as the collection of kaimoana from rivers such as the Waikanae, surrounding wetlands and the Coastal Marine Area (CMA). The inability to provide kaimoana to manuhiri directly reflects the cultural credibility of the people, in particular the values of:

- Manaakitanga (support and care of your guests); and
- Whanaungatanga (maintaining relationships between people)

The mauri of air, as it is with water, can also be compromised through mistreatment and contamination. Air pollution can have a significant impact on the health of people, as inhalation of toxins, and other noxious discharges can adversely affect the elderly and people suffering from respiratory illnesses. The iwi have expressed concerns about whether there is the potential for higher concentrations of exhaust emissions as a result of the Project as well as in relation to the potential for noise pollution from vehicle use.

Potential effects of the Project on the environment of particular concern to iwi include:

- Increased sediment entering waterways (for example, rivers, lakes, CMA);
- Loss of terrestrial and freshwater habitats; and
- Loss of natural habitats (native flora and fauna).

These effects are discussed in further detail in Part G, Chapters 20, 21, 22, 23 and 28, Volume 2.

14.3.7 Visual/amenity impacts – construction

Since the mid 19th Century, agricultural and urban development has significantly altered the natural environment on the Kāpiti Coast. These activities have had a significant impact on iwi visual amenity values as they detract from important cultural features in the landscape.

Overall, the landscape character of the Kāpiti Coast features high natural coastal values, particularly former dunes and wetland areas, many of which were sites of activity or burial, or were natural resources of importance to Māori. Therefore, the construction of a new Expressway has the potential to impact adversely on the cultural landscape, including view shafts to sites of cultural significance.

Earthworks will temporarily expose large areas of the Project area and alter the natural contours. Any loss of indigenous vegetation will also alter the natural values of the area. The potential effects of construction such as from dust, traffic and noise, will also affect the amenity value of the area.

In summary, potential visual/amenity effects of the Project of concern to Māori include:

- Nuisance effects (dust, traffic, noise from construction activities); and
- Impacts on landscape character and visual amenity values.

These effects are discussed in further detail in Part G, Chapters 12, 17, 19 and 20, Volume 2.

14.3.8 Social/community impacts

Cultural health determinants account for a broad range of issues, which include the aforementioned matters, as well as other variables such as employment and socio-economic circumstances. This includes the strengthening of leadership and decision-making and recognising that Māori success relies on their capacity to lead, influence and make positive choices for themselves. Thus, the potential impacts on cultural health include the effects of the proposed Expressway on iwi's sense of wellbeing, and opportunities for social and economic development.

The future settlement of the Te Āti Awa ki Whakarongotai Treaty claim is likely to achieve various objectives of importance to the iwi; as well as the return of sites of cultural importance, Te Āti Awa ki Whakarongotai hopes to be positioned to capitalise on their resources and grow their commercial asset base, which in turn will provide employment opportunities for local iwi and hapu. As outlined in Part G, Chapter 29, Volume 2, the proposed Expressway is anticipated to bring about economic benefits to the District from improved accessibility and travel time reliability.

Nevertheless, iwi have expressed concern that the proposed scheme may affect their ability to initiate and progress tribal commercial ventures: of specific concern are the potential impacts on aquaculture, agriculture and ecotourism on the Kāpiti Coast.

Potential impacts of the Project of particular concern to iwi are:

- Potential impacts on parcels of land subject to the Treaty claim process; and
- Potential impacts on iwi commercial initiatives.

14.4 Measures to avoid, remedy or mitigate actual or potential adverse effects on tangata whenua

14.4.1 Cultural mitigation proposals

The NZTA has sought, as far as practicable, to avoid affecting sites of significance to tangata whenua in developing the final alignment and the design of the proposed Expressway. However, there are locations along the extent of the proposed Expressway where impacts (direct and indirect) cannot practicably be avoided. The NZTA has directly engaged with tangata whenua to seek to determine appropriate mitigation measures to address these impacts.

A range of proposals for Te Āti Awa ki Whakarongotai and the Takamore Trust have been developed to date, some of which are appropriately implemented through the designation process as measures to avoid, remedy or mitigate the effects of the proposed Expressway, whereas others will occur through agreements on measures that have to be implemented under different statutory processes.

As the major impact of the Project on cultural heritage will occur within the Takamore Cultural Heritage Precinct, including the registered Takamore Wāhi Tapu Area, a number of mitigation proposals are focused on addressing potential impacts on a number of highly sensitive sites and places within this area, whereas other measures seek to address the effects of the proposed Expressway on the natural character and ecology of the area, as part of the broader suite of measures required to address the ecological, stormwater, noise and visual effects of the project. In addition, there are other measures that will have to occur under other statutory processes outside the RMA. Overall, the desired outcome is to address the various impacts outlined in Table 14.2 within an integrated framework that addresses the concerns of the Trust as kaitiaki of the Takamore Cultural Heritage Precinct.

A further set of mitigation proposals relating to the balance of the proposed Expressway has been prepared, and has formed the basis of ongoing discussions with Te Rūnanga o Āti Awa ki Whakarongotai. As with the mitigation measures related to the Takamore Cultural Heritage Precinct,

these proposals encompass an integrated range of actions and agreements, some of which fall outside the RMA to be given effect.

At this stage of the process, the NZTA is proposing that conditions relating to a number of matters be imposed on the designation and/or resource consents granted for the Project to avoid, remedy or mitigate adverse effects on cultural values that have been identified through the consultation undertaken to date. It may be that, as a result of further consultation with iwi, amendments or additions to these will be required.

The nature of the conditions that may be imposed on the designation would relate specifically to environmental enhancement and protection of places of cultural importance, and could include:

- Environmental
    - Ongoing engagement with the Takamore Trust and Te Āti Awa ki Whakarongotai through the construction period for the purpose of assessing the impacts of construction on cultural health, in particular any impacts on:
        - Water quality
        - Coastal condition
        - Ecology – marine/aquatic life/birdlife/habitat
- Cultural Sites
    - Prior to construction, undertake a constraints mapping exercise that records the location of culturally sensitive sites and places.
    - Cultural monitoring for earthworks and excavations required for archaeological/geotechnical investigation, excavation and construction activities, particularly for sensitive sites and areas such as the Takamore Cultural Heritage Precinct.
    - In consultation with local iwi, draft and comply with the one or more protocol documents which include the following:
        - Koiwi discovery protocols;
        - Artefact discovery protocols;
        - Tikanga protocols;
        - A protocol for archaeological site identification training for contractors; and
        - A protocol for the cultural training of contractors
    - Early engagement with Te Āti Awa ki Whakarongotai Expressway Committee and Takamore Trust during the construction period on issues concerning monitoring, construction and any other activities deemed to have an effect on cultural values.
    - Develop, in liaison with KCDC and iwi, an interpretation programme outlining the significance on the Kāpiti Coast to local iwi.
    - Explore opportunities to erect memorial pou/kohatu/plaques to commemorate the significance of the Kāpiti Coast to local iwi.

The protection of cultural sites of significance may require the following actions:

1. Prior to construction, undertake a constraints mapping exercise that records the location of culturally sensitive sites and places.

2. Cultural monitoring for earthworks and excavations required for archaeological/geo technical investigation, excavation and construction activities.

3. In consultation with local iwi, draft and comply with the one or more protocol documents which include the following:

    - Koiwi discovery protocols
    - Artefact discovery protocols
    - Tikanga protocols
    - A protocol for archaeological site identification training for contractors
    - A protocol for cultural training for contractors

4. Early engagement with Te Āti Awa ki Whakarongotai Expressway Committee during the construction period on issues concerning monitoring, construction and any other activities deemed to have an effect on cultural values.

5. Develop in liaison with KCDC and iwi an interpretation programme outlining the significance on the Kāpiti Coast to local iwi.

6. Explore opportunities to erect memorial pou/kohatu/plaques to commemorate the significance of the Kāpiti Coast to local iwi.

14.4.2 Relationship agreements

Relationship agreements between the NZTA and the Takamore Trust and Te Rūnanga o Āti Awa ki Whakarongotai Inc are being progressed. It is anticipated that these agreements will be completed in early 2012.

The NZTA has signed a MoU with Ngāti Toa Rangatira for the Transmission Gully project and is currently negotiating similar type relationship agreements with Muaupoko, Ngāti Raukawa ki te Tonga and Ngā Hapu o Ōtaki.

15 Network utilities

Overview

The Project directly affects a number of network utilities, including electricity and gas distribution, water supply, wastewater and stormwater disposal utilities. NZTA has consulted with KCDC and other network utility operators to identify network utilities that will be directly affected and how they can be protected and /or how relocation can be appropriately undertaken. The outcomes of these initial discussions concluded that all adverse effects on network utilities directly affected by the Project will be able to be appropriately avoided, remedied or mitigated.

15.1 Introduction

This Chapter identifies network utilities that are potentially adversely affected by the Project, and how they will be protected or relocated. Initial consultation with KCDC and other network utility providers has included phone conversations, letters, and meetings to discuss the Project and its potential effects on their utilities.

The NZTA have worked closely with network utility providers to seek to ensure that their infrastructure is maintained both during construction and when the proposed Expressway is operational. The process for managing protection and relocation works will be set out at a high level in the proposed Network Utilities Management Plan (NUMP) proposed as a condition of the Designation.

15.2 Existing environment – network utilities

Existing network utilities within the Project area include infrastructure for:

- electricity transmission;
- electricity distribution;
- gas transmission;
- gas distribution;
- water, wastewater and stormwater;
- telecommunications facilities;
- airports; and
- railways.

15.2.1 Electricity transmission infrastructure

Transpower's Bunnythorpe to Haywards A (BPE-HAY-A) and B (BPE-HAY-B) 220 kV lines cross the proposed Expressway alignment ("the alignment") at one point north of Smithfield Road between chainage 14900m and 15100m. The lines are carried by steel lattice towers. Two transmission towers (towers) referred to as T233 and T248 are located in close proximity to the alignment. There are no Transpower substations within the Project area or that are located near the proposed Expressway alignment.

15.2.2 Electricity distribution infrastructure

The sole electricity provider for the whole project area is Horowhenua Energy Limited (Electra). Electricity distribution infrastructure will be affected in a number of locations and will need to be protected or relocated. The network consists of above and below ground cables, typically 400V, 11kV and 33kV. None of the Electra substations are located in close proximity to the proposed Expressway alignment, with the Raumati substation being the closest at a distance of 0.5km to the east of the proposed alignment.

15.2.3 Gas transmission infrastructure

A Vector Gas (Vector) transmission pipeline corridor crosses the alignment a number of times north of the Waikanae River between chainage 11000m and 12200m. The corridor contains two pipelines being the "100Line Kapuni Pipeline" and the "601Line Kapuni – Wellington Duplication Waikanae Loop Pipeline". They are recorded to be approximately 700 – 800mm deep and are 200 - 300mm in diameter. The pipelines service the greater Wellington Region and originate from the Kapuni gas fields in Taranaki. A Vector delivery station is located on the northern banks of the Waikanae River at chainage 10700m. The delivery station is approximately 12.5m to the east of the proposed Expressway alignment, a new access way to El Rancho will also pass through the current delivery station site. As a result the delivery station will need to be relocated.

15.2.4 Gas distribution infrastructure

Vector has a gas distribution system servicing the Kāpiti urban areas, generally located in the local roads. The pipes are typically polyethlene (PE) 32-100mm nominal bore and 400 kilopascals (kPa). The pipes cross the alignment at most local road intersections and crossings along the alignment.

15.2.5 Water, wastewater and stormwater infrastructure

KCDC provides water, wastewater and stormwater services for all the urban areas on the Kāpiti Coast. These services are predominantly located in the road corridors, with the exception of approximately five wastewater pipes.

There are three critical watermains (300 – 600 mm diameter) that cross the proposed Expressway. One watermain is in Kāpiti Road and two are in Otaihanga Road. There is a wastewater pump station near the corner of Leinster Avenue and State Highway 1. The KCDC wastewater treatment plant is located approximately 53m to the east of the alignment on Flyfield Place, Otaihanga.

Wastewater services will be affected at the following locations:

- a wastewater pump station is located at the end of the Leinster Avenue at approximately chainage 3000m of the proposed Expressway (at the intersection with SH1). This pump station will be relocated clear of the alignment;
- two wastewater pipes which service the properties located at 246 and 242 SH1 cross the alignment north of Leinster Avenue between chainage 3100m and 3400m. These properties will need to be serviced by a new wastewater line;
- a gravity sewer crosses the proposed Expressway alignment in Kiwi Road at chainage 5200m. The pipe is a vital service and needs to be maintained at all times. The pipe will be replaced under the alignment to protect the service from increased soil pressure created by the proposed Expressway embankment, as well as from infiltration pressures created by the wetlands that are proposed to be built above the pipe next to the proposed Expressway in its vicinity;
- a 300mm diameter asbestos cement (AC) reticulation main is located on the north side of Kāpiti Road, which crosses just west of Arawhata Road and runs along the south side of Kāpiti Road (under the proposed Expressway alignment) to Te Roto Drive. At this point, there is a tee junction with 250mm AC reticulation main running up Te Roto Drive and a 250mm diameter AC reticulation main continuing westwards along the south side of Kāpiti Road. The existing 300mm and 250mm diameter AC water mains on the south side of the road are to be replaced with new Ductile Iron (DI) pipes under the new berm and footpath. This will likely require a short term shut-down and cut-over connection at night to be coordinated with KCDC's services department. These mains are essential services and will remain live during construction The method of protecting these essential mains will be selected during construction depending on the scale of ground improvements required in this area;
- a 100mm diameter wastewater rising main crosses the proposed Expressway alignment from the pump station at Te Roto Drive to Cypress Grove at approximately chainage 6900m. This pipe needs to be replaced with a more robust pipe where it crosses the alignment to protect against pipe rupture;
- a 150mm diameter Polyvinal Cloride (PVC) wastewater pipe currently runs northward from Flyfield Place along the west side of Mazengarb Road, reducing to a 100mm diameter pipe and crossing over to number 353 Mazengarb Road (on the eastern side). It is expected that the pipe will need to be replaced as it is not expected to have sufficient cover where it goes under the proposed alignment. It is likely to be protected by a concrete encasement as it will be at a shallow depth under the road;
- two wastewater rising mains cross the alignment to the wastewater treatment plant north of Mazengarb Road between chainage 8200m and approximately chainage 8600m. These are essential services and need to be maintained at all times. The 450mm diameter AC rising main will need to be replaced with a more robust pipe material where it crosses the alignment to protect against possible pipe rupture. The 350mm diameter PE rising main from Rauparaha pump station will need to be replaced with a more robust pipe material to protect against possible rupture. The pipe also runs through an area identified as a proposed stormwater management wetland, this pipe will need to be relocated around any wetland area to maintain access for maintenance;

- a 100mm diameter AC wastewater rising main crosses the alignment at 10700m to service El Rancho (Christian Holiday Park). This rising main will be replaced by a 125OD[123] diameter SDR11[124] PE100 risings main along the driveway, which is being lowered to pass under the alignment within an encasement pipe;
- a 450mm diameter AC sewer runs northward along Te Moana Road, and a 150mm diameter AC pipe also connects into it at a manhole located where the proposed roundabout on the southern side of the proposed Expressway alignment will be. A new replacement pipe is proposed to run along the eastern side of Te Moana Road under the Te Moana Road Interchange. To protect the pipe during construction of the interchange the pipe may need to be positioned under the road carriageway or for additional protection a stronger pipe may be used; and
- a 520mm diameter reinforced concrete gravity fed sewer crosses the proposed Expressway alignment approximately 500m east of Ngarara Road at chainage 14100m. The length of the pipe in this vicinity will be replaced to ensure it has an acceptable lifespan following the construction of the proposed Expressway.

Water services will be affected at the following locations:

- an existing 250mm diameter AC pipe runs along the west side of Mazengarb Road. Mazengarb Road will be lowered by up to 2m to go under the proposed Expressway, and therefore the pipe will be need to be replaced over a length of approximately 350m;
- The existing 100mm diameter PVC water pipe which crosses the alignment from Kauri Road at chainage 10900m will be replaced. This will be located along the El Rancho driveway which is being lowered to pass under the proposed Expressway; and
- An existing 300mm diameter unplasticised polyvinyl chloride pipe (uPVC) water supply rising main runs along Ngarara Road at chainage 13600m and supplies water to Waikanae from emergency bores in the area. This emergency supply may not be needed during the winter, although KCDC will need access to this bore over the summer months. A new 300mm diameter pipe similar to the existing pipe will be attached to the side of the Ngarara Road bridge proposed to be constructed over the proposed Expressway.

15.2.6 Telecommunications infrastructure

Telecom has a main fibre core line (i.e. the national line) that crosses the Waikanae River between the two Vector transmission lines. This line may need to be relocated for a section near the river. The main fibre core includes eight major ducts (100mm diameter). Services of a similar scale are also located in Kāpiti Road. Raumati and Mazengarb Roads have a fibre core of four major ducts.

[123] OD abbreviation for ‘outer diameter’

[124] SDR abbreviation for ‘standard dimension ratio’ (material pipe class)

Telecom, Telstra Clear and FX Networks all have services in the area that will be affected by the construction of the proposed Expressway. Their networks are a mixture of fibre optics, coaxial and copper cables, located both above and below ground.

There are eleven locations along the alignment where Telecom has underground copper and / or fibre optic lines:

- north of Leinster Avenue between chainage 3200m and 3300m;
- Raumati Road between chainage 4400m and 4500m;
- Kapiti Road between chainage 6300m and 6400m;
- Mazengarb Road between chainage 7900m and 8000m;
- Otaihanga Road between chainage 9100m and 9200m;
- south of Waikanae River between chainage 10500m and 10600m;
- Te Moana Road between chainage 11800m and 11900m;
- Ngarara Road at chainage 13600m;
- Smithfield Road between chainage 1460m and 14700;
- Ngarara Road (paper road) between chainage 16300m and 16400m; and
- Peka Peka Road at chainage 17400m.

There are ten locations along the alignment where Telstra Clear has underground copper and / or fibre optic lines:

- Leinster Avenue between chainage 3000m and 3100m;
- north of Leinster Avenue between chainage 3200m and 3300m;
- Raumati Road between chainage 4400m and 4500m;
- north of Raumati Road between chainage 4500m and 4600m;
- Kapiti Road between chainage 6300m and 6400m;
- Mazengarb Road between chainage 7900m and 8000m;
- Otaihanga Road between chainage 9100m and 9200m;
- north of Otaihanga at chainage 9700m;
- north of the Waikanae River between chainage 10700m and 10800m; and
- Te Moana Road between chainage 11800m and 11900m.

There are two locations along the alignment where FX Network telecommunications lines cross the alignment:

- Kāpiti Road between chainage 6300m and 6400m; and
- Mazengarb Road between chainage 7900m and 8000m.

15.2.7 Airport infrastructure

The Kapiti Coast Airport is located on Kapiti Road to the west of the alignment. The airport runway forks off in a triangular shape. The closest runway area is approximately 456m to the west of the alignment opposite chainage 5500m. The main airport terminal buildings are approximately 890m to the west of the alignment on Kapiti Road.

15.2.8 Rail infrastructure

The NIMT runs parallel to the existing SH1 within the Project area. The proposed Expressway will run in parallel to and in close proximity to the NIMT from MacKays Crossing northbound and will deviate away from the NIMT (arching away in a westerly direction) at Leinster Avenue at chainage 3100m. At Peka Peka Road, the proposed Expressway will return to the NIMT, to run in parallel with the railway approximately between chainage 17000m and 18000m. The proposed Expressway will not intersect the NIMT at any point. The existing rail crossing from the existing SH1 onto Hadfield Road will remain unchanged.

15.3 Assessment of effects on network utilities

The Project philosophy towards planning for existing network utilities is to avoid disruption to services, where practicable. However, given the large scale of the Project and the abundance of network utility infrastructure along the alignment, not all potential impacts can be avoided.

The intensity of network utilities near or within residential areas is typically higher than in rural or rural residential areas. In particular, the urban areas of Raumati, Waikanae and Paraparaumu have a greater number of network utilities that will be impacted by the construction of the proposed Expressway.

Concept solutions have been discussed with all affected network utility providers. The following approaches formed the basis of the Project design response:

- To seek to maintain full operation of services during construction of the proposed Expressway;
- To seek to protect existing services from potential damage caused by the proposed Expressway operation or its construction;
- To seek to protect the proposed Expressway from future damage and disruption caused by possible service failures (for example, burst water mains);
- To maintain accessibility to the services (for example, for maintenance and repairs);
- To relocate overhead services underground where they cross the proposed Expressway;

The design solutions are to be based on a like-for-like replacement of existing services: for example, new pipes and pump stations will have the same flow capacity as the existing, using materials and specifications to current standards. In some locations, the best design option was not always immediately obvious as other factors such as construction methodology, sequencing, cost, or the outcome of site investigations dictated the solution.

15.3.1 Project assumptions

With the exception of the KCDC water, wastewater and stormwater services, service providers were provided with plans highlighting the locations where their services would be affected and were asked to make the following assumptions:

- trenches within the proposed Expressway construction area will be excavated and back filled by the NZTA;
- network utility providers are to supply and install the cable/pipe in the prepared trench and make the necessary disconnections/connections; and
- the relocations will be made prior to the bulk of the earthworks.

The process for further engaging with network utility operators and exchanging information will be set out protocols in the Network Utility Management Plan (NUMP). The NUMP will include:

- protocols for liaison and information exchange between network utility providers and the NZTA;
- a process for network utility operator approval of proposed works on their utilities;
- protocols for onsite works and responsibilities for both NZTA's contractors and the network utility operator;
- protocols for utility operator design and supervision services; and
- protocols for inspections and final approval of works by network utility operators.

15.3.2 Electricity transmission infrastructure

a. Transmission lines

The Project may adversely affect the BPE-HAY-A and BPE-HAY-B 220 kV lines that cross the alignment north of Smithfield Road at chainage 15100m.

The two towers referred to as T233 and T248 are located close proximity to the proposed Expressway and the likely construction footprint creates adverse effects that relate to the maintenance and operation of the towers and / or lines. Potential adverse effects include:

- excavation will be required near two transmission towers T233 and T248 which could potentially undermine the stability of these structures. The proposed earthworks will be sufficiently separated from the towers this separation will avoid potential adverse effects. As a result it is unlikely towers T233 and T248 will need to be relocated.
- dust generated during construction could potentially settle on transmission lines and affect their integrity, the management of dust is discussed in section 15.5 below; and
- the presence of two existing towers near the eastern edge of the proposed Expressway presents a potential safety hazard. Transmission lines crossing the proposed Expressway alignment is also a safety hazard during the construction period.

The remainder of the alignment is clear from substations and transmission lines.

Transpower's high voltage transmission lines may require realignment and raising as a result of the Projects close alignment with existing towers. A further two towers (T251 & T235) may require their height to be increased to allow the Project to avoid adverse effects on the Transpower network, with specific conditions being proposed to agree necessary dust measures with Transpower, to be implemented during construction.

The NZTA has advised Transpower of the proposed Expressway alignment and potential implications for their transmission line. Transpower is currently investigating reconductoring options for both BPE-HAY-A and B lines and has acknowledged that there will be benefits to be gained by co-ordinating potential relocation of the towers with the reconductoring. Discussions on whether the two towers need to be relocated, and decisions on any other towers needing to be raised in height are on-going with Transpower. The process for carrying out works will be set out in the NUMP.

The potential adverse effects on Transpower's transmission lines are considered to be isolated to one area north of Smithfield Road where the lines cross the alignment. All adverse effects on other existing electricity transmission lines will be avoided (by relocation of the two towers identified) or adequately mitigated during the detailed design phase.

15.3.3 Electricity distribution infrastructure

Consultation has taken place with Electra to identify where the proposed Expressway will impact on its services and how these services will be maintained during construction and operation of the proposed Expressway.

Where the above ground network crosses the alignment, cables will likely be buried underground (for example, within ducting); existing below ground services which cross the alignment will require relocation or protection. Solutions for maintaining services will be incorporated into the Project and will be implemented during construction. Protocols for managing this process with Network Utility providers will be set out in the NUMP.

During construction there is potential for dust to settle on insulators which may interfere with the lines. This will be managed through use of dust suppressant which is outlined in Appendix H – Erosion and Sediment Control Plan. With implementation of the CEMP, the potential adverse effects on Electra's utilities will be avoided or mitigated to an acceptable level.

15.3.4 Gas transmission infrastructure

As outlined above Vector has a gas pipeline corridor that crosses the alignment a number of times near Te Moana Road. The corridor contains two gas pipelines which service the greater Wellington Region. Vector has been consulted with respect to the proposed Expressway design and its implications for their pipelines.

There is a delivery point station located to the north of the Waikanae River that will likely require relocating. Vector is aware that the delivery point station is currently located within the alignment. NZTA and Vector have discussed options for relocation of the pipeline and delivery point station, although a final decision on this yet to be made.

Any required protection or re-alignment of the gas pipelines and/or delivery point station is intended to be co-ordinated with the construction of the proposed Expressway. NZTA will work closely with Vector to avoid and mitigate potential adverse effects on their gas pipeline network to an acceptable level.

15.3.5 Water, wastewater and stormwater infrastructure

No particular issues are anticipated with re-alignment of these services. A number of pipes cross the proposed Expressway along the entire length of the alignment, and the NUMP will guide how these relocations are to be carried out during the construction period. Further detail on the works required is set out in section 15.2.5 above. Any potential adverse effects on local water, wastewater and stormwater systems will be avoided or appropriately mitigated to an acceptable level.

15.3.6 Telecommunications infrastructure

Telecom, TelstraClear and FX Networks have fibre optic cables that will be affected by the Project. Telecom also has copper lines which cross the alignment. NZTA has consulted with these organisations to identify the number of cables affected and options for maintaining these utilities during construction and operation of the proposed Expressway.

The options available are protection of cables where they cross the alignment, and / or realigning the cables so they are not affected. These solutions will be incorporated into the Project and will be undertaken in conjunction with proposed Expressway construction works.

Any adverse effects on telecommunications infrastructure will be appropriately avoided or mitigated.

15.3.7 Airport infrastructure

During construction of the proposed Expressway the potential for dust generation could adversely affect the operation of the Kāpiti Coast Airport. Particularly during the summer months, if not managed appropriately, dust has the potential to settle on airport facilities and interfere with aircraft and other airport equipment.

The CEMP has addressed the potential effects of dust. The potential for dust will be suitably mitigated by use of dust suppressants during the construction phase. Once the proposed Expressway is constructed there are not anticipated to be any potential dust effects. Any adverse effects from construction activities on the operation of the Kāpiti Coast Airport will therefore be avoided or mitigated to an acceptable level.

15.3.8 Rail infrastructure

As noted above, the NIMT is located in close proximity to the proposed Expressway alignment in Raumati and Peka Peka.

The operation of the NIMT could be adversely affected during the construction period. Potential effects include dust becoming airborne during excavation works as dust. Dust could settle on railway infrastructure and interfere with its operation. Dust control will be managed appropriately in accordance

with the CEMP (for example, by the use of dust suppressants). Subject to implementation of the CEMP, any adverse effects on the operation of the NIMT will be avoided or mitigated to an acceptable level.

The proposed Expressway does not cross the NIMT at any point within the Project Area. Therefore, once the proposed Expressway is operational there will be no adverse effects on the operation of the Rail corridor.

15.4 Measures to avoid, remedy or mitigate actual or potential adverse effects on network utilities

The actual and potential adverse effects on network utilities are likely to occur during construction of the proposed Expressway. A number of the utility services that cross the proposed Expressway alignment have not had potential relocation plans finalised (i.e. the Vector distribution pipe and Transpower towers) these agreements are to be completed prior to construction of the proposed Expressway.

Potential construction effects identified above in sections 15.3 would be managed by the CEMP. The NUMP will also be used to set out the process of undertaking the works. This document does not intend to directly provide mitigation of effects, but is more concerned with operational activities.

16 Urban form and function

Overview

This Chapter outlines the potential effects of the proposed Expressway on urban form and function within the Kāpiti Coast District and wider context. The effects assessment has been grouped under the headings of:

- Urban growth;
- Connectivity; and
- Amenity values.

A separate document Urban and Landscape Design Framework describes the Kāpiti urban environment in the project area in detail and sets out key design considerations for the proposed Expressway, the way in which the design has responded to those matters, and how the detailed design for the proposed Expressway needs to occur to secure an appropriate urban form and function outcome.

The process of assessing effects on urban form and function was carried out throughout the development of the Project and decisions on its design. The assessment was informed by the feedback from Kāpiti residents on urban planning and design issues during consultation. The residual potential adverse effects that were unable to be fully addressed during the design process and NZTA's proposed mitigation measures have been described.

16.1 Introduction

This Chapter summarises the findings of the assessment of the proposed Expressway on urban form and function, drawing on the assessment of Urban Planning and Design Effects (UPDE) in Technical Report 6, Volume 3.

The assessment of UPDE forms the basis of the analysis supporting the information in this Chapter. An Urban and Landscape Design Framework (ULDF) (Technical Report 5, Volume 5) has also been prepared for the Project; this sets out a framework for assessment of urban design matters and is a companion document to Technical Report 6. The ULDF is a technical document rather than an assessment of effects. The NZTA requires that urban and landscape design considerations for its projects are addressed within a project-specific ULDF.

This assessment does not specifically address noise & vibration, visual & landscape, transport, cultural, economic or social effects, all of which are addressed by other assessments. However, it does consider the collective influence of these effects on the urban form and function of the Kāpiti Coast, particularly on those areas immediately adjacent to the proposed Expressway. This assessment therefore draws on the findings of those assessments (noise and vibration – Technical Reports 15, 16, 17 & 18, Volume 3; landscape and visual – Technical Report 7, Volume 3; cultural – Technical Report 11 & 12, Volume 3;

economic – Part G, Chapter 29, Volume 2; and social – Technical Report 20, Volume 3). The Chapter on traffic and transport effects (Part G, Chapter 12, Volume 2) discusses the amenity generated by the proposed Expressway providing access to local centres and the provision of pedestrian and cycleway facilities.

16.2 Investigation and assessment methodology

The process of determining the urban planning and design effects followed several process steps:

1. A set of objectives was established at the outset of the Project (refer to ULDF); these objectives guided the assessment throughout the entire Project scoping and design process and are common to the other Wellington Corridor RoNs;

2. An investigation to establish the character of the existing environment of the proposed Expressway route was undertaken to establish an evidential base and the design options promulgated with the team were developed with reference to this environment;

3. Consultation was undertaken on options and feedback on urban planning and design issues identified to inform the assessment (further information on consultation methods is provided in Technical Report 5, Volume 5); and

4. An assessment of the potential effects of the preferred proposed Expressway design on the existing urban environment was undertaken with specific regard to the urban conditions that will result from its construction.

Those matters specifically addressed in the assessment of urban planning and design effects (Technical Report 6, Volume 3) relate to:

- Urban Form;
- Connectivity; and
- Amenity and Quality of the Environment.

The process of assessing the effects of the proposed Expressway did not wait until the final design was produced. The assessment was on-going throughout the design process to ensure that the Project incorporated urban planning and design considerations.

This process is significant as it has enabled many effects to be avoided or mitigated through the alignment and design of the Expressway as it is now proposed. It also allowed the identification of potential ways to mitigate effects if the design could not fully avoid those effects.

There have been different techniques employed to address urban effects in the design option decision-making process these include multi-criteria analysis, local area movement surveys, on site counters, school accessibility plans and pneumatic counters. A full description of these techniques is set out in sections 4.2 to 4.3 of Technical Report 6, Volume 3. A detailed assessment of amenity has also been undertaken as discussed in Chapter 17 Landscape and Visual and Effects of this AEE.

16.3 Existing environment – urban form and function patterns

A description of the existing urban environment has been developed as a point of reference for the assessment of effects in section 16.4 below. A full description of the existing environment is contained within Part C, Chapter 6 Description of the environment of this AEE; and in Technical Report 6 Urban Planning and Design Effects and within the Urban and Landscape Design Framework in Technical Report 5.

16.3.1 Land use and built environment

The area of the Kāpiti District through which the proposed Expressway passes has a range of land uses and lower densities of use typical of a New Zealand urban area. Building heights are typically low (no more than two storeys, including in the town centres) with a few exceptions such as at Paraparaumu Beach.

The Kāpiti area consists of a series of beach communities. Lateral east-west connections from the existing SH1 leading to the beach are now an important part of the movement network and have provided a street structure on which urban development has been based. The number of north-south arterial and connector roads is limited, reducing the amount of connectivity in that direction. During the 1950s, the Kāpiti Coast grew rapidly and developed a more suburban character. The original designation for the Sandhills Motorway (along which the proposed Expressway broadly follows) occurred at this time, resulting in urban development growing up to the edge of this proposed roading corridor.

Consequentially, much of the former dune landscape has been subsumed by development. Typically, the more recent development has filled in between the beach settlements and spread back to and out from the main centres at Waikanae and Paraparaumu, and up into the hills. The area between Paraparaumu and the Waikanae River has remained as open space which is now generally occupied by rural-residential land uses. The Waikanae River itself and its corridor have served to maintain this open space gap, and the retention of the river corridor as open space is an objective of KCDC's Development Management Strategy.

The identity and naming conventions of the District's urban areas continue to follow the pattern established historically - a string of 'beach' communities (Raumati Beach, Paraparaumu Beach, Waikanae Beach, and Peka Peka Beach), and the associated inland communities (Raumati, Paraparaumu, and Waikanae). Most of these communities have some local amenities in the form of shops and schools. The two colleges are located at Paraparaumu.

Notable in the District is the relatively large amount of senior living residential land use. There are many 'retirement villages', as well as people of an older age living independently in the District. The same lifestyle has attracted people of working age.

The town centres at Waikanae and Paraparaumu are less than 40 years old. Paraparaumu is the largest and functions as the District centre, based around Coastlands shopping mall with adjacent civic facilities including the Council buildings and library. Plans for a town centre with a higher level of public amenity have been in train for some time.

KCDC has also investigated with the community options for improvements at the Waikanae town centre in recent times.

16.4 Assessment of effects on urban form and function patterns

The following assessment addresses potential adverse effects that the proposed Expressway may have on the urban environment, and how the proposed Expressway design and proposed mitigation measures intend to avoid or mitigate these adverse effects.

The assessment of effects on urban form and function has been divided into three subheadings:

- **Urban form and land use** – how the proposed Expressway may affect the existing and future urban form of the Kāpiti Coast, including town centres, residential communities, the Kāpiti Coast airport, and Waikanae North future urban growth area;
- **Connectivity** – how the proposed Expressway may affect local road connections and other forms of connectivity, and how such effects will be avoided or mitigated; and
- **Amenity and Quality of Environment** – how the proposed Expressway may affect the amenity values in those areas where people will experience the proposed Expressway, including people's direct experience with under-bridges, abutment forms, and bridges, as well as the degree of safety and perception of recreational amenity. The assessment considers how the Project design aims to maintain the amenity and quality of environment.

16.4.1 Urban form and function

16.4.1.1 Kāpiti Coast Airport

The Kāpiti Coast Airport ('the Airport') is a key transport node within the Kāpiti District. The Airport was recently rezoned to allow for a large area of commercial development whilst maintaining its function as a regional airport. The growth of the Airport has a number of implications for the proposed Expressway, for two key reasons:

- the Airport development includes a new east/west link road to be constructed, known as the Ihakara Street extension. The connection would reduce traffic volumes on Kāpiti Road and the need for its upgrade to address current and likely future capacity problems; and
- the proposed Expressway design includes an interchange on Kāpiti Road to provide ready access to the Airport (and town centre) by proposed Expressway users, including trucks.

The proposed interchange on Kāpiti Road will complement the existing operation of the Kāpiti Coast Airport and will provide greater efficiencies in access. The planned form and function of the Airport will be maintained and any effects resulting from the proposed Expressway and Kāpiti Road interchange are considered to be positive.

Although not part of the Project, the future extension of Ihakara Street will also provide greater connectivity for local traffic accessing the airport in an east-west direction.

16.4.1.2 Paraparaumu town centre

The town centre in Paraparaumu is the main service centre on the Kāpiti Coast. The most recent urban planning for the town centre includes:

- a town centre zoning since 1999 and more recently the introduction of a residential development overlay to provide for mixed use development ;
- a concept plan formulated in 2004 (see Figure 16.1), which assumed a WLR on about the same alignment as the proposed Expressway but smaller in scale; and
- a District Plan change to give effect to part of this concept plan which was promulgated but has been delayed in implementation due to disputes over KCDC's ownership of a large area of the subject land and appeals.

An interchange on Kāpiti Road will feed traffic on and off the proposed Expressway from the west side of the town centre via Kāpiti Road and/or a new local road network in the town centre zone (the area which is currently vacant land). The Kāpiti interchange structure will be large and could potentially adversely affect the future urban amenity of the Paraparaumu Town Centre. The aesthetic appearance of the interchange has therefore been designed with respect to its relationship with the town centre.

The Expressway proposal is not considered to be inconsistent with the Council's latest Concept plan. There is sufficient space within the concept plan land area to enable the mitigation of effects of the Project on the visual amenity of the Town Centre.

Detailed design will address the visual integration of the Kāpiti Interchange into its context, including shaping and planting of the landforms associated with the Kāpiti Road interchange and it's on and off ramps. A significant element to be worked through includes the detail of the interchange as it meets Kāpiti Road to ensure walking and cycling connectivity on the local road. Provision in the design has already been made for traffic signals and on and off ramp configurations that will assist this connectivity. The proposed Expressway and Kāpiti Road interchange will provide new opportunities for the development of the Paraparaumu Town Centre without the constraints of the existing SH1 to the east (discussed below). The overall effects on urban form and function will be positive with the appropriate level of attention to detailed design.

16.4.1.3 Waikanae town centre

The proposed Expressway will substantially reduce traffic volume on existing SH1 and provide greater scope for development of the future urban form and function of the Waikanae Town Centre. KCDC has conducted design studies to examine how the town centre layout can better provide for local needs. This work can progress with more certainty with a decision on the proposed Expressway location. The design studies on the future urban form of the Waikanae Town Centre provide an opportunity to enhance the amenity and character of the area.

The Te Moana Road interchange will be the main connection from the proposed Expressway to/from the Waikanae town centre (3km to the west of the Waikanae town centre). The distance of the interchange from the town centre could potentially affect the potential for commercial and retail growth in this town centre. Some of the existing shops rely on passing motorists for trade, with the most affected activities

likely to be the two motel complexes, a supermarket (with fuel retail), a fast food outlet, two service stations and 11 restaurants, cafes and takeaway outlets, (although, the assessment is that not all of their trade is reliant on passing motorists). Counter to this potential adverse effect is that the removal of traffic from the current State highway route will allow a higher level of amenity within the town centre and this can enable new improvements in public space and connectivity to public transport and eastern areas of the town centre - that will generate new commercial opportunities.

Planned growth areas in Waikanae are located close to the Te Moana interchange (especially the proposed multiple neighbourhood residential development at Ngarara). Future increases in traffic volume from these growth areas will be able to conveniently access the proposed Expressway via a connection near the Te Moana interchange avoiding the need to travel along Te Moana Road up to the existing SH1. This planned growth area will utilise the Waikanae town centre as a main service centre. Local movements are also provided for with the Smithfield Road proposed Expressway overbridge. In addition to giving access to existing properties and other users (such as horse riders), this bridge will allow movements from any future development at Ngarara to move east and west across the proposed Expressway. An extension of this bridge connection is a planned link road through the Waikanae North area to north of the Waikanae town centre. The timing of construction of this link road will be dependent on the Ngarara development and progress of the nearby Waikanae North development.

In terms of effects on Te Moana Road, the proposed Expressway is expected to alter the preferred access of heavier service and delivery vehicles such as trucks servicing the Waikanae town centre. These trucks are expected to access the Waikanae town centre from either the north or the south along the existing SH1, or from the proposed Expressway depending on whether the trips are linked with other local movements. If the Waikanae bound town centre trucks also service Paraparaumu they will likely use the existing SH1. Similarly it can be expected that trucks bound for Waikanae town centre coming from the areas to the north will turn off the proposed Expressway at the Peka Peka connection. However, if only servicing Waikanae and coming from areas south they may be more likely to arrive via Te Moana Road. The number and frequency of truck movements arriving via Te Moana Road is likely to be relatively low compared to the other scenarios. Overall, most trucks passing through the District and not servicing Waikanae or Paraparaumu are likely to use the proposed Expressway (rather than existing SH1) with a significant decrease in heavy vehicle movements through Waikanae town centre.

In summary, the Waikanae Town Centre will experience a general reduction in traffic volume once the proposed Expressway is operational. This reduction in volume will allow greater scope to plan the future urban form of the Waikanae Town Centre. There is potential to lower the traffic speed on existing SH1 and reconfigure the layout of the town centre which would enhance existing amenity values in the town centre to provide for planned development areas. However, it is acknowledged that the reduction in traffic volume will adversely affect existing retailers who rely on through traffic for trade. It is expected that these retailers may relocate and that over time there will likely be a redistribution of business within the town centre. The overall effects on urban form are considered to be positive.

16.4.1.4 Relationship of existing SH1 with Paraparaumu and Waikanae town centres

There will be a number of positive effects on the town centres that will result from reductions in traffic on and the removal of through traffic from the existing SH1.

These positive effects include potential for:

- a lower traffic speed environment that will enable:
  - opportunities for new uses with a relationship to the road frontage;
  - a safe environment for pedestrians and cyclists at grade; and
  - improved pedestrian links between the town centre and rail station at Paraparaumu;
  - reduced width of traffic lanes providing space for planting and visual amenity improvements, as well as a better layout and function of the bus interchanges; and
- a reduction in the number of heavy vehicles through the town centres.

The potential for such measures to be introduced once the proposed Expressway becomes operational is likely to feed into future town development studies for Paraparaumu and Waikanane.

16.4.1.5 Waikanae north growth area

The Waikanae North Area is the descriptor for the planned urban growth in the area north of Waikanae. This comprises two large areas – Ngarara Zone (see Figure 16.1) and Waikanae North Development Zone, as well as other smaller areas such as Ferndale.

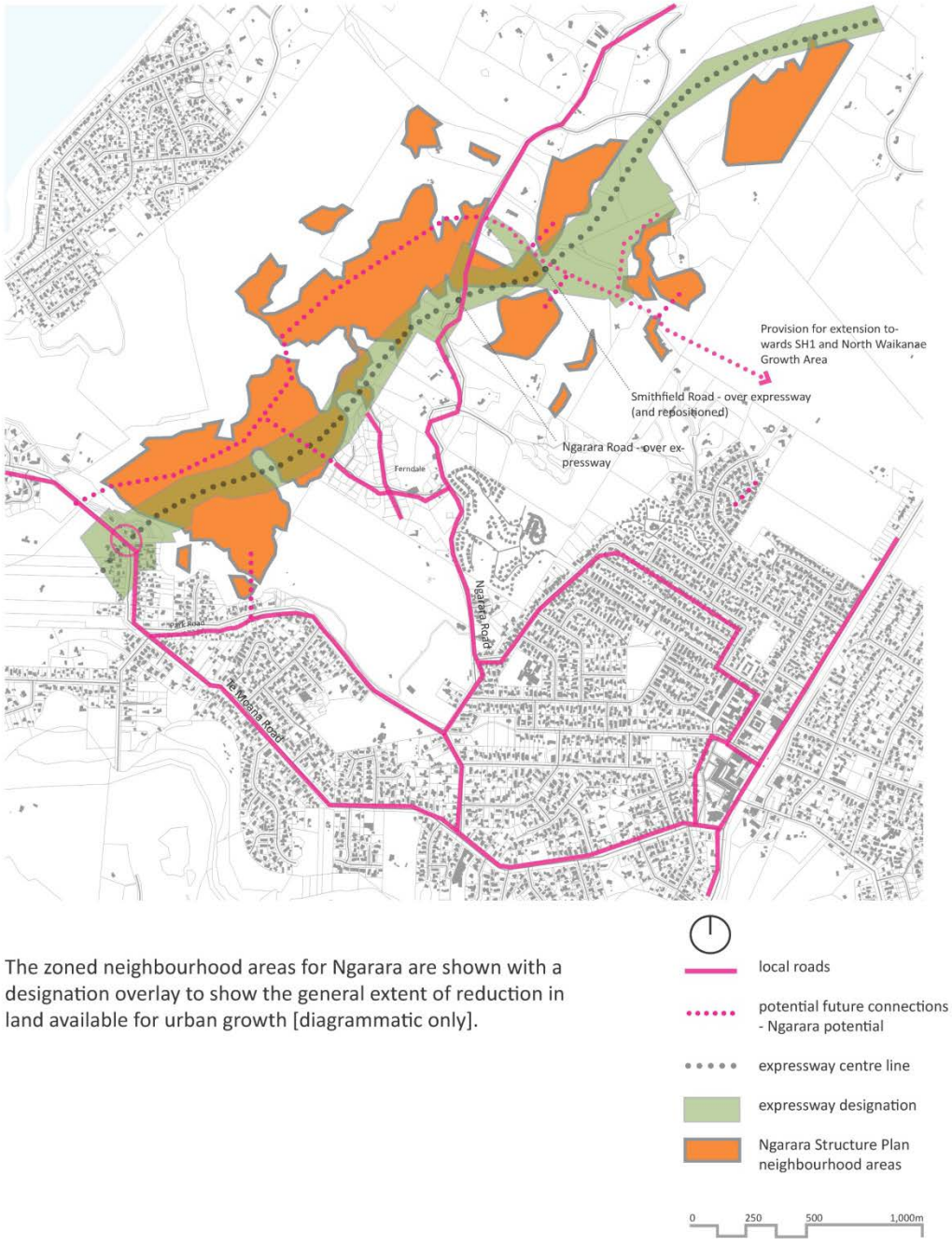

Figure 16.1: Ngarara Development Zone

The urban planning policies that define the form, quality and character of the future urban environment sought from the development of the Waikanae North area were promulgated following an extensive process. The subject area has a designation for a road (the existing WLR designation) within it. The proposed Expressway largely follows this alignment, although it would avoid the significant wetlands within Ngarara that are currently crossed by the existing WLR designation.

The effects of the proposed Expressway on the development of the Waikanae North area of most significance are those created by the reduced areas available for development, particularly in the Ngarara Zone. The construction footprint of the designation for the proposed Expressway reduces the total neighbourhood areas of approximately 128 hectares by approximately 23 hectares (a reduction of approximately 17%).

Accordingly, there would be a reduction in the capacity of this area to provide for the District's urban growth. The structure plan for this area would need to change to reflect the proposed Expressway and some increased densities could also be considered to compensate for lost potential. It is reasonable to expect that, during the proposed Expressway construction (2013-2017), development uptake for residential activities may be slower to progress given the construction effects.

The proposed Expressway will result in a number of potential adverse effects on the Ngarara development area, in terms of visual and noise effects. There is some ability to reconfigure future residential neighbourhoods to utilise the natural land forms that may assist to provide acoustic and visual barriers to the proposed Expressway.

The alignment of the proposed Expressway has been chosen to avoid the wetlands within Ngarara. The wetland areas offer opportunities to provide open spaces within a future urban spatial structure in this area.

In terms of future connections, there would be several opportunities to provide for new road connections into Ngarara from Te Moana Road. In addition, Ngarara Road itself would cross over the proposed Expressway, providing an immediate connection between the eastern part of Waikanae and the Ngarara development to the west. It is also planned to provide a new bridge link over the proposed Expressway to replace the Smithfield Road connection currently to Ngarara Road. This will also be positioned to allow a link back into the Waikanae North Development Area, providing a continuous Waikanae east-west link from Ngarara to the existing SH1.

In summary, the principal effect on the Ngarara Zone of the proposed Expressway would be a reduction of the area's development potential. The actual extent of this loss cannot be understood without re-planning the area, but it could be in the order of 20% of the development previously planned. There are also opportunities to consider areas currently adjacent to existing SH1 for future residential growth, which may offset this lost development potential.

The development of North Waikanae Development Zone on the east side would be unfettered by the proposed Expressway, and the ability to link this development with Ngarara would be maintained via the proposed Smithfield Road Expressway overbridge.

16.4.1.6 Managing unplanned development pressure

The design of the proposed Expressway has taken into account the potential for pressure for urban development that is not consistent with the District's urban growth strategy by excluding or limiting direct connectivity in those areas where urban growth is not proposed. Otherwise, it is anticipated that the Kāpiti Coast District Plan will continue to be the principal method for managing unplanned development pressures.

a. Kāpiti Road Interchange

Land fronting Kāpiti Road in the vicinity of the proposed interchange would likely come under further pressure for commercial development as a result of the Project. Most of this land is currently zoned for commercial use, and thus this is not considered to be a significant issue or to be in conflict with the Council's urban planning policies. Residentially zoned land to the southeast of the proposed interchange that is currently a mix of residential and services (medical practitioners) is likely to come under pressure for commercial uses as a result of the Project. It is considered that the District Plan will sufficiently address any development not in accordance with the zone provisions.

b. Te Moana Road Interchange

The Waikanae interchange on Te Moana Road is within a relatively wide area of open land and may be more at risk of land uses (such as service stations) wanting to locate adjacent to the proposed Expressway. It is noted that much of the flat land around the interchange at Te Moana Road is within an overland flow path from the Waikanae River towards the Waimeha Stream. The Crown will retain ownership of large areas of this land in order to allow for this over land flow path to operate in extreme flood events. Other land in this vicinity will be managed under the provisions of the Kāpiti Coast District Plan. Overall, it is considered that potential adverse effects of unplanned land use around the Te Moana interchange are able to be suitably avoided.

c. Poplar Avenue partial interchange

The area around the proposed Poplar Avenue interchange is zoned rural and residential, and accordingly there is currently limited scope for commercial development to occur under the provisions of the District Plan. The existence of Queen Elizabeth Park and the close proximity of the railway line and the existing SH1 to the proposed Expressway overbridge would limit opportunities for unplanned land development. Therefore, the potential for unmanaged development around the Poplar Avenue interchange is considered to be limited, and any significant changes in land use would be managed under the policies and rules of the District Plan.

d. Peka Peka Road partial interchange

The area around the proposed Peka Peka partial interchange is relatively open rural land, with some rural lifestyle blocks. The current nursery and associated café are well used, and although the proposed Expressway will change access arrangements to Peka Peka, it will still be connected to the current SH1 and local people are expected to continue to frequent it. However, it is reasonable to expect that general sales for these retailers will be lower with the partial interchange as opposed to a full interchange. The risk of new commercial type development at this intersection is likely to be limited by the inability to get off the proposed Expressway for travellers heading north or for people coming off local roads to travel south on the proposed Expressway. There is also a relatively small local area catchment to support any substantial commercial development seeking to take advantage of traffic turning off at Peka Peka Road from the proposed Expressway. Overall, it is considered that the potential for adverse effects on urban form at Peka Peka will be avoided.

16.4.2 Connectivity

For the purposes of this assessment, "connectivity" is defined as *"the functionality and quality of the physical connections between the multiple places people need to access for their use and enjoyment of the area"*. Connectivity is a key component which dictates urban form and function. The connectivity of the proposed Expressway with local roads crossing the alignment in an east-west direction has been an important objective of design development, as were a number of other connectivity opportunities. In this respect, the proposed Expressway will bring about a number of positive effects resulting from improvements in connectivity.

16.4.2.1 North- south connections

The principal enhancement in connection that the proposed Expressway would provide is between Paraparaumu and Waikanae. The main constraint currently restricting vehicle connectivity between these communities is the single bridge over the Waikanae River. The additional bridge over the Waikanae River provided by the proposed Expressway, with full interchanges on both sides of the River, will significantly enhance connectivity between these two communities.

Once the proposed Expressway is operational, the existing SH1 will have a much lower traffic volume (with traffic passing through the District generally using the proposed Expressway). This will provide a new slower traffic environment option for those in the community that may prefer these conditions.

16.4.2.2 East- west connections

Provision for maintaining east-west connections have been one of the Guiding Objectives of the Project. With this in mind, all east-west local road connections have been maintained. Two additional pedestrian bridges are also proposed. In the block between Kāpiti Road and Mazengarb Road the bridge will provide cycle and pedestrian connectivity in an area where there is a strong existing pattern of cross-corridor walking and cycling movement in the absence of a local road. The other bridge is proposed at the Leinster Avenue end of the route where the current connection of the end of Leinster Avenue to the existing SH1 will be severed. The Leinster Avenue connection to Poplar Avenue would be retained, but for those people wanting to move from the north-east area of Leinster Avenue towards Paraparaumu town centre along the existing highway this movement would become more circuitous. The proposed bridge would enable walking and cycling movements and would also provide connectivity for any future urban development of the area.

16.4.2.3 Walkway & cycleway connections

Cycling and walking connectivity is being significantly enhanced through the provision of a shared path the length of the proposed Expressway from Paekākāriki in the south to Peka Peka in the north. The shared path will connect to local roads along its route and to the two well used paths at Wharemauku Stream and Waikanae River as well as the bridges described above.

Connections to other walking networks are also being provided, and the grades on embankments will be designed to enable the best practicable slopes for walking and cycling. At the Waikanae River crossing, provision for horse traffic to share the walking/cycle bridge will be made. The catchments for the local

primary schools have been assessed and the cycle and walking path is expected to add to the options for people moving to and from these schools.

16.4.2.4 Connectivity across Kāpiti Road at the interchange

There are challenges at the two interchanges for local area movements and connectivity across the local roads. At Kāpiti Road, which will be a busy interchange, traffic light signals will enable clear periods for crossing by pedestrians and cyclists and other active modes. The design has eliminated free turns onto and off the proposed Expressway, making the crossing of the on- and off-ramps controlled by the traffic lights and therefore more predictable. This arrangement significantly improves the safety and quality of the crossings for pedestrians and cyclists.

16.4.2.5 Connectivity across Te Moana Road at the interchange

At the Te Moana Road interchange, it is currently proposed to use roundabouts to manage traffic flows to and from the proposed Expressway to the local road. These will be difficult crossings to make for pedestrians and cyclists and will inhibit the connectivity along and across Te Moana Road. Te Moana Road is an important east-west road link as it is the only direct link between the Waikanae Beach area and the main body of Waikanae. It is well used by school children as there is no school at Waikanae Beach. It is also used by recreational and other users moving between the beach and lower river area and Waikanae township including horse riders. It has been agreed with KCDC to review this arrangement to determine whether traffic lights should be used, which would improve the ease of walking and cycling movements and so connectivity in this area.

16.4.2.6 Urban growth areas

In addition to existing east-west links, the potential of the proposed Expressway to affect future additional connections across the proposed Expressway has been assessed, particularly in relation to the future potential urban growth in the Waikanae North area. It is considered that with the proposed Ngarara Road and Smithfield Road bridges that provides east-west connections are sufficient.

16.4.3 Amenity values

Amenity values are defined in the RMA as *"Those natural and physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes"*.

In regard to amenity values, the urban planning and design assessment (Technical Report 6) focused on the following:

- The appreciation of pleasantness in regard to local road and other east-west links (like
- Waikanae River and Wharemauku Stream) which the proposed Expressway would cross, as well as
- at town centres where people come together for social and cultural reasons, for the various services offered from there;

- The aesthetic coherence of all proposed Expressway structures and the way in which these are
- designed in relation to the landscape, recognising that the landscape design itself is
- addressed by the Assessment of Landscape and Visual Effects in Technical Report 7, Volume 3;
- The recreational attributes in regard to horse riding, cycling and walking and how provision can be made for these activities; and
- The proposed Expressway user experience in terms of its appreciation of its pleasantness, aesthetic coherence and cultural and recreational attributes.

In addition, the effects of the Project on the amenity values of those parts of the District within the immediate vicinity of the proposed Expressway are considered in respect of the combined effect of the noise and vibration, natural and artificial light, appearance and change in character that the proposed Expressway will have on the natural and physical qualities and characteristics of these areas. This assessment draws on the findings of the relevant technical assessments in Volume 3, including light (Technical Report 8), noise and vibration (Technical Reports 15, 16, 17 & 18), landscape and visual (Technical Report 7), and terrestrial ecology (Technical Report 27).

16.4.3.1 Local road crossings

The primary point at which local people will have a direct experience of the proposed Expressway is at those points where the proposed Expressway crosses over a local road or other path: typically, these are east-west roads and paths. There is a lesser level of immediate interaction for the two locations where the local roads will go over the proposed Expressway.

There are eight connections across the proposed Expressway via underbridges (not including Ngarara and Smithfield Roads which go over the proposed Expressway and the two pedestrian bridges):

- Poplar Avenue;
- Raumati Road;
- Ihakara Extension/Wharemauku Stream;
- Kāpiti Road;
- Mazengarb Road;
- Otaihanga Road;
- Waikanae River; and
- Te Moana Road.

Furthermore, while local road users will primarily be people in vehicles, the most important consideration in urban planning terms is for people walking, cycling or otherwise moving east/west under the proposed Expressway.

Poor quality underbridges may encourage people not to walk or cycle, or may direct them to use less direct alternative routes. In many instances people may choose to use a car instead or if without access to a car (like children, older people or those on low incomes) not make the trip with consequent loss of

benefit. As part of the proposed Expressway Project, it is proposed to provide two pedestrian overbridges. Apart from these there are no alternatives to moving under the proposed Expressway in the more urban areas. This reinforces the importance of the design of these underbridge spaces for users.

16.4.3.2 Local roads at grade

Experience with underbridge locations is that these can be uncomfortable places that people will avoid if poorly designed.

One of the premises of the design process was a preference to have local road crossings that cross the proposed Expressway at the existing level of the local road, as on balance this was a better option than using bridges over the proposed Expressway. The slopes of any bridges would discourage walkers and cyclists, inhibit mobility impaired people and people of an older age. Bridges over the proposed Expressway would also obstruct a number of property accesses fronting the local road in the vicinity of the ramps leading to the bridges; the longer the bridge ramps (to lower the gradient for vehicles and people to climb), the more properties that are affected by bridge ramps.

16.4.3.3 Light

Where people walk and cycle on local road crossings in large numbers, the north and south bound lanes of the proposed Expressway will cross over on separate bridges. This is to allow natural light beneath the bridge to provide a lighter experience enhancing the amenity of this underbridge space.

The proposed Expressway design also includes lighting for the walkway/cycleway along the most populated path lengths. Under the current design, the illuminated walkway/cycle way section starts from Raumati Road, carries on across Kāpiti Road and through to Mazengarb Road. Urban design workshops identified that there would be benefits from lighting on walkway/cycleway routes, particularly where there is potential for early evening use in the darker winter months by school children and commuters. A potential adverse effect from lighting however, is that this would attract people to the route at night which if there is limited use may make it unsafe given the lack of mutual surveillance.

The other effect may be light spill to adjacent properties. These lighting effects are addressed in Technical Report 8, Volume 3 and in Chapter 18 of the AEE.

16.4.3.4 Abutment forms

Abutment forms will generally be angled back on the underside of bridges over local roads and paths frequented by people. Vertical walls on the underside of bridges, combined with the normal width of footpath (1.5m), can create an over-bearing scale that is uncomfortable for pedestrians. The proposed angling back of bridge abutments (termed spill-through abutments) seeks to achieve a more light and open space. The abutment surfaces will have texture, colour and utilize local materials to provide visual relief and interest to pedestrians, which will be important given the scale of the proposed Expressway structures. The abutments forms and the architecture of the bridges are consistent and have been designed in a coordinated process. The aim is to ensure that the lead in to the underbridges on either side encourages pedestrian and cycle movement under. There will be consistency within the ‘family’ of bridges given their number and frequency.

16.4.3.5 Bridge forms

The design process considered a number of options for bridge forms, with the preferred design being one that seeks to integrate the main bridge components (barrier, deck, cross heads, piers) so that they visually 'read' as one shape and thus provide more fluid and sculptural forms that are aesthetically pleasing.

There is provision also to uplight these forms to highlight their sculptural shapes and to similarly add to the experience for people moving under the bridges after dark. A consideration of bridge forms in context with the surrounding landscape is considered in the visual and landscape assessment in Chapter 17 of the AEE.

16.4.3.6 Safety

The safety of the spaces beneath bridges has been carefully considered. A safe environment will be created by:

- providing clear lines of sight for people walking or cycling beneath;
- having sufficient path space that cyclists and walkers are not pushed close to moving vehicles and so at risk from being hit;
- providing good light levels to provide clear visibility;
- ensuring there are no spaces where people can conceal themselves and confront or attack unsuspecting users;
- maintaining direct visual contact between vehicles passing and walkers or cyclists (passive surveillance); and
- encouraging by the quality of the space, high levels of use by walkers, cyclists.

16.4.3.7 Other structures

The other key structures that have been carefully considered in urban design terms are the proposed noise barriers. It is noted that, where practicable, noise 'bunds' (shaped raised ground) will be used as physical barriers between the proposed Expressway and the noise receiving environment.

16.4.3.8 Expressway user experience

The primary focus of the urban design assessment has been from the point of view of the local area and residents. However, the amenity values that users of the proposed Expressway will experience also need to be considered: such users will be local residents, visitors to the District and people passing through the District.

People's experience and perceptions of the proposed Expressway and its aesthetic coherence will relate to the sections of the highway network that extend beyond the project area. To this end, coordination has occurred between the designers of the other RoNS projects.

In particular, it has been determined that the sections of the network from north of Transmission Gully will all have a similar context (a coastal plain) and that there is some logic to coordinating the designs of these three sections. This includes:

- highway furniture used (lights, barriers, signs etc);
- median width which will range between 4 and 6 metres and shoulder widths of 2.5 metre;
- design speeds (generally 110kmh) and geometry; and
- landscape treatment.

In addition, consideration has also been given to consistency of bridge design. The proposed Expressway will generally pass over local roads until the north end where the land uses are more rural and the arrangement reverses so local roads bridge over the proposed Expressway.

16.4.3.9 Rural & open space area amenity values

The proposed Expressway passes through areas that are zoned rural and open space in the District Plan as well as urban areas. These rural and open space areas are generally quiet, characterised by low density (or no) housing and local roads with relatively low traffic volumes. Agricultural uses include pastoral grazing.

The maintenance of amenity in rural and open space areas primarily relies on the avoidance and mitigation of adverse visual and noise effects.

One of the guiding principles for the Project team was to design the proposed Expressway so that it sits as low into the landscape as practicable. In areas of duneland, the existing topography assists in achieving this outcome. However, the need for bridging will result in the proposed Expressway being visible in many places. In addition, some sections of the alignment, such as the northern-most end, have few natural landforms that will assist in screening the road.

The proposed Expressway design includes substantial earthworks. Consideration has been given to how the edges of the proposed Expressway can be contoured to provide some visual screening where practicable. Noise walls/fences and retention of existing vegetation will also be utilised with the aim of so far as practicable having the proposed Expressway blend into the rural and open space environments. For further detail on mitigation measures, refer to the full assessment of effects on visual amenity included in Chapter 17 Landscape and Visual of this AEE and in the ULDF (Technical Report 5, Volume 5)

Notwithstanding the proposed mitigation, the proposed Expressway will alter the amenity values of the rural and open space, although this effect will be reduced by distance from the proposed Expressway. In some locations, particularly in locations that currently have little current traffic and are close proximity to the proposed Expressway, the effect on existing amenity values will be significant; in other areas, the presence of existing natural landforms and vegetation will assist in mitigating such effects. To a degree, such a change is an anticipated outcome of realigning the State highway, and it would be unreasonable and impracticable to seek to fully avoid or mitigate all potential effects on amenity values, particularly in a rural environment in which a State highway is not out of context or inappropriate.

The low density of housing in the rural sections of the proposed designation, and the selection of the proposed Expressway alignment, has resulted in few houses being within close proximity to the proposed Expressway. Along most of the rural sections of the route, the width of the proposed Expressway designation provides a sufficient corridor in which an appropriate level of mitigation can be provided in regard to visual and acoustic attenuation. However, the visual and noise environment will undergo a significant change, albeit that it can be mitigated to some extent as to its severity.

16.4.3.10 Urban amenity values

The proposed Expressway will pass through a number of urban environments (Raumati, Waikanae and Paraparaumu) that are characterised by relatively moderate to low ambient noise levels (depending on local traffic characteristics), low to medium density residential use, and well-established vegetation. The long history of roading designations has prevented development within the designation corridor, which is approximately 100m wide, along most of the proposed designation. Where the proposed Expressway deviates from previous designations, the wide corridor is proposed to be continued, partly to provide a buffer distance, and also to allow for appropriate mitigation to be provided.

In the development of the proposed Expressway, a key component of the decision-making process on its alignment and design was to ensure the best practicable level of amenity value within urban areas. A focus was also made on the needs of the most vulnerable and those people most affected by adjacency such as at schools. To achieve the best practicable amenity visual and acoustic effects were considered in an integrated design process. The main decisions made were to:

- align the proposed Expressway to maximise the separation distance from neighbouring residential areas where practicable;
- set the proposed Expressway as low as practicable into the landscape, making use of natural landforms where practicable;
- using earth bunds integrated within the natural landforms (as a first preference to a noise wall) that have the dual purpose of noise attenuation and visual screening; and
- using landscape treatment and planting to provide visual screening to the proposed Expressway as well as for noise wall structures.

Based on the proposed alignment and design of the proposed Expressway, including the extent and form of noise and visual mitigation, it is considered that a reasonable standard of amenity will be achieved (the assessment of visual and noise effects are outlined in Chapters 17 Landscape and Visual Effects and Chapter 19 Noise and Vibration of this AEE). There is no doubt that the appearance of the area will change (as it would have with other roads or urban developments such as at Ngarara), but the available corridor width (generally 100m) and the attention to the design of the landscape and architecture of structures that occurs within it is aimed at making the change as attractive as practicable.

In regard to the proposed Expressway structures, a principle of the ULDF was to recognise the importance of interchange and bridge structures in terms of creating a quality environment at local roads and adjacent communities. The Kāpiti Interchange will become a key link to the Paraparaumu town centre and is surrounded by a mixture of relatively low visual amenity commercial, industrial, health-

care and residential uses. There are long term plans for the general town centre area to be significantly redeveloped. Given this context, the design, bulk and scale of the interchange (including the proposed landscape treatment) will not detract from the existing visual amenity and can be integrated with the redevelopment of the town centre area over time.

At the proposed Te Moana interchange, which is flat and more open, the proposed Expressway is elevated and so the effects on visual amenity from private properties and Te Moana Road will be high. The effects on landscape character of the quiet suburban/ rural area as a result of the landform modification, interchange structures and the activity on the proposed Expressway will also be very high.

Consultation has identified that some local residents have concerns that the Te Moana interchange will increase traffic flows along Te Moana Road to the existing SH1. However, traffic modelling shows that there will be a reduction of traffic volume on Te Moana Road once the proposed Expressway is operational. This is because those vehicles travelling from Waikanae Beach and the western areas of Waikanae intending to go south (towards Paraparaumu) will be likely to use the Te Moana interchange. These vehicles will thus no longer need to travel all the way up Te Moana Road to the current highway. This reduction in traffic volumes will result in an improvement in amenity values for residents between the interchange and existing SH1 (especially walkers and cyclists, including children commuting to school).

The proposed partial interchanges at Poplar Avenue and Peka Peka are located in areas where they would be visible to a limited number of residences, and the proposed landscape treatment would assist in attenuating the visual impact on the amenity values of these vicinities.

The design and positioning of the other bridge structures have been fully addressed in the development of the proposed Expressway design to reduce their visual presence: for example, the lowering of a section of Mazengarb Road to reduce the elevation of the proposed Expressway as it crosses this road.

The potential shading effects of the proposed Expressway structures and associated embankments were considered during the design development process, including the shading effects of noise attenuation structures. The potential for shading effects to occur is limited to several areas of housing in relatively close proximity to the proposed Expressway, where early morning or late afternoon shading may occur at times of the year. However, any such shading that may occur would be consistent with District Plan requirements.

For a number of residential properties, the presence of open space within the existing designation makes a significant contribution to their amenity values. This undeveloped space has enhanced amenity values by creating higher levels of privacy, lower levels of noise and a sense of openness. As much as practicable, the alignment and design of the proposed Expressway, including the proposed use of earth bunds and planting, seeks to mitigate the effects of the Project on these values to an acceptable level, notwithstanding the corridor has long been identified for major roading purposes.

An assessment of air quality effects from traffic was undertaken (Chapter 20 Air Quality of the AEE), which found that people living within 200 metres of the proposed Expressway will have a slightly increased exposure to vehicle related contaminants as a result of the Project, compared to existing ambient levels. However, this increase would have a low level of effects and would meet accepted air quality standards. In addition, the maximum ground level concentrations of all vehicle-related

pollutants are predicted to decrease between 2016 and 2026, largely as a consequence of predicted improvements in the vehicle fleet. Accordingly, it is considered that any effects on amenity values from changes in air quality would be minor.

In summary, the proposed Expressway will introduce a large piece of infrastructure into a currently vacant corridor, which has been set aside for the past 50 years to construct a major road. There will inevitably be adverse effects on existing amenity values of residents adjoining the proposed Expressway, due to the existing quiet and open environment. The Project intends to mitigate these adverse effects on amenity values to a level suitable for adjoining urban land uses: the types of mitigation are described below in section 16.5.

16.4.3.11 Recreational amenity values

It is considered that there will be, in overall terms, positive effects for walking, cycling and horse riding recreational users from the construction of the proposed Expressway given that current formal networks are not only being retained but also significantly added to and connected by the development of the proposed shared walking and cycle path along the proposed Expressway route, parts of which can also accommodate horse riders.

In regard to the Waikanae River corridor, the construction of the bridge will create significant adverse visual effects. It will not be possible to mitigate all adverse effects generated by the bridge. A detailed assessment of visual and landscape effects are included in Chapter 17 of the AEE.

16.5 Measures to avoid, remedy or mitigate actual or potential adverse effects on urban form and function

Many of the potential adverse effects on urban form and function have been addressed through the design process. Set out below are the elements of the Project where proposed conditions will address effects that have not been fully avoided, remedied or mitigated.

- Challenging elements in the proposed Expressway design that have yet to be fully resolved - in these situations, enough design work has been done to satisfy the Project team that there is an ability to resolve design issues in further stage of detailed design; and
- Where there will be adverse effects that cannot be avoided or remedied by further design changes and will need some other form of mitigation.

The suite of conditions proposed by NZTA is set out in Chapter 33 of this AEE.

16.5.1 Summary

The potential adverse environmental effects on the form and function of areas the proposed Expressway will pass through will be suitably avoided and / or mitigated. This will be achieved through the elements detailed in the Plan Set at Volume 5, and conditions on the designation .

17 Landscape and visual

Overview

The proposed Expressway will be a large roading infrastructure element that will result in changes to the landscape. The scale of the necessary earthworks in conjunction with the scale and elevation of the various associated structures (i.e. bridges, retaining walls and noise fences) will have landscape and visual effects and, in places, these effects will be adverse. Conversely, the proposed planting will strengthen the framework of vegetation throughout the District, and the recreational values for locals and visitors will be enhanced with the proposed cycleway/walkway along the route.

In some areas, there will be some significant adverse landscape and visual effects, arising from both the construction and operation of the Project. A best practice approach has been taken to avoid effects as far as practicable.

The landscape and visual team, as part of the Expressway Project team, have provided advice and input throughout the design process to avoid or reduce adverse landscape and visual effects as far as practicable through good design. For example, this input included working with a multidisciplinary team to determine the Best Practicable Option for noise attenuation along the proposed Expressway.

Where avoidance of all adverse effects has not been practicable, various mitigation measures have been proposed and included in the design of the proposed Expressway. These measures have been informed by the urban and landscape design principles developed for the Project and documented in the Urban Landscape and Design Framework (ULDF) (Technical Report 5, Volume 5). In relation to landscape and visual effects, earth bunding and associated planting are the primary mitigation measures proposed.

The complete assessment of landscape and visual effects is contained in the Assessment of Landscape and Visual Effects Report (Technical Report 7, Volume 3).

17.1 Introduction

This Chapter presents an assessment of the landscape and visual effects of the proposed Expressway Project, including the proposed earthworks and new structures.

The assessment extends over a range of different landscapes along the 16km proposed Expressway alignment and describes the mitigation measures NZTA is proposing to undertake that are tailored to these individual areas.

Full details of the assessment of landscape and visual effects undertaken are contained in Technical Report 7, Volume 3. All landscape and visual drawings (illustrating effects and proposed mitigation) associated with this assessment can be found within Volume 5.

The ULDF (Technical Report 5, Volume 5) defines the existing environment and the design rationale that has informed this assessment.

The assessment of landscape and visual effects has, in part, drawn on information contained in other Technical Reports in Volume 3, particularly:

- Ecological Impact Assessment (Technical Report 26)
- Assessment of Hydrology and Stormwater Effects (Technical Report 22)
- Assessment of Traffic Noise Effects (Technical Report 15)
- Assessment of Construction Noise Effects (Technical Report 16)
- Construction Methodology Report (Technical Report 4).

Some environmental effects that would often be included as part of a landscape and visual assessment, such as urban design matters and effects on cultural landscape values, have been addressed by other Technical Reports, particularly:

- Urban and Landscape Design Framework (Technical Report 5, Volume 5)
- Assessment of Urban Planning and Design Effects (Technical Report 6, Volume 3)
- The Takamore Trust Cultural Impact Assessment (Technical Report 11, Volume 3)
- Te Rūnanga o Āti Awa ki Whakarongotai Inc Cultural Impact Assessment (Technical Report 12, Volume 3).

17.2 Existing environment: landscape and visual

To assess the landscape and visual effects of the Project, an understanding of the existing landscape and visual environment is required. The following subsections provide a short description of the existing landscape context and visual amenity of the environment.

17.2.1 Landscape context

17.2.1.1 The regional landscape

When considered at a regional level, the topography of the Project area is relatively flat, located on the relatively narrow coastal plain between the Tararua Ranges and the Tasman Sea.

The Kāpiti coastal plain is located at the southern end of an extensive coastal sand country land system, which extends from Paekākāriki to Hawera. With the exception of the alluvial deposits on the Waikanae River floodplain, the entire proposed Expressway is situated on sand country; a complex of old sand dunes, interdunal hollows, sand plains, peatlands and drained swamplands.

The sand country land system has been significantly modified through drainage and vegetation clearance, originally for farming but subsequently for residential, rural lifestyle, and horticultural development.

The Tararua Ranges, coastal escarpments and Kāpiti Island are distinctive and defining landforms, which are well recognised and visible from many locations throughout the Kāpiti district.

17.2.1.2 The local landscape

At a local scale, the remaining dunelands and waterbodies are significant features of the local landscape.

The proposed Expressway passes through a variety of smaller landscapes – residential areas, open farmland, vegetated dunelands, and rural lifestyle areas, each with a different and distinctive landscape character.

17.2.1.3 Western Link Road designation

The proposed Expressway generally follows the existing WLR designation, but in places the alignment departs from this.

The long history of roading designations in this corridor has resulted in a corridor of open space, providing a separation and buffer between residential areas in some places. Many of the dunes within the existing WLR designation remain today only because of the 'protection' that that designation and previous designations have provided over the previous decades (since the 1950s). This is particularly evident between Kāpiti and Mazengarb Roads, where land beyond the existing WLR designation has been flattened to facilitate residential and industrial development, while the dunes within the designation have remained relatively intact.

In places along the proposed Expressway route, residential subdivision has been developed right up to the existing WLR designation, whereas in other places, especially in the northern section, large tracts of farmland remain, together with relatively recently developed pockets of rural lifestyle holdings.

17.2.2 Existing amenity

This assessment specifically considers the visual aspect of amenity. Visual amenity is a component of the overall amenity values of a place. Amenity includes a combination of many factors, such as, visual amenity, ambient noise, air quality, and recreational and cultural attributes.

The existing environment along the proposed Expressway route can be categorised into four amenity types - rural/open space amenity, urban/industrial amenity, suburban amenity, and highway/road amenity - described in Table 17.1 below:

Table 17.1: Amenity types

Rural /Open space amenity	Suburban amenity	Urban /Industrial amenity	Highway/Road amenity
■ Sense of spaciousness ■ Productive farmland and associated elements and patterns, fences, shelterbelts grazed pasture. ■ Privacy, relative quietness and minor traffic and bustle, rural noises such as machinery and stock may be present. ■ Environment relatively uncluttered by structures, buildings and artificial features. ■ Natural landforms, waterbodies, trees and vegetation are dominant.	■ Relatively small spaces enclosed by buildings, fences and vegetation. ■ Background neighbourhood sounds and smells, activity on streets, in parks and within residential sections, differing levels of noise and activity occur at various times (weekends, week days, evenings, night time). ■ Visually dominated with buildings, structures and domestic vegetation. ■ Hard surfaces dominant in street environment, natural landforms/waterbodies less prominent.	■ Buildings and structures are dominant, with relatively large bulk and often with tall and broad facades close to the street boundary. ■ Exterior spaces enclosed by buildings and fences. ■ Relatively high traffic activity, and busy road environment. ■ Hard surfaces dominate, natural features and vegetation a minor element.	■ Linear space, often enclosed by residential/industrial development/vegetation. ■ Traffic activity and noise are dominant features, also dust and exhaust fumes on busy roads. ■ Linearity of road provides strong directional axis of view, can be visually cluttered in built up areas, including signage, lighting, parked and moving vehicles. ■ Hard/artificial surfaces dominate. ■ Physical personal safety a perceived and actual issue.

17.3 Actual and potential landscape and visual effects

17.3.1 Assessment methodology

The proposed Expressway route passes through a range of landscape types, including, rural, rural lifestyle, suburban, industrial, open space and river environments. Twelve landscape character areas are identified in Table 17.2.

Table 17.2: Landscape Character Areas

	Sector 1	Sector 2	Sector 3	Sector 4
Landscape Character Areas	Queen Elizabeth Park	Raumati Road	Otaihanga South	Ngarara
	Raumati South	Wharemauku Basin	Otaihanga North	Peka Peka South
		Kāpiti-Mazengarb	Waikanae River	Peka Peka
			Te Moana	

The landscape and visual effects of the Project in relation to each of the landscape character areas were assessed and consideration given to the following three interrelated components:

- Biophysical - This considers the extent and significance of modifications to landforms, waterbodies and vegetation.

- Visual amenity - Visual amenity is a component of the overall amenity and therefore contributes to peoples' appreciation of the pleasantness and aesthetic coherence of a place. The magnitude of effects on visual amenity is dependent on several factors, including the size of the viewing audience, the sensitivity of that audience, and the degree of the visual change.
- Landscape character - The effects on landscape character relate to changes in land use, (new or different activities), changes to existing patterns and elements in the landscape, such as vegetation, waterbodies, landform, and settlement patterns.

A detailed assessment of effects can be found within Technical Report 7, Volume 3, with a summary of these effects provided within Table 7.3 of this Chapter.

The magnitude of the biophysical, visual amenity and landscape character effects have been based on a seven point scale ranging from extreme to negligible (refer to Technical Report 7, Volume 3).

Consideration of landscape and visual issues early in the design process has meant that there is a significant degree of mitigation already 'built-in' to the design. This assessment therefore, includes the mitigation planting as part of the proposal, rather than as an aspect to be considered separately.

The full assessment methodology is provided within section 5 of Technical Report 7, Volume 3. The main actual and potential landscape and visual effects have been assessed using Part 2 of the RMA as a framework.

17.3.2 Temporary effects

The construction effects are relatively short term (approximately 3 to 4 years) in relation to the life of the Project and therefore are regarded as temporary effects[125]. However, given that construction of the proposed Expressway will not start at one end and progress to the other, many of these temporary effects will occur at different times along different parts of the route during the overall construction period (refer to Chapter 8 of this report for details on the likely construction sequencing).

There will be different construction activities that have the potential to affect the landscape and visual outlook. These construction activities fall into the broad categories of earthworks, structures, temporary fencing and temporary buildings and yards.

17.3.2.1 Earthworks

Given that the proposed Expressway passes through large areas of peatland at various places along the route, specific ground improvement measures will be required.

[125] Temporary effects are regarded in this assessment as those effects created by the construction process; over and above the effects of the earthworks and changes to the landform and vegetation considered in the remainder of the Chapter.

For some properties (especially those in relatively close proximity to the proposed Expressway), the earthworks will be visible for the duration of the ground improvement period. However, this will change when construction has been completed. The ground improvement works will generally be located in predominantly rural or low density residential areas. The residential areas immediately adjacent to the proposed sections of the proposed Expressway where ground improvement works will be required, and potentially the most affected, are the Leinster Avenue, Raumati Road/Rata Road and Midlands subdivision communities.

The total number of residents to whom these ground improvement works will be visible and therefore which will be directly affected will be relatively small.

17.3.2.2 Structures

There will be a lot of activity around the places where the bridges, retaining walls and other structures are being built, especially at the location of interchanges. Many of the bridging and other structural components will be precast off site and transported to the various sites, which will reduce the amount of time and activity at the actual locations where these structures are being built.

Contractors working on construction bridges will need to use floodlights, either portable or temporary, but these will be mounted and directed at the activity areas so that they do not cause glare towards any residential properties or towards roads.

17.3.2.3 Temporary fencing

At the outset of the construction, the area where earthworks and other construction activities will occur will be securely fenced. The sites selected for the establishment of the construction yards are relatively discrete and separated from residential properties. While the fencing around the yards will be visible from public roads and residential areas, it is unlikely to be intrusive or result in any adverse landscape or visual effects.

17.3.2.4 Temporary buildings and yards

Due to the lineal nature of the proposed Expressway, eleven areas along the route will be established to accommodate and service the works at various stages during the construction programme. All yards will be located within the Designation with layouts and access to seek to avoid adverse effects on residents and local road users. The extent of yards will vary according to their purpose (i.e. whether they are a Project Yard, Bridge Yard or Interchange Yard).

Site establishment for the yards will include site clearance, ground preparation, and establishment of erosion control measures prior to any construction activities occurring. Intersection Yards and the Project Yard will be lit at night. While Bridge Yards will probably not be lit at night, bridge construction operations will be (refer to Technical Report 8, Volume 3).

Upon completion of the works, the construction yards will be disestablished and the areas reinstated.

17.3.3 Summary of temporary effects

While earthworks will occur along the entire route, the erection of structures such as bridges and retaining walls, and the location of temporary buildings and yards will occur at specific locations. Consequently the potential landscape and visual effects of these will be limited to site specific areas.

The construction process will have landscape and visual effects for nearby residents and others in the vicinity of the proposed Expressway corridor. In particular, the removal of vegetation and earthworks will be the most significant, and will affect the visual amenity of the locality. During and post construction, the bare earth or hydroseeded surfaces, especially on the elevated embankments, will be most visible and, from some locations, visually prominent. Until the proposed planting is established, the visible earthworks will have a 'bare' or 'new' appearance, contrasting strongly with the established view which it has replaced.

In locations where ground improvement works are required, unvegetated earthworks approximately 2m to 4m higher than the finished road height may be visible for periods of 6 to 24 months. Consequently, the visual effects of ground improvement earthworks are likely to be greater than the final effects of the established proposed Expressway, as the finished proposed Expressway road level will be lower and the embankments planted.

Overall, there is the potential for temporary adverse landscape and visual effects during the construction period.

17.3.4 Biophysical effects

The proposed Expressway traverses 16 km of an undulating dune and peatland landscape. The scale of the proposed Expressway means that substantial changes to landforms, vegetation and waterbodies are not practicably avoidable in places.

The alignment and design has, wherever practicable, avoided areas of intact dunes, indigenous vegetation and wetland areas. In particular, the alignment of the proposed Expressway through the Raumati South character area, which has deviated from the existing WLR designation, has avoided a series of large intact dunes with stands of semi-mature manuka, as well as a natural wetland.

Physical change to the dune landforms, floodplain areas and wetlands cause the greatest level of adverse biophysical effects, as these are permanent changes to natural landforms. Due to the large scale of the physical changes proposed, little effective mitigation is possible, beyond integrating the earthworks into the natural landforms as far as practicable.

In places, intact dunes within the proposed Expressway footprint will be totally removed and in other places they will be modified by cuts or the addition of fill to form bunds. As discussed, many of the dunes remain only because of the 'protection' that previous designations have imposed on the use and development of much of the proposed Expressway corridor.

The construction of elevated ramps at interchanges and bridges also requires significant change to the existing landforms, especially where ramps are required in flat or low lying areas such as the Poplar Avenue, Wharemauku Basin, Te Moana Road, Smithfield Road and the Peka Peka interchange overbridge.

Conversely, in places, the existing height of the dunes is utilised to ramp the proposed Expressway or local road over the intersecting road, such as at the Raumati, Mazengarb, Otaihanga, Ngarara Road crossings. While in these situations the dunes may largely remain intact, the integrity of their natural form would still be significantly modified.

Loss and fragmentation of indigenous vegetation and habitats, while undesirable, can to some extent be effectively mitigated, through replanting, rehabilitation and offset mitigation measures. However, the benefits of such measures will be effective only if they are properly managed and maintained.

The proposed Expressway alignment has avoided all but four wetland areas, three of which lie within the Otaihanga South character area, and which will be fragmented and reduced in size. An area of new wetland proposed in the same character area will go some way to remedy this loss. The large crescent-shaped dune with advanced regenerating indigenous vegetation near Puriri Street, north of the Takamore urupā, will be substantially altered by large cuts and the loss of an area of advanced secondary native vegetation. However, this alignment avoids the need to remove more dwellings in the Te Moana character area.

The proposed riparian mitigation planting on the sections of streams affected by the proposed Expressway will in time improve the indigenous biodiversity and habitat of those parts of the streams.

17.3.5 Visual amenity effects

The proposed Expressway will be an unavoidably visible component in the landscape. Its large scale and the number of elevated structures make it impracticable to fully screen from view. The dynamic aspect of traffic movement visible on the proposed Expressway will accentuate the visual impact. However, for large sections of the proposed Expressway, the remaining dunes, proposed earth bunds, noise walls and planting will screen views of the moving traffic and the proposed Expressway itself.

The effects on visual amenity are rated as very high in three landscape character areas and high in another four. The greatest visual effects are where the proposed Expressway footprint is large and where there are large structural and elevated components (ramps bridges, embankments and noise walls). The magnitude of these effects increases where they are visible to both resident and transient viewing audiences, and when the visual change detracts from existing views and outlooks.

The effects on the visual amenity of the Waikanae River corridor will be extreme in the close vicinity of the proposed bridge, very hight at greater distances. The River corridor's high natural and recreational values and its status as an Outstanding Natural Landscape make this area sensitive to change. While the visual effects would be severe within close proximity of the bridge (i.e. within approximately 200m), they diminish with distance and with intervening vegetation.

Similarly, the bridge and embankments crossing Wharemauku Stream introduce large elevated features into a relatively flat and undeveloped landscape, reducing the openness of the area and restricting views to Kāpiti Island from some locations. The proposed interchanges at Kāpiti Road and Te Moana Road include large elevated structures, crossing busy local roads and in residential areas, therefore impacting on a large viewing audience.

In places, the changes the proposed Expressway will produce in relation to altered landforms or mitigation planting will not necessarily adversely affect visual amenity but will simply be different (e.g. along Makarini Street). For a large section of the proposed Expressway between Kāpiti and Mazengarb Roads, the residents on the eastern side currently have views of the remnant dunes in the existing WLR designation. Some of these dunes will be reduced in height and in places earth bunds will be constructed so traffic on the proposed Expressway will not be visible. Planting proposed on these new landforms will, in time, replace the scrub with a backdrop of trees and other vegetation.

At some locations, the effects on visual amenity for residents immediately adjacent to the proposed Expressway will be adverse, particularly for residents who lose views of open space and for whom traffic becomes a prominent element of the foreground view (e.g. Chilton Drive).

The magnitude of effects on visual amenity range across six of the seven point spectrum (from extreme to low) depending on the location of the viewpoint (refer to Table 17.3).

17.3.6 Landscape character effects

The landscape character varies along the proposed 16km route; there are areas with distinct rural, rural lifestyle, residential, urban, industrial, and highway characters. As a large section of roading infrastructure, the proposed Expressway will introduce a new type of activity and character into these areas.

The proposed Expressway will bisect the landscape, interrupting the natural topography and waterbodies, as well as man-made patterns such as settlements, plantations, shelterbelts, roads and accessways.

The degree of change to the existing landscape character relates to the scale of the proposed Expressway footprint and the size of the various structures. The change to landscape character will generally be the greatest in the immediate vicinity of the footprint; however, with increasing distance from the proposed Expressway these effects will lessen.

The least effect on the existing landscape character occurs where the proposed Expressway is close to the existing SH1 and NIMT rail corridor, which is already a busy transport environment. While the proposed Expressway will contribute to this character in these areas, in other areas it will be an unfamiliar element, notwithstanding that much of the route lies in a corridor that has long been identified for a major road.

For most of the route, the changes to landscape character are rated high. In three character areas, the changes will be very high – Wharemauku Basin, Waikanae River and Te Moana. In these locations, the scale of the proposed Expressway structures and the activity that the proposed Expressway will introduce will significantly change the existing landscape character.

17.3.7 Summary of effects

The biophysical, visual amenity and landscape character effects of the Project within each of the twelve landscape character areas are summarised in Table 17.3. These effects have been assessed with the inclusion of the mitigation measures that have been an integral part of the design from the outset. That is, earth bunds, noise attenuation structures and planting.

Table 17.3: Summary of landscape and visual effects by character area

Character Area	Biophysical	Visual Amenity	Landscape Character
QE Park	low	low	low
Raumati South	moderate	high	high
Raumati Road	high	high	high
Wharemauku Basin	high	very high	high*
			very high**
Kāpiti Mazengarb	high	high	high
Otaihanga South	very high	low	high
Otaihanga North	high	moderate	high
Waikanae River	moderate	extreme***	very high
		very high****	
Te Moana	high	very high	very high
Ngarara	high	moderate	high
Peka Peka South	moderate	moderate	high
Peka Peka North	moderate	high	high

* Considered in the context of a future built environment with the development of the town centre, the effects on landscape character would be high

** Considered in relation to the existing open space environment, the effects on landscape character would be very high

*** In close proximity to the bridge

**** At greater distances where the bridge is visible

17.3.8 Natural character

The proposed Expressway crosses eleven watercourses, most of which currently have a low level of natural character, due to being channelised, with poor riparian vegetation and low in-stream ecological value. However, the Waikanae River has a high level of natural character.

The imposition of the large scale of the proposed Expressway where it crosses these streams will have an adverse effect on the natural character in terms of perceived naturalness. It will also affect the natural character in a biophysical sense because of the loss of habitat in the long culverts.

However, the proposed riparian restoration/enhancement of sections of the streams will improve the ecological value and natural character of these particular stream sections.

Small parts of some of the larger wetlands will be lost, which will adversely affect their natural character. In addition, three small and high value but modified wetlands in the Otaihanga character area will be either lost or seriously compromised by construction of the proposed Expressway, which will have serious or very high adverse effects on their respective natural characters. However, the new off-set wetland proposed in this character area, once established, will go some way to compensate for the decreased natural character of the existing wetlands.

The loss of natural character in the immediate vicinity of the proposed Waikanae River bridge would be very high because of the realignment of the Muaupoko Stream in this vicinity, the confinement of the main river channel by riprap and by having the bridge overhead. However, in the context of the River over its entire length, the effect on its natural character would be low.

17.3.9 Outstanding natural features and outstanding natural landscapes

Short sections of the proposed Expressway are in close proximity to the former coastal escarpment, (at Raumati and Peka Peka), and where the proposed Expressway crosses the Waikanae River corridor – these landscapes have been scheduled in the Kāpiti Coast District Plan as Outstanding Natural Landscapes (ONL).

The proposed Expressway would not have any effects on the two escarpment ONLs. However, in relation to the Waikanae River ONL, the effects of the proposed Expressway bridge crossing would be moderate when considered in terms of the ONL overall but, in the immediate vicinity of the river crossing, the effects on the natural and landscape values would be extreme.

17.3.10 The effects on natural components (biophysical aspects) of the landscape

The physical changes to the dunes and other landforms, features and waterbodies will adversely affect the quality of the environment along the proposed Expressway route. However, the large areas of the proposed Expressway corridor to be planted with predominantly locally eco-sourced indigenous vegetation will improve the biophysical aspects of the environments along the route.

17.4 Summary of landscape and visual effects

The proposed Expressway is a large piece of infrastructure that will result in changes to the landscape. The scale of the footprint, the earthworks, size and elevation of the various associated structures such as bridges, retaining walls and noise structures that comprise the proposed Expressway, will have adverse landscape and visual effects which are unavoidable, even with the substantial mitigation that is proposed as part of the design.

Due to the relatively populated area, through which the proposed Expressway would pass, there is a large potential resident and transient viewing audience. For the majority of those residents that would be able to see the proposed Expressway, the visual effects would relate to a change of view, not necessarily adverse, but different. Mostly, the proposed Expressway would be experienced as planted

bunds, beyond which traffic is not visible. However, some nearby residents will be adversely affected through loss of views or inability to practicably screen views of traffic.

The large transient viewing audience will experience the proposed Expressway for short periods of time at local road crossings and at interchanges.

The Waikanae River is highly valued by the community for its recreational, natural, and 'wild' values and is recognised in the District Plan as an outstanding natural landscape. The proposed Expressway bridge over the Waikanae River, with associated buttresses, rip rap, re-alignment of Mauapoko Stream will significantly change the immediate river corridor environment. Once established, tall vegetation proposed adjacent to the walkways will generally screen views of the structures from more distant locations up and down river. However, the effects on natural character, visual amenity, the 'wild' and natural values and the tranquillity in close proximity to the bridge will be unavoidably permanent and significant.

Largely, the adverse effects relate to (or correlate with), the relatively short time frames associated with construction and the subsequent five to ten years when the proposed Expressway will be a 'new', unfamiliar feature in the landscape. For many years, the works and mitigation planting will have a raw and immature appearance, which will contrast to the long established and undisturbed adjoining landscape. In the longer term however, over the successive decades, the landscape change (earthworks, vegetation, interchanges) will mature and become part of the landscape fabric of the district.

While the landscape and visual effects of the proposed Expressway have been considered in the context of the existing environment, this will also continue to change over time. The Paraparaumu and Waikanae areas are predicted to continue growing, as reflected in the District Plan provisions that provide for expansion of urban and residential areas such as the development of Kāpiti Airport, the town centres, and various plan changes such as the Waikanae North Development Zone, Waikanae North Urban Edge, and Ngarara. The form of these developments, in part, will be influenced by the presence of the proposed Expressway and over the long term the proposed Expressway will become integral element of a popular, fast-growing and increasingly developed area.

17.5 Measures to avoid, remedy or mitigate actual or potential adverse effects on landscape and amenity

17.5.1 Mitigation through design

As part of the proposed Expressway Project, the landscape and visual team have provided advice and input throughout the design process to avoid or reduce adverse landscape and visual effects as far as practicable through good design, rather than simply relying on landscape mitigation.

The key principles that guided the landscape input to the proposed Expressway design process included:

- To avoid, where practicable, disturbance of intact natural landforms, water bodies and areas of indigenous vegetation. Where avoidance is not practicable, to minimise the extent of modification;

- To recognise the diverse local character of the landscape along the route and reflect that character through landscape design and plant species selection;
- To seek to achieve a design where the proposed Expressway integrates into the landscape as far as is practicable;
- To recognise the importance of retaining existing vegetation (exotic and indigenous), to provide a basis on which to develop a vegetation framework;
- To seek to include environmental benefits where practicable - for example, biodiversity;
- To recognise that the visual and amenity effects on the receiving communities have precedence over proposed Expressway user visual and amenity experience;
- To seek to ensure proposed plantings are sustainable in the long term through use of appropriate planting medium, appropriate species, locally eco-sourced species and effective maintenance regimes;

Importantly, the proposed mitigation measures have been considered as part of the overall proposed Expressway design, rather than 'add-on' mitigation measures. As an example of this, the inclusion of planting along the proposed Expressway corridor, and its design, was an integral part of the Project design process from the outset.

17.5.2 Mitigation of temporary effects

As previously described, the actual and potential adverse landscape and visual effects arising during the construction process will be temporary.

While the overall construction period spans three to four years, the likely construction programme would be undertaken in a sequence of construction zones. These start from separate locations and work over different sections at a time, so that activities such as vegetation clearance and bulk earthworks will be limited to a much shorter period from any one viewpoint.

An Ecological Management Plan and a Landscape Management Plan[126] have been prepared for the Project (refer to Appendices M and T of the CEMP, Volume 4). These documents outline methods and monitoring necessary for managing the adverse landscape and visual effects of construction. Some of the key elements to these Management Plans include:

- *Retaining existing vegetation:* Through recognised protection techniques, particularly at the 'site establishment' phase of construction, groups of trees, stand-alone mature trees, and residual amenity plantings on residential properties that are affected by construction can be retained and protected. The areas of vegetation to be retained are identified in the Vegetation Map, Volume 5.

[126] It is anticipated that these documents will be a 'live' document and will be updated and revised as the construction methodology and practices for managing ecological and landscape effects change over time.

- *Re-vegetation*: Exposed, recently earthworked areas will be visible but this will change as the hydroseeded grasses germinate and become established. The visibility of earthworks will change once the final planting is completed and as the plants grow the landscape and visual effects will progressively lessen. Timely revegetation (for soil stabilisation) is included in proposed consent conditions addressing erosion and sediment control.
- *Buffer zones to limit light spill*: A 10.0m buffer zone between any equipment requiring light and a residential boundary and lighting layout and design for the construction yards will be reviewed and approved by an accredited illumination engineer to seek to avoid adverse environmental effects from lighting prior to it being installed. Details on temporary and construction lighting are addressed in the Assessment of Lighting Effects report (Technical Report 8, Volume 3).
- *Reinstating construction yards*: Upon completion of the works, the construction yards will be disestablished and the areas reinstated.

17.5.3 Mitigation of long- term effects

Mitigation measures involving shaping of earthworks to integrate them with the surrounding topography, in conjunction with planting, are fundamental aspects of the Expressway proposal.

The landscape mitigation measures proposed seek to address two aspects in particular:

- *Effects on biophysical factors*: by retaining existing trees and vegetation where desirable and practicable, earth bunding and contouring of earthworks, and planting to seek to integrate the proposed Expressway into the fabric of the surrounding landscape.
- *Effects on the visual amenity from beyond the corridor*: by including measures that can as far as practicable, screen views of the proposed Expressway, associated structures, and traffic movement, particularly for nearby residents. The measures include earth bunding and planting.

As discussed, there is a crossover between landscape mitigation measures and those carried out for other reasons, particularly those to be carried out for noise, stormwater management and ecological purposes.

17.5.3.1 Contouring of earthworks

While the land along much of the route is flat, sand dunes of various heights and inter-dunal hollows are landforms that significantly contribute to landscape character. They also provide considerable scope to assist with integrating the proposed Expressway into the landscape. Construction of the proposed Expressway will significantly modify the landscape and, in places, totally alter and transform the dunes, which in some areas are restricted to narrow, isolated bands.

Given the level of disturbance that will occur to the dunes, it will be important to ensure that the cut faces and batter slopes are 'tied in', both physically and visually, with the adjoining, undisturbed dunes. Sometimes, this will entail re-shaping a much larger area than that simply required to construct the road itself in order that all the 'faces' of a modified landform are effectively integrated (refer to Technical Report 5, Volume 5).

At the detailed design stage, minor adjustments to the final contour plans may be needed to ensure the earthworks fully integrate with the existing landforms at a site specific level.

17.5.3.2 Noise bunds

The shape of bunds is important in that bunds need to relate to their context and, ideally, have a 'natural' appearance. The way these bunds tie in with existing and new landforms will require careful attention at the detailed design stage. While drawings can illustrate the forms of bunds in a general sense, their successful integration will rely on the interpretation by the contractors and monitoring the execution of the earthworks.

17.5.3.3 Noise walls and fences

Noise walls have been designed in relation to their context. Generally, there will be planting along the 'Expressway side' of the timber noise fences, as part of overall landscape mitigation. It is intended that earth will be mounded some way up the external faces of the concrete noise walls to partly 'bury' them on one side. The earth ramps will also be planted, further integrating them into the landscape and seeking to screen them from view from beyond the proposed Expressway corridor.

17.5.3.4 Retention of existing vegetation

There are patches of existing vegetation that are proposed to be retained, while in some places there are just individual trees. Retention of existing vegetation is a key mitigation measure, which can assist with integrating the proposed Expressway into the landscape.

In several areas where the retention of existing vegetation is proposed, the planting of adjoining areas is based on the presence of the particular type of existing vegetation. If, for some reason, the existing vegetation were to be removed then this could affect habitat, landscape character, and the success in establishing the proposed new planting. Given that screening of the proposed Expressway and associated structures is part of the mitigation strategy, retaining existing vegetation is an important consideration.

17.5.3.5 Planting

In landscape terms, planting will:

- Enhance local landscape character;
- Integrate earthworks with adjoining topography / vegetation;
- Enhance local biodiversity;
- Reinforce or complement existing vegetation to be retained;
- Screen views of the proposed Expressway, associated structures and traffic on the proposed Expressway;
- Screen views of noise fences;
- Seek to maintain visual amenity for residents; and

- Enhance cycleway/walkway amenity.

Nine planting types are proposed for the Project area (with the location of proposed planting illustrated within Technical Report Appendices, Report 7, Volume 5):

- Mass Planting - *Trees and/or shrubs (which are typically native species) with either a simple palette e.g. 1 species- kanuka or, revegetation style mixture of species;*
- Mass planting with tree enrichment - *As above with additional planting of tree species;*
- Specimen trees underplanted with groundcover species: *Mixed shrubs/groundcover species (native or exotic) including specimen trees;*
- Trees with grass - *Mown or grazed grass with large exotic or indigenous trees;*
- Riparian planting - *Planting along streams and wetlands margins;*
- Wetland planting - *Mixed wetland species for ecological and stormwater wetlands;*
- Stormwater treatment wetlands – As above;
- Flood storage areas - *Excavated areas of damp or soggy ground for flood storage*; and
- Mown Grass.

17.5.3.6 Terrestrial planting

Terrestrial planting (planting on land) will involve the following:

- All areas disturbed by earthworks will be hydroseeded on completion to provide stability and to control silt runoff. For the areas being returned to grazing, pasture grasses will be used as this will be the final vegetation cover.
- Areas to be planted in woody vegetation will be either blanket sprayed or spot sprayed, depending on the type of planting being carried out. All areas planted in woody vegetation will be mulched. Depending on the particular situation, mulch will be mechanically applied, blown on to areas or applied by hand. Various areas of woody vegetation along the route will be cleared and mulched (except those species that may become future pest plants) and used around new planting.
- All plants will be 'hardened off', either in a nursery where they are propagated or in a suitable local nursery holding area for at least two months prior to being planted.
- Controlling pest plants and animals will be a key to plant survival and establishment. Where pest plants or animals are likely to be a threat then a removal/control programme will be initiated in advance of planting.
- A two year maintenance period is proposed for planting on embankments, batter slopes, bunds, wet and dry swales and for riparian planting. A four year maintenance period is proposed for the ecological and stormwater treatment wetlands.

17.5.3.7 Wetland planting

Wetland planting involving establishing and maintaining planting in the existing and new wetlands will pose several challenges, notably pest plants and the level and period of maintenance required. A good example of what can be achieved in terms of wetland planting is the Pharazyn Reserve, KCDC's former sewerage ponds between Waikanae Beach and Peka Peka Beach. The edge of these man-made rectangular-shaped ponds has been reconfigured and extensively planted with local native species.

17.5.3.8 Lizard habitat

The Herpetofauna Report (Technical Report 28, Volume 3) recommends that suitable lizard habitat be included in the planting. Lizard habitat can be provided along the edge of the cycleway and wetland areas (with the inclusion of the species listed in Technical Report 28). This measure will be incorporated at the detailed planting plan stage.

17.5.3.9 Pest plants

Given that material used in the construction of the proposed Expressway will be transported to and from different parts of the route, as well as being brought in from places from further afield, there is considerable risk of pest plants (in particular, blackberry and convolvulus) being spread to areas where they are currently not present or where they have only a minor presence.

Removing and controlling pest plants requires vigilance and a sustained effort both at the outset of construction and during the maintenance period.

17.5.3.10 Eco- sourcing

Although very little original indigenous vegetation remains on the Kāpiti coastal sand plain, the development of the landscape and ecological mitigation planting along the proposed Expressway provides an opportunity to use a range of native plant species that occur in the Foxton Ecological District, which extends from Paekākāriki to Whanganui.

Use of eco-sourced plants has been factored into the planting along the proposed Expressway; however, there are exceptions. Given the time frames for construction of the proposed Expressway, obtaining the quantities of certain species of large grade specimen trees for planting in areas such as the Kāpiti Road and Te Moana Road interchanges is unlikely. However, the planting proposed for these areas is more for amenity purposes rather than one of trying to approximate natural plant assemblages.

Eco-sourcing plants generally do not increase costs but adds significant environmental benefits. While using eco-sourced plants is widely adopted, it does come with challenges, such as insufficient seed of the range of species required, poor germination, die-back, and unthrifty plants.

The location of proposed mitigation measures are illustrated within the Landscape Plans (Volume 5).

18 Lighting

Overview

This Chapter assesses the potential effects of the proposed lighting associated with the construction and operation of the Project and the measures proposed to avoid, remedy or mitigate those effects. These potential effects are considered to include spill lighting, glare, skyglow and headlight sweep.

Construction yard and activity lighting, while temporary, has the potential to cause light spill effects to nearby residents and glare effects to drivers of vehicles.

Most of the proposed Expressway when it is in operation will not be illuminated as it is unnecessary for a rural or semi-rural environment. However, lighting will be required for traffic and pedestrian safety at interchanges and along the proposed cycleway/walkway, as well as on underbridges where there is regular pedestrian activity. The proposed lighting in these locations seeks to achieve a balance between illumination for road safety and reduction of light pollution to the immediate surroundings.

Operational lighting from the cycleway/walkway would create light spill and glare effects in two sections of residential properties, however all identified potential and actual lighting effects of the cycleway/walkway can be effectively avoided, remedied or mitigated through measures including detailed design features and monitoring.

Overall, the potential for the Project to create adverse lighting effects is considered low, given that all potential and actual effects can be effectively avoided, remedied and/or mitigated.

This assessment is conservative given that it has not considered the natural land profiles or the potential for the physical blocking of the emitted light by solid fences, vegetation and trees in specific locations along the proposed Expressway. Thus, the actual level of potential adverse effects from lighting is likely to considerably less than that identified by this assessment. Consideration of the potential use of landscape planting and noise attenuation measures to screen light will be made during the detailed design phase where effects are potentially more than minor.

The proposed lighting for the Project will therefore achieve satisfactory illumination for road safety as well as effective mitigation of light pollution to the immediate surrounds.

18.1 Introduction

This Chapter assesses the potential lighting effects from the headlights of vehicles using the proposed Expressway, and from the proposed illumination of on and off ramps, interchanges, underbridges, the shared cycleway/walkway, and construction activities (including the lighting of construction yards) forming part of the Project. The assessment considers the potential after-dark effects of lighting on vehicles and residents including spill, glare, sky glow and headlight sweep. The visual appearance of the

proposed lighting poles is considered in the Assessment of Landscape and Visual Effects, Technical Report 7, Volume 3.

There are different lighting standards applicable to the different parts of this Project including the proposed Expressway and roads, the cycleway/walkways, and temporary construction yards (refer to the Assessment of Lighting Effects, Technical Report 8 in Volume 3 for details of applicable standards).

The assessment of lighting effects was undertaken on a generic alignment-wide basis, and did not take into account natural land profiles or physical blocking of the emitted light by solid fences, vegetation and trees (refer to Technical Reports 7, the Assessment of Construction Air Quality Effects, Technical Report 14 and the Assessment of Traffic Noise Effects, Technical Report 15, within Volume 3). All of these factors would have the effect of further reducing spill light and glare on the immediate surroundings, particularly to residential properties. Therefore, the actual level of potential adverse effects from lighting is likely to considerably less than that identified by this assessment.

This assessment is based on preliminary design concepts only and some of the finer technical details cannot be confirmed until the final design phase of the Project occurs.

The full assessment of potential lighting effects within each of the four sectors of the Project is provided within Technical Report 8, Volume 3. Reference should be made to the lighting, marking and signage drawings CV-MF-101 to 132, Volume 5, which illustrate an indicative design for the location and type of lighting installation which is likely to be used and the assessment of lighting effects drawings CV-MF-700 to 780, Volume 5, which illustrate the potential light spill levels in relation to surrounding properties from such lighting.

The assessment of Landscape and Visual Effects (Technical Report 7 in Volume 3), the Urban Landscape Design Framework (Technical Report 5 in Volume 5) and the CEMP in Volume 4 all address lighting design and mitigation of effects. As such, these reports have been cross referenced throughout this Chapter.

18.2 Lighting environment

18.2.1 Existing lighting environment

Existing lighting within the Project area contains a mix of road lighting, including those designed to Category V3 and Category V4 standard as defined by the Road Lighting Standard AS/NZS 1158. These standards ensure safe vehicle movement and the timely identification of objects and pedestrians, to the motorist's eye, while travelling at speed during the darkness hours.

Category V3 standard lighting is required for:

- Freeways, motorways and expressways consisting of divided highways for through traffic with no access for traffic between interchanges and grade separation at all intersections; and
- Arterial roads that predominantly carry through traffic from one region to another, forming principal avenues of communication for traffic movements.

Category V4 standard lighting is required for:

- Sub-arterial or principal roads which connect arterial or main roads to areas of development within a region, or which carry traffic directly from one part of the region to another part.
- The Road Categories and their associated lighting levels are detailed in Appendix A, Technical Report 8, Volume 3.

18.2.1.1 Sector 1

There is road lighting currently installed on existing SH1 for approximately 150m leading up to the existing SH1/Poplar Avenue junction (when approaching from the south) and on the junction itself.

There is no road lighting along SH1 on the northern side of this junction. This existing lighting has been assessed as greater than a Category V4 standard but not as high as Category V3. There is no existing road lighting on Poplar Avenue.

As no cycleway/walkway path exists in this sector of the Project area currently, there is no existing cycleway/walkway lighting in its proposed location.

18.2.1.2 Sector 2

There is existing Category V4 standard street lighting on Raumati Road and Rata Road within the immediate area where the proposed Expressway underbridge will be located.

Kāpiti Road has existing Category V3 standard street lighting within the immediate area where the full interchange will be located.

As no cycleway/walkway path exists in this sector of the Project area currently, there is no existing cycleway/walkway lighting in its proposed location.

18.2.1.3 Sector 3

There is existing Category V4 standard street lighting on Te Moana Road within the immediate area where the interchange is proposed. There is no lighting currently on the proposed Expressway corridor.

As no cycleway/walkway path exists in this sector of the Project area currently, there is no existing cycleway/walkway lighting in its proposed location.

18.2.1.4 Sector 4

There is no lighting currently on the Designation corridor, although there is minimal road lighting on existing SH1 to illuminate the existing junction with Peka Peka Road. There is no existing lighting on Peka Peka Road or where the Ngarara Road connection into existing SH1 is being proposed.

As no cycleway/walkway path exists in this sector of the Project area currently, there is no existing cycleway/walkway lighting in its proposed location.

18.2.2 Proposed lighting environment (including construction yards)

Large sections of the proposed Expressway will not be illuminated. It is proposed not to light the sections where the proposed Expressway will pass through rural environments. It is common practice not to light sections of roads in rural environments. Lighting is only proposed in locations where it is required for traffic and pedestrian safety. In these locations, the Project proposes lighting that, without mitigation measures, would have the potential to have adverse effects on the surrounding environment. The assessment of effects is limited to the locations where lighting is proposed to be installed, i.e. the following specific locations:

- **The four proposed interchanges and along on/off ramps**. Lighting of these sections is necessary to illuminate curves ahead, the road channels, changes in alignment, road surface markings and kerb locations, as well as any stalled or stationary vehicles;
- **Road bridge structure underlighting will be provided beneath the proposed Expressway where it passes over local roads or the cycleway/walkway path**. The locations where underlighting is proposed are limited to those which are expected to have significant pedestrian use; at Poplar Avenue, Raumati Road, Kāpiti Road, Mazengarb Road and Te Moana Road;
- **On the cycleway/walkway path between Raumati Road and Mazengarb Road**. Lighting is proposed on the path lengths which are expected to be most populated rather than along the full length. This is to provide lighting in areas where there is potential for early evening use of the path in the darker winter months by commuters and school children[127]. The lighting of the path will assist the users to orientate themselves, detect potential hazards and provide a safer environment; and
- **Construction yards**. Some of the proposed construction yards will require mobile lighting towers to be erected on a temporary basis to facilitate night works. In addition, lighting will be provided to guide staff, plant and vehicles at the start and end of each shift during the winter months.

Additional lighting, which is not anticipated to generate adverse effects, is expected to include:

- Flag lighting, usually consisting of single road lanterns, provided at isolated roads where required;
- Low level lighting at the locations where the cycleway/walkway path intersects with local roads;
- There is a proposal to provide further architectural or specialist lighting to the bridges. This lighting is likely to be LED[128] strip based or narrow beam uplighters, positioned to highlight specific aspects of the bridges;
- Small illuminated signs at each entrance or egress point of the pedestrian/cycle way; and

[127] The proposed extent of the path lighting resulted from discussions undertaken during the Design Workshop stages with Kāpiti Coast District Council's representatives.

[128] LED – Light emitting diode lighting

- A number of Vehicle Management Signs (VMS), which will provide adjustable messages to the motorist, including those relating to road conditions and speed limitations.

It is noted that these additional lights are under consideration and/or awaiting detailed design. Reference should be made to the drawings CV-MF-101 to 132, Volume 5, for the likely location of lighting installations.

18.3 Assessment methodology

As it is proposed to be authorised by a designation, the Project is not required to comply with any lighting standards within the Kāpiti Coast District Plan. Recognition has however been given to outcomes sought by KCDC.

It is appropriate that temporary construction yard lighting and the cycleway/walkway lighting conforms to the relevant standards in the Plan, as these provide lighting assessment criteria appropriate to the surrounding receiving environments.

The Plan states that 10 lux[129], measured 1.5m within a residential boundary, is an appropriate guidance level for acceptable spill light and glare to a residential property, however a lower value of 3 lux at the residential property boundary point has been taken for the assessment.

As there are no applicable District Plan rules for road lighting spill light, a German survey[130] on spill lighting has been used to provide guidance on an applicable level of assessment. This survey concluded that, with illuminance of more than 3 lux at a window, complaints relating to interior brightness of a room predominated and from above 5 lux at a window, health impairment might become a factor.

In order to assess the effects of the proposed Expressway, cycleway/walkway and construction activity lighting, drawings (CV-MF-700 to 780, Volume 5) have been created to illustrate the anticipated extent of the areas where light levels could exceed 10 lux (based on the Plan standards) and 3 lux (based on findings of the German Survey) at surrounding properties.

[129] Lux is the unit used to measure illumination.

[130] E.Hartmann, M. Schinke, K. Wehmeyer, H. Weske – Measurement and Judgment of the Light Emissions of Artificial Light Sources – Short Report. Conducted by the Institute of Medical Optics of the University of Munich., 1984.

18.4 Assessment matters

18.4.1 Potential environmental issues

18.4.1.1 Type of luminaires[131]

The types of luminaires proposed for the Project are listed in Appendix C of Technical Report 8, Volume 3. To minimise both glare and light spill, the lighting proposed for the Project consists of a mix of semi-cut off luminaires[132] and fully cut-off luminaires[133], depending on the sensitivity of the surrounding area (for illustrations refer to Appendix E, Technical Report 8, Volume 3).

18.4.1.2 White light/golden white light

The use of white light for the road lighting on this Project is not considered critical to enhance the perceived colourfulness and brightness of the surrounding environment. HPS[134] lighting design is proposed in the indicative design, providing a golden white light.

18.4.1.3 Road lighting

All the road lighting on the proposed Expressway will be installed to Category V3 standards and all lighting on sections of local roads will be installed to Category V4 standards. Generally, the sections of local roads illuminated will be illuminated either to Category V4 standards or to a level set in discussion with the KCDC. This is not expected to be above the Category V4 illumination standard and may well be below this.

18.4.1.4 Cycleway/walkway lighting

The indicative design is based on a Category P4 level[135] in accordance with the Road Lighting Standard AS/NZS 1158. Given that the spacing of light poles is yet to be confirmed, a worst case scenario has been provided for this assessment with the lighting assumed to be continuous at nominal 40m centres. The location and type of any special lighting required for cycleway bridges will be further determined at the detailed design stage.

---

[131] Luminaires refers to a complete lighting unit.

[132] Semi cut off luminaires have an upward light content restricted to 10 degrees above the horizontal plane.

[133] Fully cut off luminaires have upward light content restricted to below the horizontal plane.

[134] HPS – High pressure sodium.

[135] Category P4 design standards apply to pedestrian or cycle orientated pathways with low risk of crime and low pedestrian/cycle activity.

18.4.1.5 Light poles

Different location arrangements of lighting poles have been selected in the indicative design to give satisfactory illumination for the proposed Expressway. The height of the poles is a compromise between the desired uniformity of light, spacing, illumination levels and value for money. Standard galvanised lighting poles and offset arms are proposed for road lighting. The poles are of slim line appearance and are not obtrusive to view. The visual effects of the lighting poles have been further addressed and modelled in the Assessment of Landscape and Visual Effects (Technical Report 7, Volume 3).

18.4.1.6 Construction yards and activities

Night time works will be required at times throughout the construction phase (being approximately 4 to 5 years, across a number of work phases as described further in Chapter 8 of the AEE). Works are required at night to minimise disruption to existing local road traffic during the day. Activities which are likely to require night works and associated lighting are detailed within Technical Report 4, Volume 3 and include:

- Erection of bridges at:
    - Raumati Road
    - Kāpiti Road
    - Mazengarb Road
    - Otaihanga Road
    - Te Moana Road
    - Ngarara Road
- Widening of Kāpiti Road (to the east and west of the Kāpiti Road Interchange)
- General Traffic Management throughout the life of the contract (all Sectors)

At these locations (illustrated on drawings CV-CM-400 to 411, Volume 5), the site and adjacent construction yard will require illumination during the night to complete the required operations. During the erection of the bridges at each of the above locations, the precast yard on Otaihanga Road will also be illuminated to enable loading of bridge units.

Mobile lighting towers will be erected on a temporary basis for night works. These towers are typically less than 6m high and mounted on mobile trailers. They can be positioned to effectively minimise any light directed to any adjacent residential property.

Each construction yard area will utilise temporary lighting to enable operations to proceed during the hours of darkness during the winter period. In addition, lighting will be provided to guide staff, plant and vehicles at the start and end of each shift during the winter months.

18.4.2 Potential adverse effects

The potential adverse effects from lighting associated with the construction and operation of the Project on vehicles and residents are limited to:

- Spill lighting

With all exterior lighting, a small percentage of light will not fall within the target area. The result is wasted 'light spill', which can fall into areas where it is not wanted, such as residences adjacent to the lighting.

- Glare

Glare is the brightness of a luminaire when compared with the brightness of the background against which they are seen. For instance, a road luminaire looks much brighter (and has higher glare) when viewed against a black sky than when viewed in the surroundings of a brightly lit city street.

There are two forms of glare. Disabling glare is so intense it prevents adequate vision for accomplishing a task. Discomforting glare can generally be tolerated, but is a nuisance, as it tends to draw the eye towards the light source.

- Sky glow (upward light content)

Sky glow is a glow above a road when humidity is high. This effect is difficult to mitigate, as it is light that reflects either directly or indirectly off the road surface and illuminates water particles suspended in the air, giving a glow effect. Sky glow can be reduced by using darker coloured surfaces (i.e. black asphalt), rather than a light coloured chipping and dark painted or coloured concrete, rather than white.

- Headlight sweep

Headlight sweep relates to the aim and intensity of vehicle headlights. This is most likely to affect residents when headlights are directed toward a dwelling.

18.5 Assessment of operational lighting effects

The position of the indicative lighting (illustrated in drawings CV-MF- 101 to 132, Volume 5) and the specific type of luminaires proposed will achieve appropriate safety requirements while mitigating adverse lighting effects.

The lighting environment will be different for some residents due to the increased light levels and coverage brought about by the proposed lighting, especially in areas where currently there is no lighting. However, the new lighting proposed is also required to provide lighting levels appropriate to ensure safety for road and pedestrian users. The 3 lux limitation line on the drawings indicates where a lighting level would be considered an acceptable level (3 lux or less) or an adverse level (higher than 3 lux).

This section provides an assessment of the potential effects resulting from the proposed operational lighting.

18.5.1 Spill lighting and glare

Spill lighting and glare is easily mitigated through good lighting design practice and the use of modern luminaires. Therefore, it is unusual for any adjacent residential properties to be adversely affected. This is illustrated within drawings CV-MF-700 to 780, Volume 5, which show no dwellings affected by a light level above 3 lux, where health effects may arise (according to the German Survey discussed above).

There are two specific areas (both located within Sector 2) where, without any mitigation in place, the cycleway/walkway lighting could intrude into residential properties and be a source of irritation:

- Along the southern approach to the Kāpiti Road interchange (refer to drawings CV-MF-730 and CV-MF-740, Volume 5); and
- Along the northern section, immediately before the Mazengarb Road connection (refer to drawing CV-MF-741, Volume 5).

In these areas, the cycleway/walkway path is immediately adjacent to the back yards of existing residential properties. Without any mitigation, the combined lighting effect of this path and adjacent proposed Expressway lighting will exceed the 3 lux level, but not the 10 lux (within 1.5m of the property) level at both locations.

Mitigation is proposed at these locations and will be achieved through a selection or combination of:

- detailed design features; and/or
- installing the lighting onto the acoustic fence; and/or
- reducing the height of the cycleway light poles within these sections.

With these mitigation measures in place, effects of light spill and glare on these locations will be negligible. The adverse effects from the proposed cycleway lighting will be negligible in all other sections of the alignment, generally due to the distance of the path from adjacent residential properties.

18.5.2 Sky glow

The effect of sky glow is the combined result of thousands of road light fittings combined with the general exterior lighting installed in residential and commercial properties.

The additional lighting proposed in this project would not add to the existing skyglow effect by any significant degree. Given the limited amount of lighting that is proposed for this Project and the

photometric[136] characteristics of the proposed road lanterns, it is considered extremely unlikely that the reflected (direct or indirect) light will be at a high enough level to increase any existing sky glow effect.

The effects of the Project on sky glow are therefore considered negligible.

18.5.3 Headlight sweep

The potential effects of vehicle headlights are limited to their sweep around bends. Across the majority of the proposed alignment, there are buffer distances between the proposed road carriageway and any adjacent properties. Given the width of the buffer zone, the effect on adjacent residential properties can be considered negligible.

In addition, the retention of dunes where practicable, noise mitigation measures(such as noise walls) and planting for amenity effects in combination with these buffer distances will further obscure and minimise headlight sweep beyond the extent of the proposed alignment. While there may be headlights visible or partially visible in places along the alignment, these are unlikely to be visually intrusive.

18.6 Assessment of construction lighting effects

During construction, temporary lighting will be required in the main construction areas for any work carried out during the hours of darkness. Given good design practice and the use of modern luminaires, spill lighting is not anticipated to cause any nuisance to surrounding residents and glare from temporary lighting can be easily contained such that any potential to degrade the driving ability of motorists is avoided.

18.7 Measures to avoid, remedy or mitigate actual or potential adverse effects of lighting

18.7.1 Mitigation of operational lighting effects

While road lighting will be of a higher illumination level and greater coverage area in certain locations, the choice of luminaires, both for interchanges and road sections has been based on the specified illumination for road safety, spacing and reduction of light pollution to the immediate surrounds.

As outlined above, there are only two specific areas where lighting (from the cycleway/walkway) could intrude into residential properties and be a source of irritation. Physical barriers, luminaire back shields or specific redesign will effectively mitigate light spill at both of these locations down to an acceptable level (3 lux or less). With this mitigation in place, the effects of operational lighting on residential properties are considered extremely low.

[136] Photometric characteristics refer to the properties of light, especially luminous intensity.

It is further noted that the proposed landscaping (detailed within Technical Report 7, Volume 3) at residential and proposed Expressway boundaries may offer an additional visual barrier that could further reduce the lighting effects identified. There will be some noise mitigation measures (detailed within Technical Reports 15 and 16, Volume 3) which may also act as lighting shields for residents. Coordinating landscape planting with view shafts of lighting that are of concern to any resident might also be used. This can be addressed at detailed design phase of the Project.

18.7.2 Mitigation of construction yard lighting effects

18.7.2.1 Mitigation through detailed design

Construction yard lighting has not yet been designed. Lighting design plans for construction yards will be submitted by an accredited Illumination Engineer as part of the Construction Management Plan in Volume 4.

All design and installation of construction yard lighting will seek to minimise adverse or stray lighting effects. The lighting of construction yards can be designed to be fully compliant with the relevant lighting standards of the Kāpiti Coast District Plan and the relevant clauses of the Australian Standard (AS 4282).

Construction lighting is usually relatively transitional and will be reduced with careful location of yards, site offices and equipment in relation to any adjoining residentially zoned areas. The locations of construction yards for this Project were selected as far from residential properties as practicable, with a 10m minimum buffer zone between any equipment requiring light and a residential boundary.

18.7.2.2 Construction management

The CEMP, Volume 4, proposes to manage the potential impacts of temporary lighting during construction at paragraph 3.5.9.

The following requirements may form part of the CEMP:

- Use luminaires that do not produce environmental spill light above any relevant Kāpiti Coast District Plan standards; and
- Monitor lighting during construction every 2 months or following a complaint from an adjacent resident. Monitoring will include visual tests to check that luminaires have not been re-aimed inappropriately. Monitoring will include visual tests to check that luminaires have not been re-aimed inappropriately.

19 Noise and Vibration

Overview

The assessment of noise and vibration effects has been undertaken for both the construction and operation of the Project.

Noise from the construction of the Project will generally fall within the construction noise criteria contained within the construction noise standard with some exceptions. The intention is to meet the criteria as far as practicable, although given the scale of the works and the nature of construction activities, alternative management will need to be implemented in some parts of the alignment: alternative options for management are described within the Construction Noise and Vibration Management Plan (CNVMP). The CNVMP provides a detailed process for managing and mitigating construction noise effects and contains information regarding communication, training, maintenance of machinery and equipment and any other noise generating sources during construction.
Noise from the operation of the proposed Expressway has been assessed using modelling software to consider a baseline scenario without mitigation and potential noise effects for sensitive receptors along the alignment (primarily residential use). Noise mitigation options have been designed in conjunction with the Project engineers, landscape architects, urban designers and the construction team and the best practicable option (BPO) selected. In summary, the assessment of traffic noise effects (Technical Report 15, Volume 3) finds that while the introduction of the proposed Expressway into what is generally a currently low noise environment will result in a significant increase in noise level, the selected mitigation design of the proposed Expressway is generally able to avoid noise levels above the most stringent Category A (57 dB $L_{Aeq(24h)}$) within the NZ Standard which is considered to be an appropriate noise level for residential use and mitigates adverse effects on noise sensitive activities.

Vibration effects from the construction and operation of the Project are also considered in this assessment. The primary vibration concerns are the potential for damage to buildings, and the human response to vibration. The effects of construction vibration relate to the use of vibrating machinery and movement of heavy vehicles, whilst the effects of operation relate to the quality of the road surface. Vibration levels generated by construction are typically higher than those from operation but will be temporary and of a limited duration within any location. All potential vibration effects, both from construction and operation of the Project, will be such that no specific mitigation is considered necessary beyond effective management in accordance with the CNVMP, and maintenance of the road surface in accordance with normal processes.

Overall, the noise and vibration effects resulting from the construction and operation of the Project have been identified and addressed within the proposed Expressway design development and can be suitably mitigated during construction in accordance with the CNVMP.

19.1 Introduction

This Chapter presents the assessment of the noise and vibration effects, both during construction and once the proposed Expressway is operational. The information contained in this Chapter is based on five following technical reports in Volume 3:

- Assessment of Traffic Noise Effects (Technical Report 15);
- Assessment of Construction Noise Effects (Technical Report 16);
- Pre-Construction Noise Level Survey (Technical Report 17);
- Assessment of Vibration Effects (Technical Report 18); and
- Ambient Vibration Assessment Report (Technical Report 19)

A CNVMP has also been prepared as part of this application (this plan is contained within Volume 4, CEMP Appendix F) and has been referenced throughout this Chapter.

19.1.1 RMA framework

Under the provisions of the Resource Management Act 1991 (RMA) there is a duty to adopt the best practicable option (BPO) to ensure that the noise from any development does not exceed a reasonable level.

The standards NZS6806:2010 applied in the assessment and proposed mitigation of road traffic noise from new road and altered roads and NZS6803:1999 applied in the assessment of construction noise are based on the BPO approach.

19.2 Existing environment - noise

A survey of existing ambient noise levels was carried out within each of the four sectors of the alignment to provide a reference point for the assessment of noise effects (Technical Report 17, Volume 3). The existing noise environments for each Sector are discussed below.

19.2.1 Sector 1- MacKays Crossing to Raumati Road

The noise environment in Sector 1 varies from relatively elevated noise levels in areas close to the existing SH1 (e.g. at Leinster Avenue) to relatively quiet in areas removed from local main roads (for example, towards Raumati Road). Noise levels were measured at twelve locations, including two long duration noise level surveys. Noise levels ranged from 42 to 68 dB $L_{Aeq(24h)}$.

19.2.2 Sector 2 - Raumati Road to Mazengarb Road

Sector 2 includes densely populated residential areas between Kāpiti and Mazengarb Roads, with further scattered residential developments north of Raumati Road and south of Kāpiti Road. Apart from areas immediately adjacent to the local main roads (Kāpiti, Mazengarb and Raumati Roads) the ambient noise

environment is considered to be low for a suburban area. Noise levels were measured at nineteen locations, including two long duration surveys. Noise levels ranged from 42 to 55 dB $L_{Aeq(24h)}$.

19.2.3 Sector 3 - Mazengarb Road to North of Te Moana interchange

The character of Sector 3 is predominantly rural, with a few dwellings spread along the alignment. Areas of denser residential activity include the Kauri/Puriri Road area and Te Moana Road. Ambient noise levels are relatively low for most of the survey locations. Noise levels were measured at nine locations, including three long duration noise level surveys. Noise levels ranged from 42 to 53 dB $L_{Aeq(24h)}$.

19.2.4 Sector 4 - North of Te Moana Interchange to Peka Peka Road

Sector 4 traverses rural areas only, with the proposed Expressway connecting with the existing SH1 at Peka Peka. Dwellings are located sparsely along the alignment with a more densely populated area at Peka Peka. Noise levels were measured at seven locations, including one long duration survey. Noise levels ranged from 44 to 55 dB $L_{Aeq(24h)}$. Dwellings at Peka Peka are some distance from the existing SH1, and closer houses would be removed for the construction of the proposed Expressway; therefore, ambient noise levels at the closest potentially affected houses are lower than in Sector 1. Overall, ambient noise levels along the proposed Expressway alignment are relatively low due to the absence of major local roads or industry in the vicinity.

19.3 Construction noise effects

19.3.1 Assessment criteria

The relevant noise criteria used in the assessment of construction noise levels are set out in NZS6803:1999. The Standard provides for higher noise criteria during normal working hours for construction noise received in residential areas to enable construction activity to take place. For commercial and industrial areas, less stringent noise criteria are specified during night-time when it is less likely that persons or business activities would be affected by construction noise.

It is noted that the ambient noise levels in the area under consideration are generally low. Therefore, even although construction activities will achieve compliance with the daytime construction noise criteria, there will be a significant increase in overall noise level during the construction phase. This is, as set out in Standard NZS6803:1999, an expected and inevitable result of large construction projects in the vicinity of receivers.

19.3.2 Assessment of construction noise effects

The alignment passes through areas of both rural and residential land use. Residential use is considered a sensitive receiver and is generally sensitive to construction noise effects, especially during night hours. The construction activities that may cause adverse noise effects include:

- Fill delivery for preload construction;
- Excavation and fill;

- Off-road earthworks transport;
- Road base course and sealing works;
- Bridge construction, including piling & vibro-replacement[137];
- Local road realignment and resurfacing; and
- Construction of noise barriers along property boundaries.

For most large-scale construction projects, minor exceedances of the construction noise criteria for brief periods of time are common. Provided these exceedances are temporary and of limited duration, this may not be unreasonable. The duration of a construction activity exceeding criteria that could be considered to be reasonable may vary from site to site and activity to activity.

Construction is not generally proposed over a 24 hour period for this Project as generally it can practicably be completed without significant night-works. However, some bridges are likely to require night-time construction to reduce the impacts on traffic on major local roads. This would likely be confined to activities relating to bridge beam placement in order to minimise the duration of night-time construction. Furthermore, it is possible that some other unforeseen construction activities may be required during night-time.

In the event that night-time works occur for one or two nights, this may be acceptable provided that residents have been informed and a clear time frame provided. However, should night-time works be on-going for several consecutive nights, and at a noise level that affects residents' ability to sleep, then alternatives should be considered such as the temporary relocation of the most affected residents. A set process for considering whether such measures are required to address any issues should they arise is set out in the CNVMP.

The assessment within Technical Report 16, Volume 3, identifies the proposed construction activity and closest positions where daytime/night time construction noise criteria are potentially exceeded. Section 10.8 of the CNVMP contains a hierarchy of management procedures/options to mitigate potential exceedance of the construction noise standards. For activities that are likely to exceed the construction noise criteria, active noise management and mitigation measures are recommended. These measures are detailed in the CNVMP and will reduce, avoid and mitigate noise emissions as far as practicable.

While construction noise levels are higher than on-going operational noise levels, it is commonly accepted that for any construction to occur, noise criteria must be less stringent, with the understanding that construction is a temporary activity with a limited duration, particularly in a project such as the proposed Expressway, with construction moving along the alignment.

In summary, it is considered that the Project can be constructed within reasonable noise criteria, provided that the BPO of mitigation is implemented throughout and contractors are committed to managing construction noise on an on-going basis. It is noted that the ambient noise levels in the area under consideration are generally low. Therefore, even when achieving compliance with the daytime

[137] Vibro-replacement is the process of constructing stone columns using a vibratory probe (vibroflot).

construction noise criteria in the Standard, there will be a significant increase in overall noise level during the construction phase. This is an expected and inevitable result of large construction projects in the vicinity of sensitive receivers.

19.4 Operational traffic noise effects

19.4.1 Assessment criteria

19.4.1.1 New Zealand Standard NZS6806:2010

Traffic noise has been assessed in accordance with the New Zealand Standard NZS6806:2010. Noise levels in the standard are not based on existing ambient noise levels and are chosen depending on the type of road, traffic volume and the application of BPO for mitigation.

Table 19.1: Noise Criteria NZS6806

Category	Criterion	Altered Roads	New Roads[138]
A	Primary	64 dB $L_{Aeq(24h)}$	57 dB $L_{Aeq(24h)}$
B	Secondary	67 dB $L_{Aeq(24h)}$	64 dB $L_{Aeq(24h)}$
C	Internal	40 dB $L_{Aeq(24h)}$	40 dB $L_{Aeq(24h)}$

The Project has been assessed based on the new road criteria. However, criteria for altered roads have been included as they are relevant in locations where the Project will connect to the existing State highway at either end of the Project. Category A and B noise level criteria are measured at the outside façade of a PPF (PFFs are described later in section 19.4.2), and when these are exceeded, Category C criteria apply inside the building.

These categories have been developed for design and consenting, rather than assessment purposes. However, in general terms:

- Category A indicates that a reasonable external noise level is achieved that allows for noise sensitive activities being carried out without adverse effects.
- Category B indicates an increased level of noise compared to Category A but noise sensitive activities would generally be able to be undertaken inside a building with windows open.
- Category C indicates that mitigation may be required to achieve an acceptable level of noise inside, with windows closed.

To ensure the noise assessment has a complete understanding of the Kāpiti context, ambient noise measurements have been recorded as set out in section 19.2. However, as the existing ambient noise level along the alignment is not controlled by current road traffic noise, it is not practicable to model existing noise levels in the vicinity of the proposed alignment.

[138] with a predicted traffic volume of 2,000 to 75,000 AADT at the design year.

19.4.1.2 NZTA (Transit) noise guidelines

Prior to the development of NZS6806, the NZTA's predecessor Transit New Zealand had developed 'Transit New Zealand's Guidelines for the Management of Road Traffic Noise – State highway Improvements' (Noise Guidelines). The NZTA, while fully adopting the provisions of NZS6806, has an internal requirement that an assessment in accordance with the Noise Guidelines be undertaken for any Project which is being consented during the first two years of adoption of NZS6806 in order to gain an understanding of the implications of the new Standard. Generally similar to the assessment methodology prescribed in NZS6806, the Noise Guidelines differ in some fundamental aspects from the Standard. These differences include specifically:

- The criteria, which are based on ambient noise levels rather than the type of roading
- Project;
- The assessment position, which is at 1 metre from the facade rather than at the facade
- thus including a 2.5 decibel facade adjustment; and
- The inclusion of a maximum noise criterion (the Single Event Noise Design Criterion
- L_{Amax}).

It is therefore not practicable to directly compare the Noise Guidelines outcomes with those determined through NZS6806. The noise assessment includes reference to the NZTA noise guidelines, generally, as one of the mitigation options.

19.4.2 Protected premise and facilities (PPFs)

PPFs are defined fully in NZS 6806:2010 but include facilities such as:

- buildings used primarily for residential activities;
- marae;
- spaces within buildings used for overnight medical care; and
- teaching areas and sleeping rooms in buildings used as education facilities.

Commercial and business uses are not considered to be PPFs and are therefore excluded from the assessment as they are not considered to be noise sensitive. NZS6806 stipulates that, in an urban area as determined by Statistics New Zealand, all PPFs within 100 metres of the alignment shall be assessed. The whole alignment traverses an urban area within the meaning of that term in the Standard. The noise assessment for the Project has been undertaken in accordance with this limitation.

However, in some circumstances to address concerns raised during consultation on the Project the NZTA has also included additional buildings in the assessment for informative purposes only, for example El Rancho, Christian Holiday Park.

The full assessment methodology is outlined within Technical Report 15, Volume 3.

19.4.3 Assessment of operational traffic effects

Several operational scenarios for new roads are to be assessed under NZS6806. These include:

- **Existing noise environment** - noise surveys of the existing environment have been undertaken to assist assessment. Most of the alignment is not controlled by current traffic noise therefore it is not possible to model the existing traffic environment for large sections of the alignment.
- **A future Do- minimum scenario** – represents a future scenario at the design year where a project has been implemented without any specific mitigation. This means that the choice of road surface material is independent from its noise generating characteristics and the only barriers included are solid safety barriers, which are required for reasons other than noise mitigation.
- **Future mitigation options** – future scenarios at the design year whereby mitigation has been design to reduce noise levels in order to achieve compliance with the relevant noise criteria and fulfil the BPO test.

The noise level change due to the Project is predicted to be considerable in some areas, with increases ranging for most affected dwellings from 10 to 21decibels.

The Do-minimum scenario serves as the basis for the assessment of noise mitigation options. The modelling outcomes of the Do-minimum scenario are described in Table 9.2 below.

Table 19.2: Predicted noise levels for the Do- minimum scenario

Area	Key modelling results	Is the Do minimum scenario the selected BPO?
Sector 1		
West of the proposed Expressway – Leinster Avenue area	A total of 21 PPFs are in the area to the west of the proposed Expressway at Leinster Avenue. The Do-minimum scenario includes low noise road surface material (OGPA) and concrete edge barriers on the bridge over Poplar Avenue. The proposed Expressway would have a negligible to moderate effect on dwellings within 100 metres of the alignment, with noise levels remaining similar to existing levels for some dwellings while others would experience a noise level increase of up to 9 decibels.	No
West of the proposed Expressway – Raumati South	The Do-minimum scenario includes low noise road surface (OGPA) and 1.1 metre high concrete edge barriers on the proposed Expressway bridge crossing Raumati Road. Three PPFs are predicted to be within Category B, with the remaining PPFs in Category A.	Yes
East of the proposed Expressway – Raumati South	The Do-minimum scenario involves the use of low noise road surface (OGPA) and 1.1 m high concrete edge barriers on the proposed Expressway bridge over Raumati Road. Of the 11 PPFs assessed, two would be within Category B with the remaining dwellings within Category A.	No

Area	Key modelling results	Is the Do minimum scenario the selected BPO?
Sector 2		
West of proposed Expressway – Raumati Road	The Do-minimum scenario provides for low noise road surface material (OGPA) and 1.1 metre concrete edge barriers on the proposed Expressway bridge over Raumati Road. Two PPFs would be within Category A and two within Category B. Noise levels are predicted to increase by between 5 and 7 decibels, a noticeable change.	No
East of proposed Expressway – Rata Road	The Do-minimum scenario provides for low-noise road surface material (OGPA) and 1.1 metre concrete edge barriers on the proposed Expressway bridge over Raumati Road. Of the Four PFFs assessed, two would be within Category A and two within Category B. Noise levels are predicted to remain similar to existing for one PPF, and increase by between 5 and 7 decibels at the other dwellings, a noticeable change. The Do-minimum scenario would fulfil the requirements of the Noise Guidelines, therefore, no specific mitigation option was developed for this circumstance.	Yes
West of proposed Expressway – South of Kāpiti Road	The Do-minimum scenario includes the use of low noise road surface (OGPA) on the proposed Expressway and dense asphalt on the Kāpiti Interchange ramps, and 1.1 m high concrete edge barriers on the proposed Expressway bridge over Kāpiti Road. As the ambient noise level is low, the introduction of the proposed Expressway will result in a significant increase in noise level, by up to 22 decibels, with an average noise level increase of 12 decibels. This would be likely to be perceived as a doubling in noise, compared with the existing noise environment. Two PPFs would be within Category C. A further ten PPFs would be within Category B, and the remaining 23 in Category A. Dwellings in Milne Drive immediately adjacent to the Kāpiti Road northbound off ramp and double storey dwellings overlooking the proposed Expressway alignment will be affected.	No
East of proposed Expressway – Kāpiti Road to Mazengarb Road area	The Do-minimum scenario includes low noise road surface (OGPA) on the proposed Expressway, dense asphalt on the ramps of the Kāpiti Interchange and 1.1 metre concrete edge barriers positioned on the proposed Expressway bridge edges across Kāpiti Road. Of the 147 PPFs assessed, 100 would fall within Category A, 42 within Category B and 5 within Category C. Noise levels are predicted to increase by between 2 and 23 decibels, with an average increase of 11 decibels. This is a significant increase for the majority of PPFs.	No
West of proposed Expressway – Cheltenham Drive area	The Do-minimum scenario includes the use of low noise road surface (OGPA) on the proposed Expressway and 1.1 m high concrete edge barriers on the proposed Expressway bridge over Mazengarb Road. Noise levels are predicted to range from 49 to 63 dB LAeq(24hr), an increase between 4 and 18 decibels depending on the location of the dwellings in relation to the proposed Expressway. Of the 42 PPFs assessed, 28 would be within Category A, with the remaining 14 PPFs predicted to be in Category B.	No

Area	Key modelling results	Is the Do minimum scenario the selected BPO?
Sector 3		
West of proposed Expressway – Mazengarb Road area	The Do-minimum scenario includes the use of low noise road surface material (OGPA) on the proposed Expressway and 1.1 metre high concrete edge barriers on the proposed Expressway bridge over Mazengarb Road. The introduction of the proposed Expressway into the currently quiet noise environment results in a significant increase in noise level by between 11 and 17 decibels. Noise levels at the eight PPFs assessed are predicted to range from 56 to 62 dB LAeq(24hr).	No
East of proposed Expressway – Mazengarb Road area	The Do-minimum scenario includes the use of low noise road surface material (OGPA) on the proposed Expressway and 1.1 metre high concrete edge barriers on the proposed Expressway bridge over Mazengarb Road. The introduction of the proposed Expressway into the currently quiet noise environment results in a significant increase in noise level by 15 and 18 decibels respectively. Noise levels at the two PPFs assessed are predicted to range from 60 to 63 dB $L_{Aeq(24hr)}$.	No
Otaihanga Road area	The introduction of the proposed Expressway into the existing low noise environment is predicted to result in a noise level increase of between 12 and 15 decibels, with an average noise level increase of 13 decibels. For the Do-minimum circumstance, this includes the use of low noise road surface material (OGPA) and 1.1 m high concrete edge barriers on the proposed Expressway bridge across Otaihanga Road. There are four PPFs assessed within 100m of the proposed Expressway.	No
El Rancho	The camp is outside the 100m assessment area set out in NZS6806. However, it has been included in the assessment for informative purposes. With the establishment of the proposed Expressway, the noise levels at the El Rancho buildings are predicted to be range from 48 to 56 dB $L_{Aeq(24h)}$, i.e. all buildings will be within Category A, the most stringent of NZS6806. The proposed Expressway is proposed to be surfaced with low noise road surface material (OGPA) and would have a 1.1 metre concrete edge barrier on the western edge of the proposed Expressway extending from the southern end of the Waikanae River bridge to approximately chainage 11000m. This barrier will have a significant shielding effect on the elevated proposed Expressway for the El Rancho facilities.	Yes
East of proposed Expressway – Kauri Road area	The proposed Expressway in the vicinity of the Kauri Road area would utilise low noise road surface material (OGPA). Noise levels are predicted to range from 51 to 60 dB $L_{Aeq(24h)}$ without the use of further mitigation measures. Only one of the six PPFs assessed would receive noise levels above the Category A criterion.	No

Area	Key modelling results	Is the Do minimum scenario the selected BPO?
West of proposed Expressway – South of Te Moana Road	The proposed Expressway is proposed to be surfaced with low noise road surface material (OGPA) on the main road and asphaltic concrete on the ramps of the full diamond interchange. In addition, a 1.1 metre high concrete edge safety barrier will be installed on the proposed Expressway bridge over Te Moana Road. This barrier is predicted to result in effective acoustic shielding of traffic noise from the proposed Expressway due to the height difference between the vehicles and the dwellings below. The introduction of the proposed Expressway into this environment is predicted to result in a noticeable to significant increase in noise level by between 2 and 11 decibels. Of the seven PPFs assessed, three would be within Category A. For the remaining four PPFs, noise levels are predicted to remain within Category B without the implementation of additional mitigation.	No
West of proposed Expressway – North of Te Moana Road	The proposed Expressway is proposed to be surfaced with low-noise road surface material (OGPA) on the main road and asphaltic concrete on the ramps of the full diamond interchange. In addition, a 1.1 metre high concrete edge safety barrier will be installed on the proposed Expressway bridge over Te Moana Road. This barrier is predicted to result in effective acoustic shielding of traffic noise from the proposed Expressway due to the height difference between the vehicles and the dwellings below. The introduction of the proposed Expressway into this environment is predicted to result in a significant increase in noise level by up to 14 decibels for PPFs not fronting Te Moana Road. Of the 17 PPFs assessed, nine would be within Category A, four within Category B and four within Category C.	No
Sector 4		
East of proposed Expressway – End Farm Road	The road surface material north of the new Smithfield Road bridge is proposed to be chip seal. Resulting noise levels for the Do-minimum scenario are predicted to be, 20 decibels above the existing noise levels. Both PPFs would be within Category C.	No
West of proposed Expressway – Peka Peka Road	The proposed Expressway is proposed to be surfaced using chip seal in the vicinity of Peka Peka Road. Based on this layout, the Do-minimum noise level is predicted to vary from 56 to 70 dB $L_{Aeq(24h)}$, depending on the location of the dwelling in relation to the road and the shielding provided by the raised Peka Peka ramps. Five positions are predicted to be within Category A, with one of the remaining two positions being in Categories B and C each.	No
East of proposed Expressway – Hadfield Road	The proposed Expressway is proposed to be surfaced using chip seal in the vicinity of Peka Peka Road. Based on this layout, the Do-minimum noise level is predicted to be 63 dB $L_{Aeq(24h)}$. This means that the Category A criterion can be complied with without the need for mitigation, and no further mitigation options have been assessed for this PPF.	Yes

As a result of the initial assessment summarised in Table 19.2, noise mitigation options were assessed for all areas. NZS 6806:2010 sets out a process for the evaluation of mitigation options. The process is not purely based on reaching a specific noise level or noise reduction but aims to achieve the BPO by taking into account aspects such as the visual and urban design implications, constructability and value-for-money of various mitigation options. This is intended to produce a more integrated solution than if noise mitigation was considered in isolation.

A full description of the mitigation options evaluated for each area is contained in Technical Report 15, Volume 3. In four areas the Do-minimum scenario was selected to constitute the BPO, i.e. no additional mitigation would be implemented. The reasons for this are summarised in Table 9.3 below:

Table 19.3: Areas where the Do- minimum scenario was selected as BPO

Area	Reason mitigation was not recommended
Sector 1	
West of the proposed Expressway – Raumati South	Taking into consideration the minimal noise level reductions and adverse visual effects of any noise barriers being installed on the bridge over Raumati Road, the Project team selected the Do-minimum option as BPO. In addition, all but three PPFs will be within Category A, with the remaining being in Category B, therefore the predicted noise environment for all dwellings is considered to be suitable for residential use
Sector 2	
East of proposed Expressway – Rata Road	A barrier option was developed from an acoustic point of view. However, it's intrusiveness due to its height in relation to the dwellings meant it was not considered further. In addition, half of the PPFs would be within Category A and the other half within Category B, thus the predicted noise levels are suitable for residential use.
Sector 4	
East of proposed Expressway – Hadfield Road	Category A would be achieved without additional mitigation. However, due to the selection of OGPA as the BPO mitigation option for dwellings in Peka Peka Road, noise levels at the Hadfield Road dwelling are predicted to remain unchanged from current noise levels.

The remaining areas where mitigation options were selected as BPO are summarised below in Table 9.4 below:

Table 19.4: Currently proposed mitigation

Area	Selected noise mitigation
Sector 1	
West of the proposed Expressway – Leinster Avenue area	The mitigation option selected is a 2 metre high bund only with no barrier on top. This option achieves an average structural mitigation of 4 decibels and results in 15 positions within Category A and six positions within Category B. Noise levels would range from 52 to 61dB LAeq(24hr).
East of the proposed Expressway – Raumati South	A 2 metre barrier along the proposed Expressway was selected as mitigation. This option retains all PPFs within Category A and achieves an average mitigation of 3 decibels. This option also achieves compliance with the Noise Guidelines criteria.
Sector 2	
West of proposed Expressway – Raumati Road	A 2 metre high barrier along the western side of the proposed Expressway, extending from chainage 4520 to chainage 4780, has been selected as BPO. Predicted noise levels for this option show that all PPFs would be within Category A, with noise levels of 52 and 53 dB LAeq(24hr), i.e. similar to existing noise levels.

Area	Selected noise mitigation
West of proposed Expressway – South of Kāpiti Road	The mitigation option here includes 2 metre high barriers along the common boundaries with several properties, a dune fill-in at the southern end of this receiving environment and a 3 metre barrier along the proposed Expressway and ramp. A 2 metre high barrier will be located along the proposed Expressway towards the bridge over Kāpiti Road. This barrier arrangement means that high barriers along the property boundary can be avoided. This would reduce the visual impact of the barriers in close proximity to dwellings. Structural mitigation achieves noise level reductions of between 2 and 9 decibels, with an average of 4 decibels. At all PPFs but one (21Observation Place – Category B) Category A will be achieved.
East of proposed Expressway – Kāpiti Road to Mazengarb Road area	The selected mitigation option includes a 1.1 metre high concrete safety barrier along the southbound off ramp and the proposed Expressway edge. Bunds between 2 and 3 metres would be placed along the eastern side of the proposed Expressway along the southern half of this section of road, with bunds filling in gaps in the dunes along the northern half of this section of road. The infill bunds would have heights up to 7 metres, matching the dunes already existing between the proposed Expressway and the residential sites. Noise level reductions of up to 7 decibels would be achieved by this mitigation option.
West of proposed Expressway – Cheltenham Drive area	The selected mitigation option involves a split barrier/bund and lower barrier along the proposed Expressway respectively. A 4m high bund provides natural screening, and a 2.5 metre barrier would be constructed from the northern termination of the bund. This option provides a good degree of noise level reduction and avoids adverse visual and shading effects on residential properties.
Sector 3	
West of proposed Expressway – Mazengarb Road area	Category A at all PPFs west of the proposed Expressway can be achieved by means of a 2 metre high barrier immediately adjacent to the proposed Expressway, extending from the bridge across Mazengarb Road to chainage 8420. Noise reductions between 3 and 6 decibels are predicted to be achieved at all PPFs assessed, with an average mitigation of 4 decibels. Noise levels are predicted to vary from 52 to 56 dB LAeq(24hr) which is an appropriate noise environment for residential use.
East of proposed Expressway – Mazengarb Road area	A 2 metre barrier has been selected for mitigation, extending from the bridge over Mazengarb Road past the dwellings. Noise reductions of 5 decibels are predicted to be achieved at both PPFs assessed. Noise levels are predicted to vary from 56 to 59 dB LAeq(24hr), suitable for residential use.
Otaihanga Road area	A 1.1 metre bridge barrier is considered to be practicable and could be designed to blend into the rural environment. The operation of the proposed Expressway in this currently quiet environment would result in noise level increases of between 9 and 15 decibels, a significant change. However, noise levels at all dwellings will be within Category B and therefore suitable for residential use.
East of proposed Expressway – Kauri Road area	A 3 metre high bund extending for approximately 280 metres along the eastern side of the proposed Expressway has been selected. This bund would achieve noise level reductions of 1 to 6 decibels, with the most affected PPFs receiving on average a 5 decibel noise level reduction. Resultant noise levels would be between 50 and 54 dB $L_{Aeq(24h)}$, well within the most stringent noise criteria Category A. These noise levels are well suited and appropriate for residential use.
West of proposed Expressway – South of Te Moana Road	The controlling noise source for the PPFs in Te Moana Road is traffic on Te Moana Road, not traffic on the proposed Expressway. Te Moana Road will be slightly realigned and widened to allow for connection with the proposed Expressway ramps. The use of OGPA on the altered section of Te Moana Road will achieve noise reductions of up to 6 decibels for the most affected dwellings. Noise level increases are predicted to range from 2 to 8 decibels, with an average increase of 3 decibels. This area will be less affected than many others in the vicinity of the proposed Expressway due to the ambient noise level already being elevated by Te Moana Road. Resulting noise levels with the implementation of mitigation are appropriate for residential use.

Area	Selected noise mitigation
West of proposed Expressway – North of Te Moana Road	The use of OGPA on Te Moana Road will achieve noise reductions of up to 6 decibels for the most affected dwellings. The operation of the proposed Expressway in the vicinity of the PPFs north of Te Moana Road will result in a noticeable increase in noise level, of 5 to 7 decibels, for those PPFs not fronting Te Moana Road as they are currently in a low noise environment. For PPFs fronting Te Moana Road, the noise level is predicted to remain largely unchanged as the proposed mitigation will reduce traffic noise levels from Te Moana Road which will counteract the potential increase in noise level from the proposed Expressway.
Sector 4	
East of proposed Expressway – End Farm Road	The selected mitigation option involves OGPA which will continue on from the new Smithfield Road bridge extending from approximately chainage 14600 to chainage 15400. Noise levels would be reduced by 4 to 5 decibels to 61 dB $L_{Aeq(24h)}$ at both PPFs. This is within Category B and considered to be an acceptable noise level for residential use.
West of proposed Expressway – Peka Peka Road	The use of OGPA has been selected as BPO. The resultant noise levels are predicted to vary from 52 to 67 dB $L_{Aeq(24h)}$, with one PPF remaining within Category B (9 Te Kowhai Road). All other PPFs are in Category A. Mitigation in the order of 3 decibels can be achieved by this option.

As a result of the noise assessment, the following road surfaces will be used on the proposed Expressway:

- Chip seal from the south Project boundary at chainage 19000 to chainage 2400;
- OGPA from south of the Poplar Interchange at chainage 2400 to just north of the Te Moana Interchange chainage 12500;
- Chip seal from chainage 12500 to chainage 14600;
- OGPA surfacing from chainage 14600 to chainage 15400;
- Chip seal surface from chainage 15400 to chainage 17000; and
- OGPA surfacing from chainage 1700 up to the northern Project boundary at Te Kowhai Road.

The mitigation measures set out in Table 19.4 describe the options selected by the Project team to constitute the BPO to mitigate the potential adverse noise effects from the operation of the proposed Expressway.

In summary, mitigation options for operational noise have been assessed in accordance with NZS 6806:2010 and noise mitigation is proposed in a number of areas, mainly where the Project is in close proximity to residential areas. As such, operational road noise will be able to be mitigated to an acceptable level in accordance with NZS 6806:2010.

19.5 Existing environment - vibration

19.5.1 Existing ground conditions

Peat and sand are the two predominant ground conditions within the location of the proposed Expressway alignment. Vibration energy travels slower and covers less distance in soft or aerated ground conditions, as compared to hard ground conditions.

Peat is classified as soft ground, with unique vibration properties given that the consistency changes from saturated to dry. Sand is classified as soft or competent depending on the level of compaction.

19.5.2 Vibration through peat

Investigations on saturated peat (which is typical in the location of the proposed Expressway due to the high water table) found that:

- significant ground vibrations from construction can be generated in peat, particularly as a result of any weight-shift of machinery; and
- vibration will reduce with distance more than it does in hard ground conditions.

19.5.3 Ambient vibration survey results

Surveys of existing ambient vibration[139] levels were undertaken at dwellings adjacent to the Project alignment, and adjacent to the existing SH1 route in Raumati South. This information on ambient vibration levels is contained in Technical Report 19, Volume 3. The existing vibration environments are discussed below.

19.5.3.1 Dwellings adjacent to the Project alignment

The ambient vibration resulting from existing traffic is low. Most residents felt no vibration in their homes and those that did were not disturbed by it. House vibrations due to traffic were often well below the vibration levels resulting from the activities of the occupants. This indicates that residents can become accustomed to moderately high levels of dwelling vibration, provided the source of vibration is identifiable and not unexpected.

19.5.3.2 Dwellings adjacent to the existing SH1 route

Vibration levels were higher in this location, with frequent peaks attributed to heavy vehicle traffic and trains. While residents could feel the traffic vibrations, they were generally not disturbed by them, having become somewhat accustomed to them. A similar effect would be expected for residents adjacent to the proposed Designation; however, the proposed Expressway vibration will be better controlled with an improved road surface.

[139] Ambient vibration refers to the existing vibration at a given receiver location. This includes any and all vibration sources in the vicinity of the receiver (i.e. traffic vibration for houses adjacent to existing roads).

19.6 Construction vibration effects

The construction phase is expected to generate the highest vibration levels, due to the heavy machinery used for earthworks and other activities. Potential adverse effects are most likely to arise from the construction activities outlined in Table 5.1 of Technical Report 18, Volume 3.

The primary potential adverse effect of construction vibration is structural damage of dwellings or private structures such as garages or swimming pools and infrastructure assets such as roads and buried pipes. The secondary potential adverse effect of construction vibration is annoyance and disturbance of people, and the possible damage of property inside dwellings (for example, ornaments and crockery, if they are not well secured or not sitting on level surfaces).

Annoyance is considered a secondary effect because it varies from receiver[140] to receiver and can generally be managed through the CNVMP, whereas the risk of damage to buildings and structures is unambiguous.

19.6.1 Methodology

Construction vibration effects have been assessed through on-site measurement of identified machinery, heavy vehicles and construction activities, as well as the review of data from relevant standards and previous measurements. This data has been analysed and processed to establish risk contours for identified sensitive receivers (dwellings) along the proposed Expressway.

19.6.2 Assessment criteria

The construction vibration criteria for this Project are based on the draft NZTA vibration guide for managing vibration during construction associated with State highway projects. The guide addresses both building damage and human response to vibration by applying appropriate international vibration standards in a dual category approach. The Project vibration criteria selected for the construction phase are as follows:

Category A: adopts criteria from British Standard BS 5228-2:2009 and is designed to practically address the human response effects in dwellings during the daytime and night-time periods, and offices during the daytime. For other building types, and offices during the night-time (i.e. unoccupied), the policy reverts to the residential building damage criterion from German Standard DIN 4150-3:1999.

If measured or predicted vibration levels exceed the Category A criteria then a suitably qualified expert shall be engaged to assess and manage construction vibration and to comply with the Category A criteria. If the Category A criteria cannot be practicably achieved, the Category B criteria shall be applied.

[140] In the context of vibration, a receiver refers to a building or building occupant (typically residential) which may receive vibration as part of the construction and/or operation of the Project.

Category B: is generally designed to protect buildings against damage and adopts criteria from DIN 4150-3:1999 and BS 5228-2:2009, but retains a higher degree of night-time protection for occupied dwellings at night using human response criteria of BS 5228-2:2009.

If measured or predicted vibration levels exceed the Category B criteria then construction activity shall only proceed if there is continuous monitoring of vibration levels and effects on those buildings at risk of exceeding the Category B criteria by suitably qualified experts.

Table 9.5 is a reduced version of Table C2 from the draft NZTA guide, with aspects not relevant to the Project removed, and some clarification of terms added.

Table 19.5: Project construction vibration criteria

Receiver	Details	Category A	Category B
Occupied dwellings	Night-time 2000h - 0630h	0.3 mm/s PPV	1 mm/s PPV
	Daytime 0630h - 2000h	1 mm/s PPV	5 mm/s PPV
Other occupied buildings*	Daytime 0630h - 2000h	2 mm/s PPV	5 mm/s PPV
All other buildings	Vibration – continuous**	5 mm/s PPV	50% of Line 2 values in Table B.2 of BS 5228-2:2009

* 'Other occupied buildings' is intended to include daytime workplaces such as offices, community centres etc., not industrial buildings. Schools, hospitals, rest homes etc. would fall under the occupied dwellings category.

** This line addresses 'continuous' or 'long-term' vibration (as opposed to 'transient' or 'short-term' vibration – refer Appendix B.1 for definitions) as there is no construction machinery proposed which produces transient vibration. The 50% modifier to values in Table B.2 of BS 5228-2:2009 is recommended in that Standard for continuous vibration sources.

These criteria are to be implemented through the CNVMP.

19.6.3 Building damage risk

To assess the potential for building damage effects, receivers close to significant vibration sources have been identified and categorised as high[141] or medium[142] risk of exceeding the risk assessment criterion

[141] High Risk - include those dwellings where vibration levels are likely to exceed the risk assessment criteria. This does not necessarily imply that damage will be caused to the building structure, but these are the receivers subject to the highest vibration levels.

[142] Medium Risk – These dwellings are close to the risk contour and some construction activities may produce vibration levels close to the risk assessment criteria, with possible intermittent exceedance.

of 5 mm/s PPV[143] (being the Project criterion for residential buildings, adopted from German Standard DIN 4150-3:1999).

The results of the risk assessment are provisional, and must be refined and supported by site-specific measurements of high-vibration equipment once construction begins, as recommended in the CNVMP. As these measurements occur on-site, the risk categories can be refined and improved controls can be achieved.

The provisional results (refer to Tables 5.7.1 – 5.7.4 of Technical Report 18, Volume 3) indicate that within all Sectors of the Project, there is a high risk of construction activities exceeding the criteria at some receivers. Construction activities that have the potential to breach the noise criteria will have a noise assessment undertaken. All practicable measures (these measures are detailed in section 10 of the CNVMP) will be undertaken to achieve compliance with the noise criteria. If the measured levels are higher than the noise criteria plus 5 dBA, the works causing the exceedance shall cease and a Site Specific Construction Noise Management Plan (SSCNMP) will be provided to KCDC. The residential area between Kāpiti and Mazengarb Roads (within Sector 2), contains the highest number of at-risk receivers by a significant margin, due to the close proximity of a large number of residences to the proposed Designation.

There are a number of residential swimming pools on properties adjacent to the Project alignment. These are not covered by the risk assessment criterion; however, the risk of damage to the pool structure is acknowledged, particularly for those directly adjacent to the boundary. This issue would be managed by the CNVMP.

Buildings or dwellings not founded on a more stable base than peat (i.e. a suitable sand building platform or piles which extend down to a layer of sand) are at risk of differential settlement which may lead to building or property damage. There is potential for vibration from construction works to accelerate settlement and cause damage to these susceptible buildings. There are no known vibration sensitive or multi-storey buildings located near the proposed designation and the vast majority of residential dwellings adjacent to the proposed designation are understood to be located on either slab-on-grade, or piles founded on earth (sand, not peat). While unlikely, the potential for this effect occurring as a result of construction vibration will be addressed on a case-by-case basis through the management procedures outlined within the CNVMP.

Construction vibration may be felt at locations further from the proposed Expressway which have not been investigated. These effects can be managed by the Category A Project criteria outlined within the CNVMP.

It is understood there is concern that burials within the Takamore Urupā may be at risk of disturbance from construction vibration. These risks are considered low due to the soft ground conditions which will serve to envelop and protect any buried remains in a liquid suspension. Liaison with the Takamore Trust

[143] PPV stands for Peak Particle Velocity, measured in mm/s. This is the standard metric for assessing construction vibration levels.

during the construction phase (through the CNVMP) will seek to ensure any concerns over this issue are addressed.

Any remaining at risk receivers will be protected by adopting best practicable options for the construction phase, in conjunction with liaison and monitoring implemented through the CNVMP to control and mitigate any effects.

Existing structures with the potential to incur damage from construction vibration (including the burials within the Takamore Urupā) will be assessed before works commence. The same structures will be monitored during construction and re-assessed once works have been completed and any damage caused as a result of vibration from construction of the Project will be repaired. This process is explained within the CNVMP.

19.6.4 Human response to vibration

The potential for annoyance due to vibration activities is addressed by Category A of the Project Criteria outlined in the CNVMP. For temporary construction activities, higher vibration levels will generally be tolerated – if sensitive receivers are well informed of construction activities and consider that the construction operation is well controlled and managed (i.e. through the CNVMP) – because their concern over potential damage to their building can be mitigated.

Night-time construction may be required in certain areas. However, the use of high-vibration machinery at night is not currently anticipated. Potential nuisance and annoyance will be reduced by clearly communicating to nearby residents and building occupiers when and for how long the vibrations from construction activities will occur.

As long as this information is communicated accurately and with adequate forewarning, the public is generally reasonably accepting of temporary construction activity effects. Procedures for this communication are set out in the CNVMP.

19.7 Operational traffic vibration effects

19.7.1 Methodology

Operation vibration effects have been assessed through site measurements of heavy vehicle movements, and from information obtained by discussions with residents.

19.7.2 Assessment criteria

The standard adopted for operation vibration of this Project is Norwegian Standard NS 8176.E:2005 *"Vibration and Shock – Measurement of vibration in buildings from landbased transport and guidance to evaluation of its effects on human beings"*.

The details of assessment criteria and standards are contained within Technical Report 18, Volume 3.

19.7.3 Assessment of vibration effects

The primary effect of operation vibration relates to the annoyance of and disturbance to people.

Vibration effects potentially resulting from the operation of the proposed Expressway depend heavily on whether the road is smooth and even. The main potential vibration issue from the completed proposed Expressway would be from heavy vehicle movements passing over imperfections in the road surface.

The proposed Expressway has been designed to avoid cracking and unevenness in road surface over time. This outcome is achieved by a combination of excavation and replacement of peat with sand, and/or preloading of peat with a sand/gravel mix (as detailed within Technical Report 35, Volume 3).

The proposed Expressway will be predominantly surfaced with OGPA, except at the northern end from chainage 15100m to the northern tie-in at approximately chainage 18050m, which will be chip seal (refer to Technical Report 15, Volume 3). There is a difference in roughness between these surfaces, but the effect of this on vibration production is minor compared to that of larger-scale bumps and dips. The most common vibration issue arises when repairs, particularly backfilled trenches, are carried out poorly.

Road surface maintenance is a policy issue for all pavement types, and there is an existing NZTA framework to seek to ensure that the pavement of State highways does not degrade below a certain level of roughness[144].

There is a small likelihood that the closest residents will feel traffic vibration from the proposed Expressway. However, the vibrations are not anticipated to exceed a level where human comfort is compromised. Vibration monitoring may be undertaken on a case-by-case basis if complaints of traffic vibration are received.

In summary, the operation vibration effects are predicted to be negligible (i.e. very unlikely to cause annoyance), provided the road surface of the proposed Expressway is maintained according with normal processes.

19.8 Mitigation of construction noise and vibration effects

Potential construction noise and vibration effects can be suitably managed and mitigated through effective construction management in accordance with the CNVMP. The CNVMP will form part of a comprehensive suite of environmental controls within the Construction Environmental Management Plan (CEMP, Volume 4) for the construction phase of the Project.

[144] In New Zealand this roughness is categorised using the National Association of Australian State Road Authorities (NAASRA) method which uses a surface profiling machine to evaluate the state of the road surface.

As discussed, a CNVMP has been developed for this Project (refer to CEMP Appendix F, Volume 4). This document outlines the methodology for assessing, managing and mitigating the Project construction noise and vibration effects.

The CNVMP will specifically address the potential Project construction noise and vibration effects, identify the standards that all Project construction activities must comply with (i.e. the Project criteria) and outline the best practicable options for noise and vibration management throughout the Project construction period (being 4 to 5 years).

The CNVMP will contain:

- The construction noise and vibration Project criteria;
- Hours of operation, including times and days when high-vibration machinery would be used;
- A list of machinery to be used;
- Requirements for vibration measurements of relevant machinery prior to construction or during their first operation, to confirm risk contours;
- Requirements for building condition surveys of critical dwellings prior to and after completion of construction works, and during the works if required;
- Requirements for identifying any existing infrastructure assets (services, roads etc) which may be at risk of vibration induced damage during construction;
- Requirements for identifying any existing infrastructure assets (services, roads and the like) which may be at risk of vibration induced damage during construction;
- Roles and responsibilities of personnel on site;
- Construction operator training procedures, particularly regarding the use of excavators;
- Construction noise and vibration monitoring and reporting requirements;
- Mitigation options, including alternative strategies where full compliance with the Project Criteria cannot be achieved;
- Management schedules containing site specific information;
- Methods for receiving and handling complaints about construction noise and vibration (the CNVMP (CEMP Appendix F, Volume 4) also presents this as a flow diagram); and
- The procedure for managing vibration damage to existing services such as roads and underground pipelines.

19.9 Mitigation of operational noise and vibration effects

Operational noise and vibration effects can be mitigated to acceptable levels within the relevant Standards. Operational noise mitigation is discussed extensively in Section 19.4.3 above and operational vibration mitigation in Section 19.7.3 above.

19.10 Summary of effects after mitigation

Overall, it is considered that the proposed Expressway Project can be constructed and operated such that any adverse noise and vibration effects can be avoided, remedied or mitigated using best practicable options. Given this, the management of noise and vibration effects is consistent with the RMA.

20 Air quality

Overview

Construction of the proposed Expressway has the potential to generate dust, particularly during the large scale earthworks. Construction works could have an adverse effect on air quality for sensitive receptors (mainly residential premises) within close proximity of the proposed earthworks.

Due to the close proximity of sensitive receptors to the construction footprint of the proposed Expressway, a high standard of emissions control and management will be employed over the duration of the proposed construction works.

An air quality monitoring programme will be implemented to assist the control and management of construction dust discharges. The monitoring programme will be based on regular visual monitoring, continuous monitoring of total suspended particulate matter (TSP) at one or two locations, continuous meteorological monitoring at one or more locations, and prompt responses to complaints from the public and regulatory authorities. Adherence to dust management measures (as contained in Construction Air Quality Management Plan (Appendix G of the CEMP, Volume 4)) during construction will ensure that adverse air quality effects will be suitably avoided or mitigated.

Once the proposed Expressway is operational, there is the potential for adverse air quality effects from vehicle exhaust pollutants. Results of the dispersion modelling indicate that cumulative particulate matter less than 10 microns in diameter (PM_{10}) Nitrogen Oxides (NO_x), Carbon Monoxide (CO) and benzene concentrations are unlikely to exceed the relevant National Environmental Standards for Air Quality (NESAQ) and New Zealand Ambient Air Quality Guidelines (NZAAQG) thresholds. The predicted contribution of vehicles using the proposed Expressway to the ambient concentrations of pollutants will be low.

Neither operational monitoring nor mitigation is considered necessary because of the low concentrations of pollutants predicted.

20.1 Introduction

This Chapter discusses the actual and potential air quality effects arising from the construction and operation of the proposed Expressway. Construction effects mainly relate to the generation of dust, whereas operational effects arise from vehicle emissions from road users. The information contained in this Chapter is based on the following reports in Volume 3 of the Assessment of Environmental Effects:

- Assessment of Operational Air Quality Effects, Technical Report 13, Volume 3;
- Assessment of Construction Air Quality Effects, Technical Report 14, Volume 3; and
- Traffic Modelling Report, Technical Report 34, Volume 3.

20.2 Existing air quality

In order to assess the air quality effects of the proposed Expressway, information was gathered about existing air quality in the general area of the proposed Expressway and about the location of potentially sensitive receptors.

Air quality is influenced by the prevailing meteorological conditions of an area, particularly wind speed and direction. Wind direction and speed were obtained for Paraparaumu Airport from 2008-2010, in addition to that recorded at the Raumati Road Project monitoring site. Both units indicate wind directions in the general area of the proposed Expressway are predominantly northerly to northeasterly and southerly, with a strong seasonal variation. The Paraparaumu Airport monitoring mast is located approximately 20m higher than the Raumati Road unit, and the data from both sites generally shows that wind speeds are lower closer to the ground.

The proposed Expressway is within the Kapiti Coast airshed, as defined by GWRC. Monitoring of air quality in the area has been undertaken by both the GWRC (as part of its general air quality management obligations) and by the Project team (specifically for this Project). The GWRC monitoring site recorded PM_{10} and $PM_{2.5}$[145] full levels at Glen Road, Raumati South in Paraparaumu during June and July 2010. These results recorded 3 exceedances of the NESAQ / NZAAQG[146] PM_{10} threshold concentration (50 µg/m^3) over this period. Over half of the PM_{10} levels were attributed to wood burning fires, while 29% were associated with marine aerosol (produced by long-range transport of fine sea-salt across the Tasman Sea and southern oceans).[147]

The Project team established a monitoring site at Raumati Road, which measured ambient PM_{10}, NO_x, and CO[148] between January 2011 and January 2012. A summary of the background concentrations collected at the Raumati Road site in relation to the relevant NES AQ / NZAAQG standards for the period January to December 2011 are presented in Table 20.1 below.

[145] Particulate Matter less than 2.5 microns and 10 microns in diameter.

[146] National Environmental Standards for Air Quality (NESAQ) and New Zealand Ambient Air Quality Guidelines (NZAAQG)

[147] GWRC (2011) Raumati South air quality investigation – Winter 2010 particulate matter concentrations and sources.

[148] Nitrogen Oxides (NOx); and, Carbon Monoxide (CO)

Table 20.1: Summary of Background Concentrations of PM_{10}, NO_2 and CO (Raumati Road)

Parameter	Averaging period	Background concentration	NES AQ/NZAAQG threshold
PM_{10}	24 hour	36 µg/m³	50 µg/m³
	Annual	13 µg/m³	20 µg/m³
NO_2	1 hour	53 µg/m³	200 µg/m³
	24 hour	27 µg/m³	100 µg/m³
	Annual	14 µg/m³	40 µg/m³
CO	1 hour	8 mg/m³	30 mg/m³
	8 hour	3 mg/m³	10 mg/m³

Overall, the existing ambient air quality close to the proposed Expressway alignment reflects the typical characteristics of rural and urban receiving environments. The rural areas have low existing levels of air quality pollutant, whereas the urban areas tend to be impacted by PM_{10} emissions from home heating during winter time.

20.3 Sensitive receptors

The Ministry for the Environment's Good Practice Guide for Assessing Discharges to Air from Land Transport (2008)[149] recommends assessing the air quality effects of a proposed road on identified sensitive receptors. These are people who are generally regarded to be more likely to be more sensitive than the general population to vehicle exhaust emissions. Sensitive individuals are considered to include children and the elderly. Sensitive land use receptors include childcare and early learning facilities, schools, hospitals and residential care homes. In addition, areas of open space or parks used for recreational activities are classified as being receiving environments of high sensitivity.

The assessment identifies the following specific sensitive receptors (in addition to sensitive individual receptors) within 200m of the proposed Expressway:

- El Rancho Holiday Camp;
- Metlife Kapiti Retirement Village;
- Makarini Street Reserve;
- Linwood Drive Recreational Reserve;
- Waikanae River corridor; and
- Wharemauku Stream.

No schools, preschools or healthcare facilities are located within 200m of the proposed Expressway.

[149] http://www.mfe.govt.nz/publications/air/assessing-discharges-land-transport-jun08/

20.4 Assessment of effects on air quality

Potential air quality effects can arise from both the construction and operation of the proposed Expressway. The potential effects from construction and operation are quite different and hence have been considered separately.

20.4.1 Construction of the Project

The following aspects of construction of the proposed Expressway have the potential to cause adverse air quality effects:

- Dust from earthworks and road construction;
- Odour arising from disturbance of potentially contaminated sites; and
- Vehicle exhaust emissions.

Each of these potential effects is discussed in further detail below. Technical Report 14, Volume 3 contains a detailed Project Sector by Project Sector assessment of dust discharges.

20.4.2 Dust from earthworks and road construction

Exposed earthworks can be a significant source of dust, particularly when undertaken on a large scale as needed for construction of the proposed Expressway. As the particle size of dust is relatively large (larger than 100µg), it is difficult for it to penetrate the respiratory system, and therefore dust generally has minimal health impacts. However, dust can be a nuisance to the public, has the potential to affect plant life and can contribute to sediment loads in waterways by depositing in areas if no sediment control measures are in place.

Key construction activities that have the potential to generate dust include:

- Excavation and disturbance of dry material;
- Loading and unloading dry and dusty material; and,
- Stockpiling of materials, including placement and removal.

Dust may be generated from dry, undisturbed areas of earthworks at wind speeds greater than 5-10 m/s (10-20 knots). Factors which influence the rate of transportation of dust include particle size, wind speed, rainfall and the rate of evaporation.

The assessment found that without mitigation measures, dust is likely to be an issue at several locations along the proposed Expressway alignment. Table 20.2 below details these locations and the timeframes within which construction activities are likely to have a significant potential for dust emissions. Dust from construction activities will be managed through the Construction Air Quality Management Plan (CAQMP) which will ensure that potential dust effects will be suitably mitigated.

20.4.3 Emissions from construction vehicles

Construction vehicles have the potential to cause adverse air quality effects under certain meteorological conditions, which can create a nuisance at neighbouring sensitive locations. Excessive smoke and odour from diesel-fuelled heavy vehicles, generators and other machinery is primarily caused by poor engine maintenance.

The CAQMP (Appendix G of the CEMP) describes measures to be undertaken to control and monitor construction vehicle emissions (section 3.1.4), including requirements to maintain vehicles and equipment in accordance with manufacturer specifications and to immediately service any vehicles discharging excessive exhaust smoke.

Adherence to the CAQMP (Appendix G of the CEMP) practices for construction vehicles will ensure that all potential adverse effects associated with emissions will be suitably managed.

20.4.4 Pre- cast concrete manufacture

A number of large pre-cast concrete beams will be required for the bridge structures. The Otaihanga Construction Yard will have a pre-cast manufacturing facility installed where wet concrete will be brought into the site to make the beams required (note that no concrete batching plant is proposed for the construction of the proposed Expressway as all concrete will be sourced from existing facilities around the region).

When the pre-cast units are removed from the mould, hand-held grinders are often used to remove surface flaws, and occasionally water-blasting is required to obtain a suitable surface finish. Both of these activities have the potential to generate dust emissions. Dust generation can be minimised by using diamond-tooth grinders for hand-held grinding. Water blasting is usually not necessary and it is estimated that this may need to be carried out approximately 10 times during the construction phase of the proposed Expressway.

The Otaihanga Construction Yard is located 250m from the nearest sensitive receptors (residential property), thereby reducing the potential adverse effects arising from the manufacture of pre-cast concrete beams.

20.4.5 Odour

Road construction does not typically involve activities that generate offensive odours. It is possible that during earthworks activities, excavation may disturb land contaminated with organic wastes (such as closed landfills) or waterlogged soils that may be anaerobic, such as peat. Therefore some occasional discharges of odour may occur.

The proposed Expressway runs close to the former landfill site on Otaihanga Road, where the main construction yard will be located. However, it is not anticipated that any of the works in this area will release any odour as there is no proposed excavation of the former landfill site. The proposed excavation sites are suitably distanced from the former landfill area to ensure adverse odour effects will be avoided.

20.4.6 Summary of anticipated construction dust effect

Table 20.2 summarises the potential effects of the construction activities listed above and the approximate timeframes these effects are anticipated to occur in the construction programme.

Table 20.2: Areas potentially affected by dust emissions during proposed Expressway construction

Sector	Location	Anticipated Timeframe
1	Poplar Ave	Early 2014 for approx. 2 years, and from Sep 2016 for 1 year.
	Poplar Ave - Raumati Rd	Early 2015 for approx. 1 year, and from early 2017 for approx 1 year.
2	Raumati Rd – Ihakara Rd	Late 2014 for approx. 7 months, and late 2015 for anticipated 20 months.
	Ihakara Rd – Mazengarb Rd (including Kapiti Rd Interchange)	Late 2013 for approx. 6 months, and from Sep 2015 for approx. 20 months.
3	Mazengarb Rd – Otaihanga Rd	March 2014 for approx. 22 months.
	Otaihanga Rd – Waikanae River Crossing	Late 2013 for approx. 16 months.
	Waikanae River Crossing – Te Moana Rd.	Early 2014 for approx. 13 months.
		Approx. 10 occurrences over the duration of construction.
4	Te Moana Rd – Ngarara Rd	March 2015 for approx. 34 months.
	Ngarara Rd	Oct 2015 for approx. 11 months.
	Ngarara Rd – Smithfield Rd	From April 2015 for approx. 33 months.
	Smithfield Rd	May 2014 for approx. 10 months.
	Peka Peka Rd	April 2015 for approx. 32 months.

Compliance with the proposed management measures of dust effects as contained in the CAQMP (Appendix G of the CEMP) will mitigate effects at these sites to an acceptable level.

20.4.7 Operation of the Project

The effects on air quality from the operation of the proposed Expressway will be influenced by a number of different factors, including:

- Existing air quality;
- Meteorology;
- Background air quality concentrations; and
- The location of sensitive receptors.

Dispersion modelling has been undertaken to assess the pollutant levels associated with the operation and changes in the existing roading network as a result of the proposed Expressway. The model predicts future levels of PM_{10}, NO_2, CO and benzene in the Project area for the following future scenarios:

- **2016 With Project** – representative of the year of opening of the proposed Expressway (includes the impact on traffic flows of other roading projects in the region that are scheduled for completion by 2016);

- **2016 Do Nothing** – for comparison with the 2016 With Project scenario; assumes that all other projects in the region, unrelated to the proposed Expressway, have been completed, but that the proposed Expressway itself has not been constructed;
- **2026 Do Nothing** - assumes that all other projects in the region, unrelated to the proposed Expressway, have been completed, but that the proposed Expressway itself has not been constructed; and
- **2026 With Project** – representative of increased traffic volumes and likely improvements in the vehicle fleet ten years after opening; includes traffic flows, fleet composition and completed roading projects predicted for 2026.

Further information about the dispersion modelling undertaken for this assessment, including the assumptions and limitations associated with the model, is contained in Technical Report 13. This report also sets out the relevant thresholds for each of the modelled contaminants. The results of the emissions modelling are detailed below.

20.4.8 Predicted contaminant emissions

The dispersion model predicted cumulative concentrations of PM_{10} in Sectors 1 and 2. Predictions from Sector 1 and 2 can be applied for Sectors 3 and 4 as any adverse effects on air quality arising from the operation of the proposed Expressway in Sectors1 and 2 will be at least as great as or greater than those in either Sector 3 or Sector 4. The results of the modelling showed that predicted cumulative concentration of PM_{10} in these Sectors are all considerably less than the NESAQ of 50 µg/m^3 (24-hour average) and the NZAAQG of 20 µg/m3 (annual average).

While the highest PM_{10} concentrations are predicted to occur at commercial premises close to Kapiti Road, these concentrations are still within the relevant criteria. The maximum incremental contribution from the proposed Expressway to cumulative PM_{10} concentrations is 2.0 µg/m^3.

20.4.9 Predicted nitrogen oxide concentrations

The predicted NO_2 concentrations for Sectors 1 and 2 are considerably less than:

- The 1 hour average for the NESAQ and the GWRC MDL[150] for NO_2;
- The 24-hour average for the NZAAQG for NO_2; and,
- The annual average recommended by GWRC MDL and WHO AQG[151].

20.4.10 Predicted Carbon Monoxide concentrations

The predicted CO concentrations for Sectors 1 and 2 are considerably less than:

[150] Maximum Desirable Level

[151] World Health Organisation, Air Quality Guidelines

- The 1 hour average for the NESAQ, NZAAQG and the GWRC MDL; and,
- The 8 hour average for the NESAQ.

20.4.11 Predicted Benzene concentrations

The predicted incremental average of benzene concentrations in the modelled emission scenarios are all less than the NZAAQG limit of 3.6µg/m^3.

20.4.12 Summary of dispersion modelling results

The results of the dispersion modelling indicates that cumulative PM_{10}, NO_2, CO and benzene concentrations from the vehicles using the proposed Expressway are unlikely to cause exceedances of any relevant air discharge assessment criterion for air pollutants.

The operational air quality assessment concluded the following:

- Maximum ground level concentrations of all vehicle related pollutants are predicted to decrease between 2016 and 2026, largely due to improvements in the on-road vehicle fleet;
- People living within 200m of the proposed Expressway will have a slightly increased exposure to vehicle related contaminants as a result of the Project, compared to without it; and
- Concentrations of the predicted future contaminant levels, as a result of the proposed Expressway, are unlikely to cause exceedances of any relevant air discharge assessment criterion at any nearby sensitive receptor.

In summary, there will be no material adverse effects on air quality arising from vehicles using the proposed Expressway and, hence, no mitigation is considered necessary.

20.4.13 Vehicle emissions from traffic on other roads as a result of the operation of the Project

The traffic modelling (Technical Report 34, Volume 3) indicates that there will be some changes to traffic on local roads, including increases in vehicle numbers on Kāpiti Road, Poplar Avenue and Park Avenue. These increases are unlikely to have a significant impact on concentrations of air pollutants at nearby receptors because overall, the number of vehicles on local roads will remain low.

The reduced level of traffic on SH1 and the consequent reduction in congestion will result in improvements of air quality in the nearby vicinity.

20.5 Measures to avoid, remedy or mitigate potential adverse effects on air quality

Based on the construction air quality assessment, dust from construction activities has been identified as the key potential adverse effect.

Dust from construction activities will be managed through and adherence to the CAQMP (Appendix G of Volume 4). The primary management approach will be the suppression of dust at its source, allowing potential adverse effects on air quality to be appropriately managed.

A dust monitoring programme is proposed, based on regular visual monitoring in all areas, continuous monitoring of total suspended particulate matter (TSP) at one or two locations, continuous meteorological monitoring at one or more locations, and prompt responses to complaints from the public and regulatory authorities.

Monitoring and adherence to the CAQMP (Appendix G of Volume 4) will ensure that the potential and adverse air quality effects associated with emissions will be suitably mitigated.

Neither management nor monitoring of operational air quality will be required due to the predicted contribution of vehicles using the proposed Expressway to the ambient concentrations of pollutants being low.

21 Terrestrial ecology

Overview

The Project traverses a highly modified landscape, which has mainly been converted to pasture with relatively few areas of indigenous vegetation remaining. Ecological field surveys undertaken have confirmed the variability of ecological conditions along the route, from highly modified urbanised and pastoral landscapes with limited ecological diversity and values, through to regionally rare, complex and ecologically significant ecosystems. While the choice of alignment has avoided the most significant ecosystems, the proposed Expressway will traverse some areas of ecological value.

Within this modified landscape, populations of indigenous fauna are typically small, and species of conservation concern are restricted to specific sites, typically associated with fragments of indigenous vegetation. These habitats have been identified and described.

The Project ecologists have worked closely with the design team to avoid potential adverse ecological effects, where practicable. Where avoidance is not practicable, ecological mitigation has been developed to mitigate any remaining adverse effects

A conservative approach has been taken to quantifying the loss of vegetation and terrestrial habitats. The adverse effects of the Project on terrestrial ecology are most likely to arise as a result of vegetation clearance and disturbance and displacement of habitats and / or species.

Effects of construction on vegetation and the habitat of terrestrial fauna are considered to be short term, assessed as low to moderate, with the exception of effects on the North Island fernbird population and habitat. Mitigation will include ecological offsetting (re-establishment of areas of habitat lost consistent with existing values), replanting with indigenous vegetation in some areas, relocation and/or protection of fauna and careful construction management methods.

Effects of the operation of the proposed Expressway on terrestrial fauna are assessed as very low to low, with the exception of high potential adverse effects on the North Island fernbird population due to habitat disturbance and the risks of traffic mortality. Additional pre-construction research is proposed to better understand the existing population and tailor appropriate mitigation for discussion with DOC and other relevant stakeholder groups.

The ecological mitigation recommended for the loss of terrestrial habitat, combined with the methods of stormwater management for the Project, will also have a number of positive environmental outcomes.

21.1 Introduction

This Chapter presents the findings of investigations undertaken to determine the actual and potential effects of the Project on terrestrial ecology. Terrestrial ecology includes terrestrial vegetation and terrestrial fauna such as birds, bats, lizards and terrestrial invertebrates.

The terrestrial assessments commenced with an initial desktop study of ecological databases and previous relevant studies to provide information about the existing terrestrial ecology; this data informed the methodology used for field surveys undertaken within and adjacent to the Designation[152]. Once a baseline of terrestrial ecological values had been determined, the potential impacts of the construction and operation of the Project were assessed.

Liaising with the specialist ecologists on the Project team, the Project ecologist has worked closely with the design team to seek to avoid potential adverse ecological effects that had been identified, where practicable. Where avoidance was not practicable, ecological mitigation was then developed to mitigate any remaining adverse effects.

21.2 Existing terrestrial ecological values

21.2.1 Ecological investigations

The identification of effects on terrestrial ecology required the assessment of the composition and values of the existing terrestrial ecology of the study area. This relied on two complementary methods:

- Desktop studies of available relevant ecological information; and
- Field surveys.

The description of existing terrestrial ecology in this section includes a brief overview of the investigations undertaken. Further details on the methods used and findings of these investigations are contained in the following Technical Reports provided in Volume 3:

- Ecological impact assessment (Technical Report 26);
- Terrestrial vegetation and habitats (including wetlands) (Technical Report 27);
- Herpetofauna (Technical Report 28); and
- Avifauna studies: Description and values (Technical Report 29).

In addition, the following Technical Reports (Volume 3) and Management Plans (Volume 4) are cross referenced within this Chapter:

- Assessment of Landscape and Visual Effects (Technical Report 7);
- Assessment of Hydrology and Stormwater Effects (Technical Report 22);
- Ecological Management Plan (Appendix M of the CEMP)

[152] Refers to the maximum extent of direct ecological effects within the proposed Expressway Designation. The Designation is approximately 316 ha and encloses all necessary construction activities, including the proposed Expressway itself and all subsidiary work such as sediment treatment and fill disposal.

- Landscape Management Plan (Appendix T of the CEMP); and
- Construction Air Quality Management Plan (Appendix G of the CEMP).

21.2.2 Terrestrial flora and habitats

21.2.2.1 Foxton ecological district

The entire Project is located within the Foxton Ecological District[153]; which is defined by the dune topography and associated vegetation. Wind is a dominating feature of the climate, with northwesterly gales common, affecting the dune landscape, vegetation and land uses.

A great part of the Foxton Ecological District would have originally been swamp forest dominated by kahikatea and pukatea with rimu and swamp maire, with shrubs and trees dominating inland of the coast. These original forests are now reduced to several small remnants; today less than 5% of the surface area of the Foxton Ecological District consists of predominantly indigenous vegetation.

The Foxton Ecological District also contained extensive dune wetlands and lakes, and connecting waterways. Major drainage works for farming have resulted in the loss of most of these natural lakes and wetland systems throughout the area, and many streams have been channelised. Dune lakes and peat swamps now account for only a small part of the Foxton Ecological District.

21.2.2.2 Threatened plant species

Rare, threatened or locally uncommon plant species of the Kāpiti Coast were identified from a range of sources, and all key habitats within the Designation that were considered likely to contain any of these plants were identified.

Following detailed botanical surveys in these key habitats, the rare species *Korthalsella salicornioides* (dwarf mistletoe) was identified in a regenerating manuka wetland off Ngarara Road (an area not physically affected by the proposed alignment). This species has been classified with a status of 'At Risk'[154].

Korthalsella salicornioides is considered to be a naturally uncommon and biologically sparse species which can, on occasion, be locally abundant, but is more usually known in large parts of its likely range by only spot or scattered occurrences. The NZPCN website[155] notes that in some parts of its range it is

[153] An ecological district is an area of land where topographic, climatic, soils and biological features and broad cultural patterns produce a characteristic landscape of biological communities.

[154] 'At Risk' species are those that are naturally uncommon, with the qualifier of sparse distribution. All species are assessed against a standard set of criteria which is described in "Townsend, et.al (2007): New Zealand Threat Classification System Manual. Wellington: Department of Conservation". Refer to Technical Report 26, Volume 3 for further details.

[155] New Zealand Plant Conservation Network (NZPCN) website (www.nzpcn.org.nz)

seriously at risk due to the felling of its main host species (*Leptospermum* and *Kunzea*) for fire wood and also to clear land for farming or pine plantations.

Photo 21.1: *Korthalsella salicornioides*

In addition to *Korthalsella salicornioides*, there were a small number of other locally uncommon wetland plants identified within a number of the wetlands near the proposed Expressway alignment. The key species include:

- At the Raumati South Peatlands, *Nertera scapanoides*, an uncommon herb in the Wellington Conservancy of the Department of Conservation (DoC), is a dominant ground cover in large wet areas. *Baumea teretifolia* is also present, which is at its southern limit in the Conservancy. *Gleichenia dicarpa* / *G. microphylla* hybrid is also somewhat uncommon in the Conservancy;
- At the Raumati Manuka Wetland, *Nertera scapanoides* was found. It is a dominant ground cover in large wet areas, *Baumea teretifolia* and *Gleichinea microphylla* were also found at the site; and
- At the El Rancho Wetland (Weggery), an earlier site inventory (Cameron 1995) recorded the nationally critical *Ophioglossum petiolatum* (stalked adder's tongue fern) present in the wetland. Other botanical surveys since, including those undertaken for the Project, have not confirmed this species presence.

21.2.2.3 Ecologically significant areas

Within the Project area there are a number of areas of ecological significance. There are two types of these areas:

- 11 protected natural areas (PNA) that are formally protected; and
- 21 significant natural areas (SNA) that are not formally protected.

The SNA sites were derived from a number of sources, in particular, the Wildlands Kāpiti Coast District Council Ecological Sites Survey (2003) and the Wildlands Kāpiti Coast District Council Potential Ecological Sites Survey (2007), as well as the Project Ecologist's knowledge of the Kāpiti Coast.

The PNA sites include scenic reserve or conservation land protected under the Reserves Act (1977) including local purpose reserves and stewardship areas; a private or National Covenant (QEII) attached to the title of the property; or public land which has a management plan (i.e. Regional Parks).

Table 21.1 below lists those PNAs and SNAs that are immediately adjacent to or within the proposed alignment; these are shown on Vegetation Maps, Volume 5.

Table 21.1: Relevant protected natural areas and significant natural areas within the Project area

Name	Total Size (ha)	Description	In relation to the Project
Protected Natural Areas			
Terrestrial vegetation			
Ngarara Bush	2.59	An area of contiguous semi-coastal modified primary kohekohe and kahikatea forest. Protected by QE II covenant, KCDC Ecosite (K133).	Adjacent to Designation
Wetland Vegetation			
Queen Elizabeth Regional Park peatlands	N/A	A large Regional Park with a range of values, including areas of remnant swamp forest and wetland systems in the south and Poplar Ave wetlands in the north. The actual areas of peatlands have not been determined. Protected by Regional Park status, KCDC Ecosite (K184).	Partially falls beneath Project Footprint[156]
Andrews Pond Scientific Reserve.	1.3	A small manuka wetland located amongst large areas of pasture. Protected as a Scientific Reserve, RAP, KCDC Ecosite (K093).	Adjacent to Designation
Sovereign Way / Crown Hill Eco-site	0.6	Manuka transitional wetland. Protected by KCDC Recreation Reserve (E183), KCDC Ecosite (E92).	Adjacent to Designation

[156] "Project footprint" refers to the earthworks extent for the road including the road surface, associated cuts and fills and permanent stormwater treatment devices, but does not involve temporary works such as site offices, laydown and storage areas and construction sediment treatment devices. The MacKays to Peka Peka Project Footprint has an area of 164 ha.

Name	Total Size (ha)	Description	In relation to the Project
Waikanae Estuary Scientific Reserve	68.2	Nationally-significant estuarine wetland and rivermouth protects a natural mosaic of freshwater lakelets, saltwater lagoons and marshes, tidal sand flats and sandy beach at the mouth of the Waikanae River. Protected as a Scientific Reserve, KCDC Ecosite (K081).	Downstream of Designation
Waimanu Lagoons	8.0	A large saline lagoon system with linkages to Waikanae Estuary Scientific Reserve. Wetland habitat is nationally under-represented. KCDC Ecosite (K175).	Downstream of Designation
Osbournes Swamp	1.0	A modified flax/toetoe/raupo wetland with Coprosma propinqua shrubland. Protected by QEII Covenant, KCDC Ecosite (K068).	Adjacent to Designation
Te Harakeke Swamp / Kawakahia Wetland	58.2	The largest dune swale wetland remaining in a relatively natural state on the coastal plain of the Foxton Ecological District. Protected by QEII Covenants, KCDC Ecosite (K066), RAP (PNAP).	Downstream of Designation
Te Kouka Wetland	3.7	Regenerating kahikatea wetland, with scattered remnant kahikatea. Protected by QEII Covenant, KCDC Ecosite (K066).	All or part within Designation
Kawakahia Swamp Forest	0.8	A small area of kahikatea-dominated semi-coastal remnant swamp forest. Protected by QEII Covenant, KCDC Ecosite (K066).	Downstream of Designation
Nga Manu Nature Reserve	41.0	One of the largest and best examples of swamp forest within Foxton Ecological District. Protected by Private Trust, QEII Covenant, KCDC Ecosite (K133).	Adjacent to Designation
SIGNIFICANT (UNPROTECTED) NATURAL AREAS			
Terrestrial Vegetation			
Raumati Road Kanuka	0.4	A small area of kanuka forest and treeland with scattered mahoe on the raised dunes south of Raumati Road. Reference: BML,[157] 2011.	Partially falls beneath Project Footprint
Otaihanga Landfill Mahoe	0.1	Small stand of indigenous bush with remnant matai tree. Reference: Wildlands, 2007; BML, 2011.	All or part within Designation

[157] BML refers to information sourced from Boffa Miskell.

Name	Total Size (ha)	Description	In relation to the Project
Otaihanga Landfill Kanuka	0.5	Kanuka forest located on an elevated sand dune. Reference: Wildlands, 2007; BML, 2011.	Partially falls beneath Project Footprint
Waikanae River Riparian	0.13	Riparian planting on southern bank of the Waikanae River. Reference: Keesing, 2001; BML, 2011.	Partially falls beneath Project Footprint
Tuku Rakau Forest	0.9	Regenerating mahoe forest with remnant kohekohe tree. Adjacent to a small modified wetland. Reference: BML, 2011.	Partially falls beneath Project Footprint
Ngarara Farm Mahoe	4.2	A large area of advanced mahoe regenerating from gorse on the raised dunes of Ngarara Farm, in close proximity to Ti Kouka wetland.	Partially falls beneath Project Footprint
Wetlands			
131 Raumati South Peatlands	11.1	Large manuka-dominated wetland with a range of other wetland habitat types. Reference: KCDC; Wildlands, 2007; BML, 2011.	Adjacent to the Designation
Raumati Manuka Wetland	2.0	Manuka and Sphagnum wetland, with Carex and Baumea sedge-rushland and open water Reference: Wildlands, 2007; OPUS, 2007; BML, 2011.	All or part either within the Designation or Outside of Designation, but potentially connected via watertable
Kiwi Pond	1.8	A large area of seasonally wet pasture that provides occasional wildlife habitat. Reference: Wildlands, 2007; OPUS, 2007; BML, 2011.	Partially falls beneath Project Footprint
Meadows Trust Carex Wetland	0.2	Small area of induced *Juncus* and *Carex* wetland. Reference: Wildlands, 2007; BML, 2008; BML, 2011.	Adjacent to Designation
Southern Otaihanga wetland	1.4	Large area of purei sedgeland with areas of open water, Baumea rushland and scattered manuka. Reference: Wildlands, 2007; Opus, 2007; BML, 2011.	Partially falls beneath Project Footprint
Middle Otaihanga wetland	2.3	Modified manuka and Carex wetland dominated by weeds. Reference: Wildlands, 2007; BML, 2011.	Partially falls beneath Project Footprint
Northern Otaihanga wetland	1.0	Manuka and Carex wetland with Sphagnum. Reference: Wildlands, 2007; OPUS, 2007; BML, 2011.	Partially falls beneath Project Footprint
Open water and Juncus south of Waikanae River.	1.8	Stock water pond (formed) and large area of *Juncus* and pasture grasses. Reference: Wildlands, 2007; BML 2011.	Adjacent to Designation

Name	Total Size (ha)	Description	In relation to the Project
El Rancho Wetland (Weggery)	3.9	A large area of manuka dominated wetland with occasional kahikatea. Southern edge includes Baumea and Carex. Some open water and Sphagnum. Reference: KCDC, Cameron, 1995; Kessels, 1998; Keesing, 2001; BML, 2006; Wildlands, 2007; OPUS, 2007; BML, 2011.	Either falls beneath Project Footprint or Outside of Designation, but potentially connected via watertable
El Rancho Wetland (West)	0.7	Large area of manuka dominated wetland with some open water to the west. Reference: KCDC; Kessels, 1998; Keesing, 2001; Wildlands, 2007; BML, 2006; OPUS, 2007; BML, 2011.	Outside of Designation, but potentially connected via watertable
El Rancho Wetland (Takamore)	1.8	Large area of manuka dominated wetland with some open water to the north. Reference: KCDC; Kessels, 1998; Keesing, 2001; Wildlands, 2007; BML, 2006; OPUS, 2007; BML, 2011.	Outside of Designation, but potentially connected via watertable
Tuku Rakau Wetland	0.3	A small wetland with scattered manuka, cabbage tree and rushland.	All or part within Designation
Osbournes Swamp West	1.3	Large area of manuka dominated wetland with some open water. Reference: KCDC; Kessels, 1998; Keesing, 2001; Wildlands, 2007; BML, 2006; OPUS, 2007; BML, 2011.	Adjacent to Designation
Ngarara Wetland	2.7	A large area of manuka dominated wetland with areas of Carex sedgeland and regenerating kahikatea forest east of Ngarara Road. Contains *Korthalsella salicornoides*. Reference: KCDC; Wildlands, 2007; BML, 2008; BML, 2011.	Adjacent to Designation
Ngarara Dune Depressions	3.3	Three large wet dune depressions dominated by *Juncus* (induced from grazing) in the north of Ngarara Farm. Reference: Wildlands, 2007; BML, 2008; BML,2011.	Partially falls beneath Project Footprint

21.2.3 Terrestrial fauna

Several areas of habitat for herpetofauna, avifauna and terrestrial invertebrates are present within the alignment.[158]

As part of the Project ecological investigations, an assessment of herpetofauna and avifauna populations within the Project area was undertaken (discussed below).

21.2.4 Terrestrial invertebrates

A wide variety of common terrestrial invertebrates were detected during various ecological investigations, though none of conservation concern.

One specimen of *Peripatus novae-zelandiae* (velvet worm) was located in the compacted sand under a recently fallen pine tree within the Otaihanga Mountain Bike Area. While this species does not currently have a threat status, their taxonomy is under review.

21.2.5 Herpetofauna

21.2.5.1 Lizards

Much of the habitat within the southern two-thirds of the alignment is covered in dense grass and associated ground tier species, which are characteristics preferred by native terrestrial lizards due to the abundance of refuges and openness. In the northern end of the alignment, while the habitat is less desirable due to grazing, pockets of dense ground tier vegetation exist around the borders of bush patches, under fencelines and at roadside verges.

The majority of the proposed Expressway alignment contains low quality arboreal lizard habitat due to the absence of suitable tree species. However, a number of bush patches/wetlands along the alignment were considered to provide optimal habitat for arboreal lizards as a result of the presence of preferred tree species (for example, kanuka).

Desktop studies identified five species of endemic lizard that could potentially occur within the proposed Expressway alignment (refer to Table 21.2).

[158] Herpetofauna refers to amphibians and reptiles; avifauna refers to birds; and terrestrial invertebrates refer to species that are visible with the naked eye that do not have a backbone.

Table 21.2: Conservation status and habitat preferences of herpetofauna potentially occurring along the proposed Expressway alignment

Family	Common Name	Conservation Status[159]	Habitat Preferences
Skink	Copper skink	Not Threatened PD	Open and shaded areas where sufficient cover is available (e.g., rock piles, logs, dense vegetation, etc).
	Common skink	Not Threatened	Dry open areas with low vegetation or debris such as logs or stones for cover.
	Ornate skink	Declining CD,PD	Open and shaded areas where sufficient cover is available (e.g., rock piles, logs, dense vegetation, etc).
Gecko	Common gecko	Not Threatened PD	Forest, scrub, grassland and coastal areas.
	Wellington green gecko	Declining	Forest and scrub, especially kanuka / manuka.

In total, the herpetofauna survey found a minimum of 17 common skinks on 68 occasions, and unidentified skinks on 36 occasions. Skinks were observed at virtually all sites where long, thick grass was present, and were not recorded at any other site. No geckos were found during the survey and there was no record of any gecko skin sloughs.

No lizard species of conservation concern were located during the survey. Given the variety of potential habitats investigated, combined with the intensity of the surveys, if any species were missed they are unlikely to be present in any abundance.

Finding only one identifiable skink species within close proximity of the proposed Expressway alignment suggests both a lack of suitable habitat for other skink species together with high predation pressure from introduced mammals.

21.2.5.2 Frogs

Native frogs are considered extremely unlikely to occur and none were observed in the vicinity of the proposed Expressway alignment due to the absence of suitable habitat. A number of exotic frogs were observed during botanical and freshwater investigations.

21.2.6 Avifauna

Field surveys (involving point counts) recorded a total of 41 bird species (excluding dabchick) along the proposed Expressway alignment. Of the 22 native species recorded, 2species are *Threatened* (Australasian bittern and pied shag) and 3species are *At Risk* (pipit, black shag and North Island

[159] CD=Conservation Dependent; PD=Partial Decline; Sp=Sparse.

fernbird). Ecologists undertaking flora surveys also made an incidental observation[160] of dabchick. Dabchick is also *Threatened*.

Photo 21.2: North Island fernbird

While *Threatened* and *At Risk* species were present along the proposed Expressway alignment, they were recorded in very low numbers (0.8% of all observations). Overall, introduced species were found to make up the greatest proportion (62.2%) of all birds recorded during the point counts.

A comparison with Ornithological Society of New Zealand's atlas and DOC data confirms that species recorded during the avifauna field surveys were those that were expected to be found in the habitat types surveyed (i.e. those occurring along the proposed Expressway alignment and the wider area). The majority of species recorded in the OSNZ atlas and DOC data but not in the field survey work were those that primarily occur in the coastal/estuarine habitats (which are not adversely affected by the Project).

The avifauna along and adjacent to the proposed Expressway alignment were found to be dominated by introduced passerines[161], which reflects the urban and open country habitats. These habitat types are considered to be of low ecological value.

[160] Incidental observations: In addition to the above mentioned counts, all incidental observations were recorded while travelling between survey stations. The objective of these observations was to record any significant observations that may have been made outside of the formally defined methods of data collection. They included observation of avifauna within or adjacent to the site, as well as unusually large numbers of a common or exotic species, or any unusual and noteworthy behaviour.

[161] 'Passerines' are a large order of birds distinguished by having feet that are adapted for perching, including all songbirds; includes tui, blackbird, sparrows, thrushes, and starlings.

Native avifauna associated primarily with freshwater habitats (wetlands and waterways) were recorded in low numbers, though both *Threatened* (pied shag and bittern) and At Risk (black shag and fernbird) species were recorded along or adjacent to the proposed Expressway alignment. Shags were recorded traversing the site rather than utilising the waterbodies. However, the bittern and fernbird were associated with wetland habitats and are likely to be resident in the area. The incidental observation of dabchick (*Threatened*) adjacent to the proposed Expressway alignment was in open water within a modified wetland.

The wetlands in the less developed area of the proposed Expressway alignment, north of Te Moana Road (comprising Te Harakeke/Kawakahia Wetland, Ti Kouka Wetland, Ngarara Wetland and Nga Manu Nature Reserve), provide the best quality habitat for freshwater bird species due to the extent and diversity of habitat types present. This area is of particular importance to *Threatened* and *At Risk* avian species in the district.

The estuary and stream mouths downstream of the Project (including the Whareroa, Wharemauku, Waikanae, Waimeha, and Hadfield / Kowhai estuaries and stream mouths) provide habitat for a number of estuarine and coastal bird species.

The fragmented remnant native forest habitats along and adjacent to the proposed Expressway alignment provide an important habitat for a number of native avifauna species through the provision of feeding resources and nesting sites. These fragments also provide a series of forested areas that serve as a corridor to encourage the dispersal of avifauna across the wider area. Consequently, these forested areas are also considered to be of high ecological value for avifauna.

21.3 Assessment of effects on terrestrial ecology

21.3.1 Avoidance through design

As discussed earlier, in liaison with the specialist ecologists, the Project ecologist has worked closely with the design team to seek to avoid effects on terrestrial ecology (along with effects on freshwater and marine ecology).

Through this process, the most significant potential effects to indigenous vegetation were avoided. This included avoiding effects on statutorily recognised wetlands along the length of the proposed Expressway, including at Raumati South (Raumati South Peatlands), the wider El Rancho wetland complex (including Osbournes wetlands) and north of Te Moana Road (including Te Harakeke/ Kawakahia Wetland, Ti Kouka Wetland and Ngarara Wetland).

Ongoing Project design has benefited from the more detailed ecological investigations with continued refinements of the proposed Expressway further reducing effects on indigenous wetlands, habitats and freshwater systems.

Ecological involvement also assisted with the design and location of stormwater treatment wetlands and flood storage areas, bridge and culvert locations, groundwater studies (in relation to wetland hydrology), stormwater sampling, contaminant modelling and sediment and erosion control structures.

21.3.2 Methodology

Assessment of potential indigenous vegetation and habitat loss has been based on the assumption that all indigenous vegetation and habitat within the Designation is at risk, focusing primarily on the loss of all indigenous vegetation and habitat within the Project footprint.

21.4 Assessment of effects on terrestrial ecology (including wetlands) during construction

Terrestrial ecological effects associated with proposed Expressway construction can be separated into "direct effects" and "indirect effects".

The potential direct effects of construction on terrestrial ecology include:

- The loss of terrestrial habitat (including wetlands) and species through clearance and modification (i.e. earthworks and vegetation clearance) as part of construction activities; and
- Disturbance and displacement of terrestrial fauna through construction activities.

The potential indirect effects of construction on terrestrial ecology include:

- Impact on terrestrial habitat and species loss through dust, fire and weed introduction caused by construction activities.
- It is noted that Chapters 22 and 23 of this AEE address the potential effects of sediment discharge to streams, wetlands and the coast, the effects of groundwater take, effects on hydrology, and the risk of discharge of contaminants to waterways.

21.4.1 Potential direct effects of construction

21.4.1.1 Loss of terrestrial habitat (including wetlands)

The majority of the Designation lies in a highly modified pastoral landscape dominated by a mix of farming and rural lifestyle blocks and residential areas with approximately:

- 70% in pasture and grasslands;
- 16% in plantation forestry or other exotic forest and trees;
- 9% in pioneer shrublands, scrub and low forest; and
- 4% of the designation is classed as urban.

Indigenous forest makes up less than 0.5% of the vegetation communities potentially affected by the Designation. Indigenous wetlands comprise approximately 1.2% of the Project footprint.

The protection from land development provided by the long history of designations over much of the proposed Expressway corridor has resulted in a number of areas of indigenous vegetation and habitat

being maintained and in some cases improved. However, a number of these areas will be lost or modified by the proposed Expressway.

Table 21.3 provides a summary of the magnitude of impact to vegetation within the Designation as a percentage of the total vegetation of this type found within the study area[162]. As a guide the following scale is used for this assessment <1%= negligible, 1-5% = low, 5-20% = moderate, 20-50% = high, >50% = very high.

The direct effects of construction on terrestrial vegetation will include:

- Permanent loss of approximately 5.6 ha of vegetation (dominated by indigenous species) beneath the Project footprint, comprising 1.8 ha of wetlands habitat, 3.8 ha of regenerating shrublands, scrub and low forest including 0.01 ha of mature or maturing forest (primarily scattered cabbage trees); and
- Potential loss or modification of a further 7.4 ha of indigenous vegetation within the Project footprint, due to earthworks and construction activities within the proposed Expressway designation.

While any permanent loss of wetland vegetation is considered significant in terms of the general loss of wetlands in the Wellington Region, the wetlands physically affected by the proposed Expressway are not known to provide core habitat for rare or threatened flora or fauna. There is evidence that all the wetlands present are modified from their former extent as a result of historical swamp drainage and vegetation clearance, and the vegetation present reflects varying stages of successional vegetation to swamp forest.

Vegetation clearance on the margins of two kanuka stands will have a very high adverse effect on these stands, in one case leading to loss of a majority of the stand. Mitigation is considered necessary for this loss and will be provided.

There will be a high effect of earthworks and vegetation loss within the Northern Otaihanga Wetland and a moderate effect on the Southern Otaihanga Wetland. There will also be a moderate effect of vegetation clearance of the Ngarara Mahoe Forest.

The Project is assessed as having low, very low or negligible effects on all other sites or vegetation communities.

[162] "Study Area" refers to all land, water bodies and receiving environments that could be potentially affected by the Project including all downstream receiving environments. To provide consistency between this and the ecology Technical Reports within Volume 3, the study area includes all catchments that are crossed by the main Alignment. It has a total area of 10,808 ha. The study area is shown in Figure 1 of Technical Report 26, Volume 3.

Table 21.3: Magnitude of terrestrial vegetation loss (including wetlands) and modification (without mitigation)

DESCRIPTION (listed South to North)	Ecological value	Area of loss (ha)	Study area (ha)	Loss as % of study area	Assessment of impact magnitude	Assessment of impact significance
Wetlands						
Wetlands of low value –(wet pasture and Juncus)	Low	13.90	n/a	n/a	Negligible	Very Low
Raumati Manuka Wetland	Medium	0.03	2.0	15%	Moderate	Low
Southern Otaihanga Wetland	Medium	0.55	1.4	39%	High	Moderate
Northern Otaihanga Wetland	Medium	0.53	1.0	53%	Very High	High
El Rancho Wetland (Weggery)	Medium	0.38	3.9	10%	Moderate	Low
Pioneer shrublands and low forest						
Shrublands of low value (gorse and blackberry)	Low	21.9	n/a	n/a	Neutral or minor positive	Neutral
Ngarara mahoe forest	Medium	0.86	4.2	20%	High	Moderate
Waikanae river riparian vegetation (planted)	Low	0.13	2.0	7%	Moderate	Very Low
Tuku Rakau Forest	Low	0.25	0.9	28%	High	Low
Kakariki Stream riparian vegetation (planted)	Low	0.18	1.6	11%	Low	Very Low
Kanuka Forest						
Otaihanga Kanuka Forest	High	0.17	0.5	34%	High	Very High
Raumati Road Kanuka	High	0.35	0.4	88%	Very High	Very High
Other sites						
Scattered remnant cabbage trees in weedland	Low	0.01	n/a	n/a	Low	Very Low

21.4.1.2 Terrestrial fauna disturbance and displacement

a. Threatened Plant Species

As discussed, only one rare plant species was recorded during this study; the parasitic dwarf mistletoe (*Korthalsella salicornioides*) which was found within manuka scrub in close proximity to the proposed Expressway alignment.

Up to a dozen trees, on the margins of the wider wetland where mistletoe is located, may be lost during construction of the proposed Expressway. However, the core area where mistletoe is located is considered to be a sufficient distance from construction that adverse effects on that core area can be avoided. This can be achieved by marking the locations to be avoided prior to vegetation clearance, and educating contractors (as outlined within Appendix M of the CEMP, Volume 4). No additional management or mitigation is considered necessary.

It should also be noted that substantial landscape and buffer planting is proposed in the vicinity of these remnants, which should assist with the long-term maintenance of the vegetation and wetland habitat upon which this species relies.

b. Herpetofauna

The common skink was widespread in areas of dense grass along the proposed Expressway alignment and is likely to be present at similar densities throughout the district where this type of habitat is present. Large areas of this habitat will be lost beneath the Project footprint and any lizards that are resident in that habitat are at risk if not removed prior to earthworks.

In the short term, this habitat loss will have large effects on populations within the Designation, but it is considered unlikely that this loss will impact on populations of this common species within the district generally. Recovery of habitat will be rapid and in the short to medium term large areas of equivalent or improved habitat will be created on the margins of the proposed Expressway through landscaping and hydro seeding of exposed earthworks.

Construction effects on these residual lizard populations within the Designation could be reduced by trapping and relocation of lizards prior to construction. As outlined in Technical Report 28, Volume 3, while there are insufficient ecological grounds and some risks associated with capture and relocation of common lizards, provision for potentially undertaking such relocation is included in Appendix M of the CEMP, Volume 4.

c. Terrestrial Invertebrates

A wide variety of common terrestrial invertebrates were detected during various ecological investigations, though none of conservation concern. One specimen of *Peripatus novae-zelandiae* was located in the compacted sand under a recently fallen pine tree within the Otaihanga Mountain Bike Area. This species does not currently have a threat status.

The new habitat created within the alignment through landscaping, combined with increased areas of rank grassland, is expected to provide equivalent areas of suitable habitat for this species in the short to medium term. Landscaping mitigation is outlined within Chapter 17 of the AEE.

d. Avifauna

Construction of the Project has the potential to impact on mobile species of birds through the loss of habitat within the Designation, including that used for breeding, feeding and roosting.

Fernbird (at risk – declining)

North Island fernbird was observed on two occasions in the vicinity of Ngarara Wetland and the Kakariki Stream in the vicinity of Nga Manu Nature Reserve. It is likely, given the habitat available, that the observed fernbird(s) are resident in the areas they were recorded.

These may be the most southern observations of fernbird in the North Island. This makes this population of scientific interest and regionally significant.

Part of the alignment is located within the riparian area where these sightings occurred. It is likely that some fernbird habitat may be lost and there may also be some adverse effects on resident birds relating to disturbance caused by construction activities, noise, movement, and dust.

Bittern (Nationally endangered)

A solitary Australasian bittern was the only cryptic marshbird recorded during the avi-fauna study[163]. This species was recorded in the extensive areas of raupo reedland and flaxlands of Te Harakeke/Kawakahia Wetland, confirming earlier reports of a resident population of this bird.

No breeding or foraging habitat for bittern will be lost beneath the construction footprint, and it is considered unlikely that construction activity will displace these birds from their habitat, given the distance of Te Harakeke/Kawakahia Wetland from the proposed Expressway alignment.

No management or mitigation is considered necessary for bittern.

Dabchick (Nationally Vulnerable)

One incidental observation of dabchick was made during terrestrial flora surveys.

Dabchick are known to utilise freshwater wetlands as well as man-made water features such as farm ponds and sewage oxidation ponds and ample habitat is available in the wider area, with large areas of stormwater treatment wetlands and flood storage areas proposed as part of this Project.

No management or mitigation for dabchick is considered necessary.

[163] 'Cryptic marshbird' refers to wetland birds that are well camouflaged

Pipit (at risk – declining)

NZ Pipit was observed in at a number of locations along the Designation.

It is likely there will be some temporary effects on resident birds associated with construction of the proposed Expressway; however, this will be limited to the construction phase and revegetation is likely to replace lost habitat.

No further management or mitigation for pipit is considered necessary.

Black shag (at risk -naturally uncommon) & pied shag (Nationally vulnerable)

Black shag and pied shag were recorded traversing the proposed Expressway alignment, although not utilising the waterbodies. Both species are unlikely to utilise habitat along the alignment, and the risk of displacement during construction activities associated with waterbodies is considered to be low.

No management or mitigation for black and pied shags is considered necessary.

Other Avifauna

Overall, the lack of native forest habitats along the proposed Expressway alignment limits the range of abundance of native bird species present along the Designation. With the exception of a small number of cabbage trees adjacent to El Rancho Wetland (Weggery) no remnant native forest will be affected by the proposed Expressway. Native avi-fauna associated primarily with freshwater habitats (i.e. wetlands and waterways) were recorded in low numbers.

No management or mitigation is considered necessary.

21.4.2 Summary of direct construction effects

The direct construction effects on terrestrial ecology are:

- Permanent loss of approximately 5.6 ha of indigenous vegetation and habitat beneath the proposed Expressway (comprising 1.8 ha of wetlands, 3.8 ha of regenerating shrublands, scrub and low forest and 0.01 ha of mature or maturing forest);
- Potential loss or modification to a further 7.4 ha of indigenous vegetation due to earthworks and construction activities within the proposed Expressway designation;
- Potential loss of sedentary species (e.g. lizards) when their habitat is removed; and
- Disturbance and displacement of mobile species (e.g. birds) by construction activity.

Table 21.4 combines the assessment of ecological value with magnitude of effect to assess impact significance.

Table 21.4: Assessment of Impact Significance of Direct Construction Impacts (without mitigation)

DESCRIPTION	Ecological Value	Assessment of Impact Magnitude	Assessment of Impact Significance
FLORA & FAUNA			
Terrestrial Flora			
Dwarf Mistletoe	High	Negligible	Low
Terrestrial Fauna			
Common Lizards	Low	Moderate	Very Low
Peripatus novae-zelandiae	Low	Low	Very Low
Avifauna			
Australasian bittern	Very High	Negligible	Low
North Island fernbird	High	High	Very High
Black Shag	High	Negligible	Low
Pied Shag	Very High	Negligible	Low
Dabchick	Very High	Negligible	Low
Pipit	High	Negligible	Low

There is a risk of very high adverse effects on fernbird without mitigation. No other species of terrestrial flora or fauna are considered to be at risk of adverse effects to the extent that mitigation is proposed. However, attention to the protection of habitat during detailed design and construction are necessary to ensure this occurs.

21.4.3 Potential indirect effects of construction

In addition to the direct impacts, construction of the Project has the potential to cause indirect adverse effects on terrestrial ecology, in terms of the potential effects of dust and fire and the potential for the introduction of weeds to the area.

21.4.3.1 Dust

Significant amounts of airborne dust may be created during the period of construction with the potential for adverse ecological effects.

Given the nature of the sand and peat dominated substrates across the study area, dust is not considered to be a threat to indigenous flora fauna or habitats.

Extensive dust management (refer to Appendix G of the CEMP, Volume 4) will be carried out to protect residential areas, and it is considered that the levels of suppression needed to meet amenity and public health requirements will also protect indigenous flora and fauna. On this basis, no further mitigation or monitoring is proposed.

21.4.3.2 Fire

Given the frequent long dry summer periods on the Kāpiti Coast, the risk of fire during the construction period has been assessed. Fire may be caused by a range of activities including hot works, smoking, and vehicle exhausts.

This issue will be covered in the CEMP (Volume 4) which will include appropriate training, rules around hot works, and liaison with local fire services. Given this, additional mitigation or monitoring is not proposed.

21.4.3.3 Weeds

Given the propensity of invasive weed growth on the Kāpiti Coast, there is a high risk during construction of the introduction of weed species not currently present on site, or the spread of weeds which currently have limited distribution on site or locally.

This could occur through the importation of sand, topsoil, clean fill, plant stock, or as seed carried in mud on vehicles and equipment. This risk cannot be quantified but can be mitigated through appropriate management systems.

Controls will be included in the Appendix 4 of the CEMP, Volume 4, which include timely monitoring and a weed response plan.

21.4.4 Summary of indirect construction effects

The potential indirect adverse effects of construction on terrestrial ecology are limited to those related to dust, fire and weed invasion. The potential for these effects has been sufficiently mitigated through the inclusion of measures to manage those potential effects in the CEMP and its associated management plans (Volume 4).

21.5 Assessment of operational effects on terrestrial ecology

The on-going effects on terrestrial ecology resulting from the operation of the Project are relatively limited. The potential adverse effects on terrestrial fauna relate to mortality or displacement as a result of the road and vehicular traffic.

21.5.1 Disturbance to terrestrial fauna

21.5.1.1 Avifauna

North Island fernbird (At Risk – Declining)

The proposed Expressway operation has the potential to effect the North Island fernbird populations. The North Island fernbird was observed in the wider area between Ngarara Wetland, Kakariki Stream and Nga Manu Nature Reserve. A population is known historically within the Te Harakeke / Kawakahia Wetland.

There are two potential effects that could occur; displacement from habitat by proposed Expressway activity and mortality from vehicle strikes. Given the apparent rarity of this species locally, a small number of mortalities caused by vehicles could have a disproportionally large effect on the population. Similarly, displacement of birds from current habitat due to traffic noise and activity would potentially diminish the range of this species locally.

Australasian bittern (Nationally Endangered)

Australasian bittern are present in the Te Harakeke/Kawakahia Wetland, which is located approximately 170 m from the proposed Expressway alignment.

Playback[164] and observations during this study and historical information suggest that this species is not present in the many smaller fragmented wetlands to the east that lie adjacent to the proposed Expressway alignment. This suggests that there is unlikely to be regular movement of bittern across the Alignment to these wetlands which would put these birds at risk.

Overall, it is considered that the risk of adverse effects on Australasian bittern from operation of the proposed Expressway is negligible and no additional mitigation or monitoring is proposed.

Dabchick (Nationally Vulnerable)

Large areas of stormwater treatment wetlands and flood storage areas proposed as part of this Project will provide additional habitat for dabchick.

Overall, it is considered that the effect on dabchick from the operation of the proposed Expressway will be negligible and additional mitigation or monitoring is not proposed.

Pipit (At Risk – Declining)

The extent of habitat modification along the Kāpiti Coast suggests that pipit are present only as a result of their opportunistic ability to adapt to such modified landscapes. All pipit observations were in areas of grazed pasture.

Overall, it is considered that the effect on pipit from operation of the proposed Expressway to be low and no additional mitigation or monitoring is proposed.

Black shag (At Risk -Naturally Uncommon) & pied shag (Nationally Vulnerable)

No habitat required by black and pied shag for roosting, nesting and feeding will be lost in the long term as a result of the proposed Expressway and the revegetation of the stream margins will provide additional roosting habitat.

[164] Playback calls act as “lures” to entice resident birds to appear from cover or vocally respond.

Overall, the risk of adverse effects on these two shag species from the operation of the proposed Expressway will be negligible. No additional mitigation or monitoring is proposed.

21.5.1.2 Herpetofauna

The new habitat created within the Designation through landscaping, combined with increased areas of rank pasture, is expected to provide suitable permanent habitat for the relatively high populations of common skinks within the proposed Expressway alignment.

Overall, the effect on lizards from operation of the proposed Expressway will be negligible.

21.5.2 Summary of operational effects

The potential adverse effects of proposed Expressway operation are limited to those relating to mortality and displacement, particularly in regard to the North Island fernbird. The significance of those potential adverse operational effects is outlined within Table 21.5.

Table 21.5: Assessment of Impact Significance of Operational Impacts (without mitigation)

DESCRIPTION	Ecological Value	Assessment of Impact Magnitude	Assessment of Impact Significance
FLORA & FAUNA			
Terrestrial Flora			
Dwarf Mistletoe	Medium	Negligible	Very Low
Terrestrial Fauna			
Common Lizards	Low	Negligible	Very Low
Peripatus novae-zelandiae	Low	Negligible	Very Low
Avifauna			
Australasian bittern	Very High	Negligible	Low
North Island fernbird	Very High	High	Very High
Black Shag	Low	Negligible	Very Low
Pied Shag	Very High	Negligible	Low
Dabchick	Very High	Negligible	Low
Pipit	Medium	Negligible	Very Low

In all cases, with the exception of fernbird, the potential adverse effects from the operation of the proposed Expressway will be very low or low. There is a risk of very high adverse effects on fernbird due to displacement from habitat and traffic mortality.

21.6 Positive ecological effects resulting from the Project

The ecological mitigation recommended for the loss of terrestrial habitat, combined with methods of stormwater management (as described in Technical Report 22, Volume 3), will have a number of additional positive environmental outcomes. These include:

- New stormwater treatment wetlands, while having the primary purpose of managing stormwater, will also provide additional habitat benefit for native flora and fauna;
- A number of new flood storage areas will be subject to mass planting of indigenous wetland species and will provide additional benefit for native flora and fauna – some of which have connections with adjacent waterbodies;
- Through retirement, restoration and revegetation along sections of the Designation (as part of a combination of ecological, hydrological, landscape, amenity and acoustic mitigation), there is an opportunity to connect existing vegetation fragments and wetland areas and provide a series of habitat "stepping stones" along the proposed Expressway alignment. This will have long-term ecological benefits for both terrestrial fauna and native birdlife, as well as providing landscape and amenity benefits; and
- As was demonstrated by the finding of the North Island fernbird population near Ngarara Wetland as a result of investigations undertaken in relation to the Project, this Project will result in a range of ecological investigations that will provide public good in terms of increasing local conservation knowledge. This knowledge and science could be fed directly into management of adjoining areas under control of other agencies.

21.7 Measures to avoid, remedy or mitigate actual or potential adverse effects on terrestrial ecology

The previous sections of this Chapter identify that mitigation, which may include management and monitoring, is required for the following operation and construction effects:

Direct impacts of construction

- Loss of terrestrial vegetation (including wetlands), in particular kanuka and mahoe forest; and
- Loss of fernbird habitat during construction, and disturbance caused by construction activities.

In addition, while the potential adverse effects are considered low, lizard mortality will result from construction vegetation clearance.

Impacts of operation

- Displacement from habitat or mortality of fernbird during operation.

21.7.1 Loss of indigenous terrestrial vegetation and habitat (excluding wetlands)

The extent of planting required to mitigate the loss of indigenous terrestrial vegetation and habitat has been calculated in Table 21.6.

Table 21.6: Mitigation for indigenous terrestrial vegetation loss

Habitat Type	Vegetation Loss (ha)	Mitigation Ratio[165]	Mitigation Area (ha)
Kanuka forest	0.8	x 2	1.6
Regenerating broadleaf scrub and low forest (including riparian margins)	3.0	x 2	6.0
Mature indigenous forest	0.01	x 3	0.03
TOTALS	3.8	-	7.6

Accordingly a minimum of 7.6ha of mass planting along the proposed Expressway alignment (refer to Chapter 17 for a description of mass planting) is required as mitigation for the loss of terrestrial vegetation (kanuka forest, regenerating mahoe and mature indigenous forest) within the Project footprint.

As part of the Project the NZTA is proposing to undertake revegetation at a number of locations along the proposed Expressway as follows:

- Loss of the 3.8 ha of kanuka forest and regenerating broadleaved forest along the Alignment will be mitigated in part by the replanting of a minimum of 7.6 ha of broadleaved forest and kanuka within the wider area of mass planting and mass planting with tree enrichment within the Designation; and
- The approximately 0.01 ha of loss of scattered mature indigenous forest trees along the Alignment will also be mitigated as part of this larger area of mass planting with tree enrichment within the Designation.

For pioneer shrublands, which are typically dominated by gorse, no mitigation is proposed for their loss or modification. However, there is the potential for these areas to act as nursery crops and as noted in Appendix M of the CEMP, Volume 4. In some locations, this process will be facilitated through interplanting with native trees.

Overall, the quantities of revegetation proposed will fully mitigate for the small areas of vegetation that will be lost.

21.7.2 Loss of indigenous wetland vegetation and habitat

A number of options to avoid or minimise loss of wetland habitat have been explored through the Project design and the selected alignment avoids the most highly valued areas of wetland habitat. Given that full avoidance was not practicable, a minimum of 5.4 ha of wetland restoration will be created as mitigation for the loss of 1.8 ha of wetland of moderate value as outlined in Table 21.7.

[165] Refer to section 11.1.2 of Technical Report 26, Volume 3, for information on mitigation ratios.

Table 21.7: Mitigation for indigenous wetland vegetation loss

Habitat Type	Loss (Project Footprint) (ha)	Mitigation Ratio[166]	Mitigation Area (ha)
Wetlands	1.8	x 3	5.4

The key wetlands requiring mitigation were identified through this assessment as:

- El Rancho Wetland (Weggery); and
- The Southern and Northern Otaihanga wetlands and the Otaihanga Kanuka Forest.

Discussions with KCDC, GWRC biodiversity staff and DOC confirmed a preference to focus any mitigation for wetland loss and modification on existing wetlands within the study area that currently lack formal protection. This has resulted in agreement to wetland restoration work at the following selected sites adjacent to the proposed Expressway:

- Raumati Manuka Wetland;
- Otaihanga Wetlands;
- El Rancho (Weggery) Wetland; and
- Ngarara Wetland.

However, this has not always been possible. It is noted that there is little opportunity to mitigate for wetland loss within the El Rancho (Weggery) wetland as it is outside the Designation and a recognised wāhi tapu area. In response to this, restoration of the former Waikanae Oxidation Ponds, part of the Pharazyn Reserve, is proposed to mitigate for wetland loss in this location[167]. This alternative option has subsequently been discussed with KCDC, DOC and GWRC.

The 5.4ha of mitigation proposed is to be achieved through works along the Project footprint where existing wetlands or wet depressions provide opportunities for restoration, in combination with restoration work within the decommissioned Waikanae Oxidation Ponds (refer to Technical Report 26, Volume 3 for full details).

[166] Ecological mitigation ratios were derived to determine the value of the habitat being affected and quantity of mitigation that would be required for loss. Mitigation ratios are further explained within Technical Report 26, Volume 3.

[167] This option has been discussed with KCDC, DOC and GWRC. The restoration of the decommissioned Waikanae Oxidation Ponds will involve importing of approximately 76,000 m3 and 114,000 m3 of peat from the construction earthworks along the proposed Expressway alignment to raise the bed of the ponds (currently 2-3m deep) and create islands and shallows which will then be planted as wetland habitat.

The mitigation will include the following:

- Mass planting of approximately 1.1 ha of indigenous vegetation surrounding the Raumati Manuka Wetland, including interplanting within existing gorse vegetation;
- Restoration of a new (approximately 1.2 ha) wetland north of the Waste Water Treatment Plant Drain at Otaihanga and the restoration of 0.4 ha of the Otaihanga Central Wetland to provide for the relocation of established wetland plants from the Otaihanga Southern and Northern wetlands, including larger specimens of *Carex secta*, *Carex virgata* and *Baumea teretifolia*; and
- Restoration of a minimum of 3.8 ha of the former Waikanae Oxidation Ponds consistent with the approved Pharazyn Reserve Landscape and Ecological Plan[168].

In addition to this, stormwater treatment wetlands and flood storage areas will be formed along the route and will subsequently provide additional wetland benefits (refer to section 21.7 of this Chapter).

Overall, it is considered that the revegetation and restoration proposed will fully mitigate for the loss of wetlands, and will in the long term provide ecological benefit.

21.7.3 Loss of the North Island fernbird population and their habitat

Given the presence of this high value bird species in close proximity to the proposed Expressway, additional pre-construction research will be required. This research will determine the distribution and utilisation of the North Island fernbird within the Designation, between the Waikanae River and Kakariki Stream, where the proposed Expressway alignment would intercept potential fernbird habitat.

In addition to this, a research programme will commence at a motorway within known fernbird habitat, to determine the operational effects on the ability of a fernbird population to continue to utlise adjacent habitat.

Once the results of this research are collated, the range of mitigation measures available will be discussion with DOC and other relevant stakeholders.

21.7.4 Loss of lizards and their habitat

No further mitigation is considered necessary, given the affected skinks are relatively common. However, it is noted that the proposed landscape and amenity planting will result in the creation of habitat suitable for lizards in a number of locations (refer to Chapter 17 of this report and Technical Report 7, Volume 3), including a number of open environments with abundant refuges on the edge of plantings and the incorporation of ground tier species appropriate for lizard species. Large areas of rank pasture will also be retained as part of the landscape planting.

[168] Wildlands (2011)

21.7.5 Further considerations

There may be opportunities during detailed design to further review and mitigate effects on a number of high value areas of wetland vegetation, advanced regenerating forest and mature or maturing forest that fall both within the proposed Project footprint and Designation. In addition, site management will incorporate appropriate environmental management planning to seek to ensure that the areas where effects are to be avoided or mitigated are identified and protected during construction. These opportunities form an important component of Appendix M of the CEMP, Volume 4.

22 Freshwater ecology

Overview

The proposed Expressway traverses 5 separate freshwater catchments along the length of the alignment, and impacts on 15 freshwater habitats. As a result, the freshwater ecology within the Project area was the subject of comprehensive investigations. The investigations conclude that the existing aquatic fauna and physical habitat of the majority of the streams traversed by the proposed Expressway are degraded, with the exception of the Waikanae River, which is considered to be of high (regional) value for important fauna species and habitat integrity.

The construction of the proposed Expressway would involve building 22 culverts and 8 bridges within or over intermittent and perennial streams. The works required for these structures will potentially have adverse effects in terms of fish mortality in these habitats. There is also the potential for adverse effects to occur as a result of the loss of stream habitat due to the construction of the structures and other works required for the proposed Expressway. A total of 1,119m of perennial and intermittent stream habitat will be lost as a result of culvert and bridge construction, and 1,525m of stream habitat lost due to stream diversions and modifications.

Other potential adverse effects arising from the proposed Expressway include the hydrological impact on adjacent wetlands; notably the Raumati Manuka Wetland, Otaihanga Southern and Northern wetlands, El Rancho Wetland (Weggery), Ti Kouka Wetland and Ngarara Wetland, due to the potential damming and diversion of groundwater as a result of the Project.

The potential adverse effects on freshwater systems associated with culverting, bridging, diversions and modifications are proposed to be mitigated primarily through stream restoration on the waterbodies affected upstream and downstream of the Project.

Adaptive management is proposed to mitigate adverse ecological effects through the construction period. This tool is used to manage effects on complex ecological systems. Adaptive management gathers baseline ecological information pre-construction, monitors potential changes to freshwater ecosystems during construction and post-construction (3 years post completion), and initiates any necessary changes in mitigation. An adaptive management approach is also proposed to monitor and manage any potential hydrological effects on wetlands adjacent to the proposed Expressway alignment

Adherence to an Ecological Management Plan (Appendix M of the CEMP), which proposes mitigation for loss of stream habitat and fish mortality as well as limiting work to be carried out in streams during periods of fish migration, will ensure that the potential adverse freshwater ecology effects will be suitably mitigated.

22.1 Introduction

This Chapter presents the findings of investigations undertaken to determine the likely effects of construction and operation activities required for the proposed Expressway on freshwater ecology. It specifically includes the potential hydrological and de-watering effect on wetlands. This Chapter draws on the information and findings of the following Technical Reports and Appendices of the CEMP:

- Baseline Water and Sediment Quality Investigation Report, Technical Report 24, Volume 3;
- Contaminant Load Assessment, Technical Report 25, Volume 3;
- Ecological Impact Assessment, Technical Report 26, Volume 3;
- Freshwater Habitat and Species Description and Values, Technical Report 30,Volume 3;
- Erosion and Sediment Control Plan, Appendix H of the Construction Environmental Management Plan (CEMP), Volume 4 and,
- Ecological Management Plan, Appendix M of the CEMP, Volume 4.

The identification of effects on freshwater ecology required the assessment of the composition and values of existing aquatic ecosystems. There were two main methods of obtaining and collating this data:

- A desktop study was carried out which included reviewing a wide range of ecological databases, publications and previous ecological investigations; and
- Field surveys and analysis.

The description of existing freshwater ecology given in this section includes a brief overview of the investigations undertaken. Further details on the methods used and the findings of these investigations are contained in Technical Report 30 in Volume 3.

22.2 Existing freshwater ecosystems

There are five catchments affected by the proposed Expressway:

- The Whareroa catchment – includes the Whareroa Stream and a number of smaller tributaries and discharges to the Kapiti Coast. The total watershed area is 15.4km2;
- The Wharemauku catchment - includes the Wharemauku Stream and Drain 7 (Upper and Lower) and discharges to the Kapiti Coast at Paraparaumu. The total watershed area of this catchment is 12.7km2;
- The Waikanae Catchment – includes the Waikanae River, Mazengarb Stream, Wastewater Treatment Plant Drain and the Muaupoko Stream. This catchment has a total watershed area of 140.1km2 and discharges to the Waikanae Estuary;
- The Waimeha Catchment – includes the Waimeha Stream, Ngarara Creek, Kakariki Steam, Smithfield Drain and Paetawa Drain. This catchment has a total watershed of 21km2 and discharges to Waikanae Beach; and,

- The Hadfield Drain/Kowhai Stream Catchment – this catchment has a total watershed of 10.2km2 and discharges to Peka Peka Beach.

22.2.1 Freshwater habitats

A freshwater habitat is considered to be a stream with permanent or intermittent flows which has the capacity to provide aquatic habitat. Sampling was not carried out for these investigations on ephemeral streams. This section provides a brief description of the 15 different freshwater habitats within the Project area.

22.2.1.1 Whareroa Stream Tributary

The Whareroa Stream Tributary is located 500m south of the Whareroa Drain (refer below) at Waterfall Road. This tributary has some high quality ecological features, including riparian cover in the upper catchment which naturally meanders through pine and native forest. Historically, a range of native fish has been found in this waterway. However, the tributary downstream of the sampling site is open to stock access at all times and high levels of sun exposure during summer allow high levels of algae growth reducing water quality.

22.2.1.2 Whareroa Drain

The Whareroa Drain is a farm drain located within the QE Park that flows into the Whareroa Stream tributary. It has been highly modified over time to assist in draining the expansive areas of peat within the Park. At the sample site, partially obstructed culverts restrict fish movement, and the water was still (unmoving) and a dark brown colour, indicating high levels of tannin. Sampling of the site showed that short and long finned eel are present in small numbers.

22.2.2 Wharemauku Stream

The Wharemauku Stream is a highly modified predominantly urban stream which originates from springs located in the forested upper reaches of the catchment in the Tararua foothills. There have been several studies undertaken on the stream (refer to Technical Report 30, Volume 3 for more detail). In summary, these show that:

- The stream (despite high levels of modification) provides valuable habitat for nationally threatened indigenous fish;
- The habitat is under considerable stress due to a number of culverts and other structures that are in place to prevent downstream flooding;
- Macro-invertebrate studies show a surprisingly high abundance of taxa[169]; and,
- The water quality in the stream is 'poor'.

[169] Taxa: a group of (one or more) organisms adjudged to be a unit.

22.2.3 Upper Drain 7, Wharemauku

Upper Drain 7 drains through the Raumati Peatlands, which has vegetation cover of blackberry bracken with some manuka, kanuka and flax. The Upper Drain 7 consists of a drain deeply cut through peat lands to assist with water drainage. Drain 7 is the largest tributary of the Wharemauku Stream.

22.2.4 Lower Drain 7, Wharemauku

Lower Drain 7 is a drain characterised by poor water and habitat quality and low velocity, located within an urban environment. At the sampling site, the drain is highly channelised, with large amounts of in-stream debris which create barriers for water and fish passage.

22.2.5 Mazengarb Stream

Mazengarb Stream (also referred to as the Mazengarb Drain) has a number of known point source discharges of contamination into its catchment from the Otaihanga Landfill and the Paraparaumu Wastewater Treatment Plant (WWTP). The upstream length of the stream is highly modified, running through grazed rural land and through ponds of a new housing development. Water quality is considered to be somewhat degraded around the sampling site due to its proximity immediately downstream of the confluence with the WWTP Drain. Historical studies have found a good diversity of native fish in the Mazengarb Stream, and the stream is listed as a locally important fish habitat. However, monitoring shows the water quality to be generally 'poor' downstream of the landfill and the WWTP.

22.2.6 WWTP Drain (Waste Water Treatment Plant)

The WWTP Drain is a small tributary of the Mazengarb Stream which originates from a shallow drain system but primarily consists of the outflow from the WWTP ponds. Due to the output from the WWTP, the water quality in the WWTP Drain is highly nutrient enriched. The WWTP Drain at the sampling location had stable stream banks with riparian cover from overhanging trees. Previous sampling has found algal growths including sewage fungus present near the wastewater outlet.

22.2.7 Muaupoko Stream

At the sampling site, the Muaupoko Stream has long pasture grasses, willow and blackberry growing along its banks. Vegetation along the banks provides good fish habitat for in-stream macrophytes[170]. The stream flows through an area that will become part of the Waikanae River restoration area – this portion of the Stream has unstable sand banks with no vegetation.

[170] an aquatic plant that grows in or near water and is either emergent, submergent, or floating.

22.2.8 Waikanae River

The Waikanae River is considered to be one of the most ecologically significant water bodies in the Kāpiti District, and is listed in the Proposed Wellington Regional Policy Statement (PRPS) as having significant amenity and recreational values. GWRC has listed the River has having 'significant indigenous ecosystems' and the Regional Council has an Environmental Strategy in place (in conjunction with KCDC) to co-ordinate activities of the various agencies, community groups and landowners in protecting and improving the river environment.[171]

The River's headwaters are within the Tararua Forest National Park, where they flow through regenerating native forest, rough and treeland pasture, rural development and farmland upstream of SH1. Downstream of SH1, the surrounding land use is predominantly residential with flood control plantings and scattered bush remnants. The River is buffered by KCDC reserve-land and flood control land until it reaches the coast.

Previous investigations have found that the River generally has good water quality, although exceedances of metal concentrations occur periodically and appear to be attributable to stormwater discharges. Faunal studies have historically returned varied results indicating MCI levels ranging from 76 (poor) to 118 (very good). A diverse number of fish species have been recorded in the River.

22.2.9 Waimeha Stream

The Waimeha Stream is a large 5 metre drain in grazing land formed by the confluence of two springs, both located within Waikanae Township. The Stream is listed in the GWRC PRPS as a water body with a 'significant indigenous ecosystem'. The Stream is also listed as containing habitat for threatened indigenous fish species. Previous studies have found elevated E Coli levels in water samples and high nutrient levels. Other parameters measured have been low (below guideline limits). At the time the sampling was undertaken, the entire extent of the Stream in the area traversed by the proposed Expressway alignment had been cleared by a digger for seasonal flood control purposes.

The Waimeha Stream is listed as containing habitat for threatened indigenous fish species and for 6 more indigenous fish species, and is listed as having inanga spawning habitat.

22.2.10 Ngarara Creek

The Ngarara Creek is a small, relatively natural meandering waterbody cut through a mix of peat and sand country that enters Te Harakeke/Kawakahia Wetland downstream.

[171] GWRC, 1999: Waikanae River Environmental Strategy: Opportunities to Enhance the Waikanae River Environment. Publication No. WRC/FPSA-G-99/05.

At the time of sampling, large sections of Ngarara Creek had riparian vegetation made up of pine, willow, bracken and a few natives. At the sampling site, a culvert allows for fish passage; however, due to a build-up of organic material under pine forest and still water, the water quality downstream of the culvert has become highly degraded. The upstream section of Ngarara Creek is subject to regular stream maintenance to improve flows.

22.2.11 Kakariki Stream

The Kakariki Stream meanders through grazed agricultural land around the sampling site. The upper Stream catchment also contains areas of native forest and shrub wetland, forest areas and the Nga Manu Nature Reserve. The Reserve is hydrologically connected to the Kakariki Stream upstream of the sampling location. Previous studies have shown the Stream to have high levels of turbidity, low dissolved oxygen and pH – indicative of organic matter and degradation. The GWRC Regional Policy Statement listed the Kakariki Stream as one of the "Waterbodies with Water Quality Identified as Needing Enhancement for Aquatic Ecosystem Purposes".

At the location of the sampling site, riparian vegetation consisted of some scrub, Carex geminata, willow, flaxes, bracken and blackberry. The deep sided channel with overgrown vegetation provides some shading for fish species.

22.2.12 Smithfield Drain

Smithfield Drain is a deep, channelised farm drain tributary of the Kakariki Stream cut through large areas of peat north of Kakariki Stream. Some of the stream is currently fenced from stock, including at the location of the sampling site. The Drain is regularly cleared to maintain flows, and there is one culvert within this reach which provides for fish access.

22.2.13 Paetawa Drain

At the sample site the Paetawa Drain runs through pasture and has some stock fencing. The Drain is highly modified and channelised along most of its length until the confluence with the Ngarara Stream. Overhanging vegetation is predominantly pastoral weeds and grasses and the banks are heavily grazed and pugged from dairy cattle. The substrate is mostly deep mud over sand with a high level of suspended solids. This Drain is also regularly cleared to maintain flows.

22.2.14 Hadfield/Kowhai Stream

This is the most northerly waterway in the Project area. The Stream's headwaters originate in pine and native forest in a steep upper catchment, before crossing under SH1 through culverts and through farmland. There is a small area of native vegetation which is the only natural riparian planting along the stream. It has good water quality.

22.2.15 Water quality

Technical Report 24 (Volume 3) details the existing baseline water quality of the catchments within the Project area. A brief summary of this information as it is relevant to the freshwater ecology, is described below.

Sampling within the Project area found that five of the six watercourse sites[172] showed nutrient (phosphorus and nitrogen) levels higher than the ANZECC 2000 guideline values.

Elevated levels of heavy metals were found in the Ngarara and Mazengarb Streams (base flow sample) and the Wharemauku and the Mazengarb Streams (in stormwater flushes). All samples sites had turbidity levels higher than are biologically acceptable over long periods. The samples collected for the investigation all had high levels of heavy metals, dissolved oxygen and E coli.

These results suggest that many of the streams along the proposed Expressway alignment currently present challenging biological environments for indigenous flora and fauna.

22.2.16 Freshwater fish species

Freshwater fish have been recorded in the Freshwater Fisheries Database (FFDB) in 6 of the 15 streams within the Project area. The FFDB has 18 species of fish recorded in these waterways.

Electric fish surveying (EFS) recorded 11 of the 18 species that had been identified in the FFDB. Fish species not found in the Project sampling included Cran's bully, giant bully, torrent fish, shortjawed kokopu, yellow eyed mullet and brown trout. The freshwater fish species recorded at the study sites are shown in Table 22.1 below (note sites have been grouped into catchments below).

The sampling found less fish species than previously recorded in the FFDB. This may be due to sampling being carried out in discrete areas where the Project will affect the streams. This result may also be associated with the habitat being sub-optimal in these locations to support several species of native fish that require good quality habitats.

[172] The six watercourse sites sampled are identified in Figure 2 of Technical Report 24, Volume 3

Table 22.1: Fish recorded in the study area (from New Zealand Freshwater Fish Database, NIWA, 2011 and KCDC et al, 1999) and national threat classification

Common Name	Threat Classification	Waimeha Stream	Waikanae River	Wharemauku Stream	Whareroa Stream	Ngarara Stream	Ngarara Stream Tributary
Yellow eye mullet	Not threatened		Y	Y			
Short fin eel	Not threatened	Y	Y	Y	Y	Y	Y
Long fin eel	Declining	Y	Y	Y	Y	Y	Y
Torrent fish	Declining		Y	Y			
Giant kokopu	Declining			Y	Y	Y	
Koaro	Declining			Y			
Banded kokopu	Not threatened			Y	Y	Y	Y
Inanga	Declining	Y	Y	Y	Y	Y	Y
Short-jaw kokopu	Declining			Y			
Lamprey	Declining		Y	Y			
Common bully	Not threatened	Y	Y		Y	Y	
Giant bully	Not threatened	Y			Y	Y	Y
Cran's bully	Not threatened					Y	
Red fin bully	Declining	Y	Y	Y	Y	Y	
Estuarine triplefin	Not threatened						
Smelt	Not threatened		Y	Y			
Black flounder	Not threatened		Y				
Brown trout	Introduced		Y				

22.2.17 Aquatic macroinvertebrates

Aquatic macroinvertebrate surveys were undertaken across waterbodies within the Project area to determine the levels of insects, snails and worms that were present; this information helps assess the ecological health of the streams. Six different invertebrate indices were calculated according to accepted practice at each of the sample site locations, including taxa richness, EPT taxa, total and EPT true abundance, macroinvertebrate community index (MCI), and Quantitative MCI (QMCI).

EPT taxa richness – this calculates the number of *Ephemeroptera* (mayfly), *Plecoptera* (stonefly) and *Tricoptera* (caddisfly) taxa at the sample site. EPT are most diverse in natural streams and the number and diversity typically decline with increasing watershed disturbance.

MCI and QMCI consider the whole macroinvertebrate population structure and provide a score that indicates general water quality, as set out in Table 22.2 below.

Table 22.2: MCI & QMCI score classification meanings[173]

Quality Class	Stark (1998) description	MCI	QMCI
Excellent	Clean	>120	>6.0
Good	Possible mild pollution	100–120	5-6
Fair	Probably moderate pollution	80-100	4-5
Poor	Probable severe pollution	<80	<4

22.2.17.1 EPT results

In total 60 different aquatic invertebrates were sampled from the 15 water bodies within the Project area. Sample sites ranged between 3-22 EPT taxa, with the Waikanae River having the highest number of taxa present. Figure 22.1 below shows the percentage representation of the total taxa richness which is made up of EPT taxa (%EPT) present at each site.

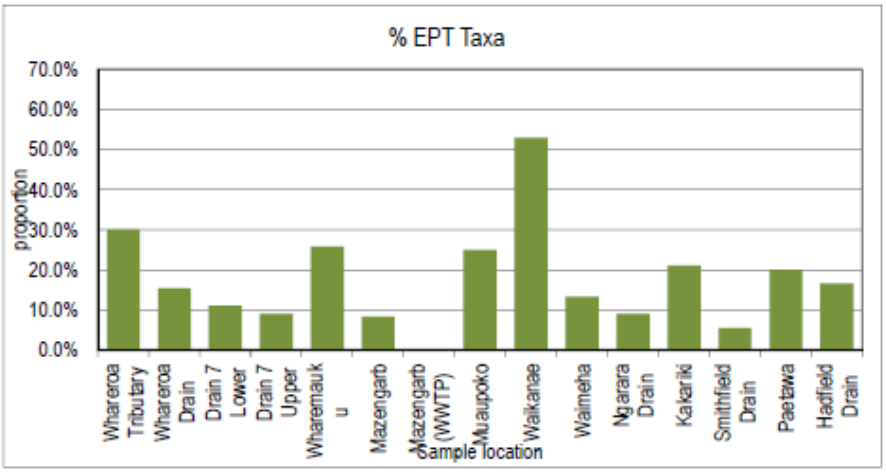

Figure 22.1: Averaged proportion (%) of EPT taxa present at each site

22.2.17.2 MCI and QMCI results

Figure 22.2 below shows the mean MCI score from each of the sampling sites. Mean MCI scores across the Project area were generally low i.e. less than 100 and typically under 90. Of the sites sampled, 13 of the 15 show 'probable moderate pollution' or 'possible mild pollution' using the indexes. The Waikanae River and Muaupoko Stream were the only samples to score over 100, indicating 'good to possible mild pollution'.

[173] Stark and Maxted. 2004. Macroinvertebrate Community Indices for Auckland Soft-bottomed Streams. ARC Technical publication 303.

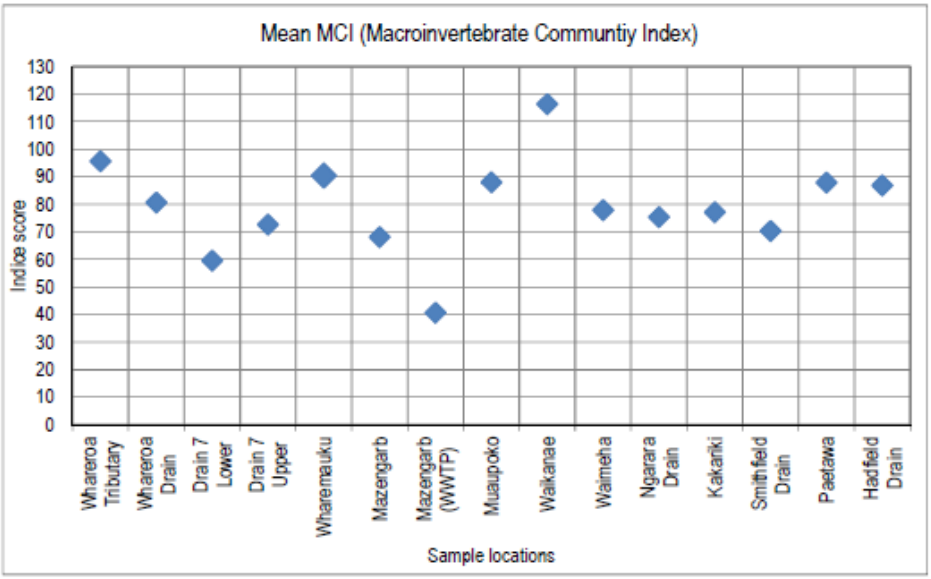

Figure 22.2: Mean MCI Score from each sampling site

Figure 22.3 below shows the mean QMCI score from each of the sampling sites. The QMCI accounts for the freshwater community 'condition'. QMCI scores for the 15 sites range from 1.7 (poor) through to 6.9 (excellent). The Waikanae River has the highest QMCI score of all of the sites sampled.

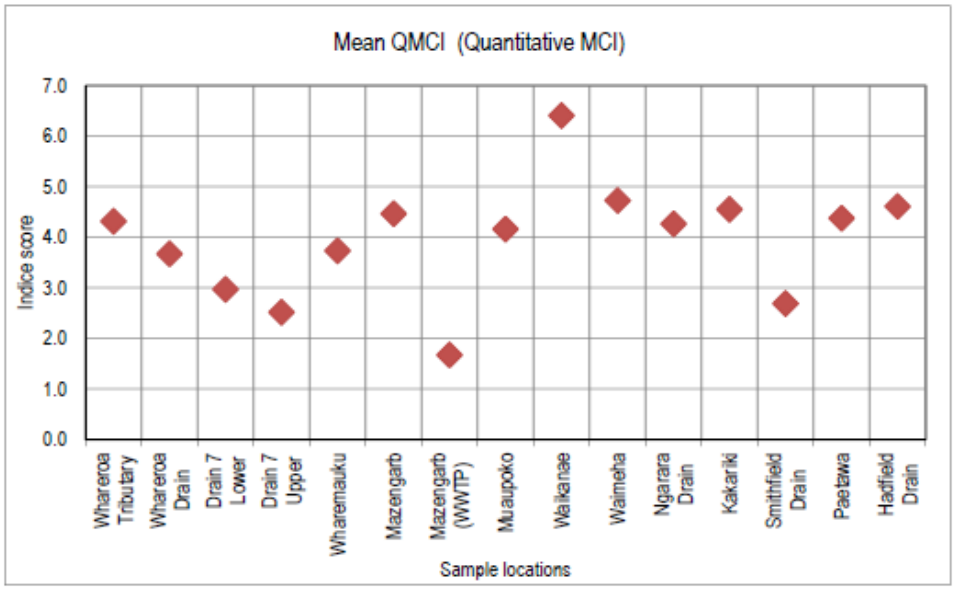

Figure 22.3: Mean QMCI Score from each sampling site

22.2.18 Stream Ecological Valuation (SEV)

The SEV model (developed by Landcare and adopted by GWRC for stream quality investigations in the Wellington Region) calculates a stream quality score based on the comparison of stream function parameters between test and reference sites. The SEV scores are produced on a scale of 0-1 (0 indicating no stream function and 1 indicating full and proper stream function). The purpose of these

scores is to provide a framework for calculating ecological mitigation for each of the streams sampled across the Project area. More detail on the SEV model and methodology is outlined in Technical Report 30.

SEV scores for the sampled sites ranged from a low score of 0.21 at the Whareroa Drain sampling site to 0.78 at the theoretical reference site[174]. The main factor influencing the SEV scores appears to be the absence of effective riparian margins.

A summary of the SEV results is provided in Figure 22.4 below.

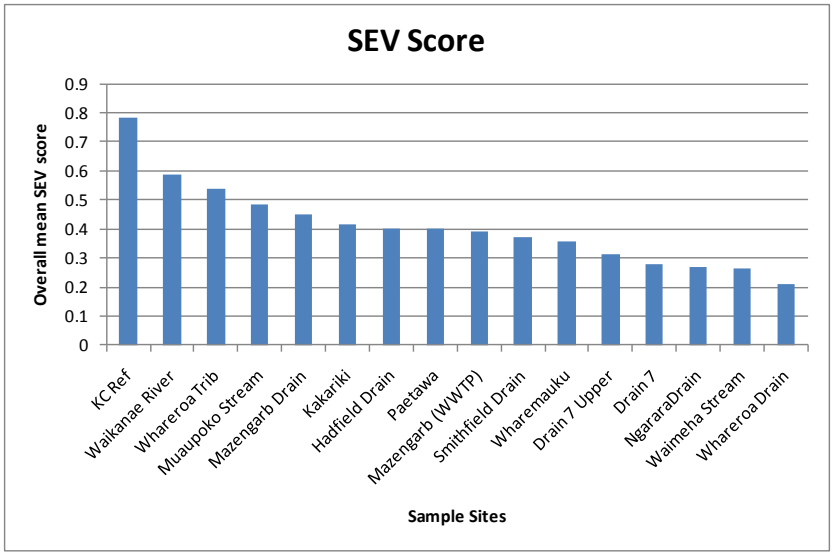

Figure 22.4: Calculated total SEV scores

22.2.19 Ecological values of streams

Based on the ecological assessment in Technical Report 30, Technical Report 26 summarises the ecological stream values of the 15 sampled sites in the Project area. Overall, the assessment concludes that:

- The Waikanae River is considered to be a regionally significant waterbody;
- The Wharemauku and Waimeha streams and the Waikanae river are considered to be of high ecological value; and,
- All of the streams sampled have high values in terms of the presence of indigenous freshwater fish species. However, the results suggest that with the exception of the Waikanae River, Wharemauku Stream and the Whareroa Stream tributary, the water bodies are low value, consistent with their highly modified and historically drained nature.

[174] reference sites being comparable streams with low levels of disturbance by human activity as detailed in Technical Report 30.

22.3 Assessment of effects on freshwater ecology

Technical Report 26 (Volume 3) outlines the Ecological Impact Assessment of the Project on freshwater ecology. The potential effects of the construction and operational activities are described in more detail below.

22.3.1 Assessment of construction effects on freshwater ecology

The potential direct impacts of construction of the proposed Expressway on freshwater ecology results from the loss and modification of aquatic habitat through culverting, armouring and diverting of streams; and fish mortality during installation of culverts and diversions.

The potential indirect impacts of construction include the impact on streams through the discharge of construction contaminants (oil, cement, lubricants) from stores or vehicles and sediment discharges.

22.3.1.1 Physical habitat disturbance

Construction of the proposed Expressway will require approximately 30 intermittent or perennial stream crossings affecting 1,431m of stream. There will also be approximately 1,525m of stream diversions or shortenings. This will potentially result in loss of habitat, associated riparian margins and resident populations of freshwater flora and fauna.

The Project design proposes the installation of 48 culverts with a total length including armouring of 2.35km. Of the 48 culverts proposed, 26 will not affect permanent or intermittent watercourses: 20 culverts are located either where there is a risk of ponding upslope of the proposed Expressway or to connect stormwater treatment ponds to neighbouring watercourses (being formed in existing streams); 6 culverts are located in ephemeral watercourses, typically farm drains and existing roadside depressions or swales with little to no aquatic habitat value. The remaining 22 culverts lie within perennial or intermittent streams: 14 are new culverts and 8 are upgrades or replacements of existing culverts.

Nine diversions totalling 1,525m in length with associated reclamation are proposed in perennial or intermittent streams. While 1,525m of stream will be reclaimed, the total length of the diversion channels will be 2,016m, or 491m longer than will be lost. With the exception of Muaupoko Stream outlet, all diversions proposed consist of replacing straight channelised farm drains. New diversion lengths and new sections of stream being created have incorporated meanders in their design and will provide a quality of habitat that is better than that found in the existing watercourses..

Eight bridges are proposed to be constructed with an associated armouring of 312m of stream bank. The proposed bridges cross perennial or intermittent streams. Except for the bridge over the Waikanae River, all of the bridge structures will be single span, with no piers or piling within stream or river channels. Construction of all of the bridges will require rock armouring of the stream banks and bed to prevent movement of the stream and the risk of undermining the bridge foundations. The Waikanae Bridge will have five spans. Associated with construction of this bridge will be large scale earthworks to widen the existing floodplain, which is being carried out on instruction from GWRC.

22.3.1.2 New stream sections

In addition to the culvert, bridge and diversion construction, 7 new sections of stream are proposed to be created to connect the proposed Expressway works to stormwater pond outlets and to existing watercourses. This would result in approximately 2,016m of new stream habitat which will receive riparian planting of some form. This new habitat would provide opportunities for mitigation of the stream length lost as described above.

22.3.1.3 Summary of stream works

Technical Report 26 summarises the magnitude of aquatic habitat loss as a result of in-stream works required for construction of the Project. Table 22.3 below provides an assessment of impact significance of these works. Overall, the assessment concludes that 2.9km of stream habitat will be lost as a result of the Project. This length is distributed over 12 waterbodies of generally low value. The works required for armouring, diversion and culverting provide an opportunity to improve stream habitat if designed and installed properly. Therefore, good design is the critical component to ensuring that the in-stream works become, in themselves, mitigation for most of the stream modifications.

Table 22.3: Assessment of Impact Significance (without mitigation)

DESCRIPTION	Ecological Value	Assessment of Impact Magnitude	Assessment of Impact Significance
High Value Streams			
Waikanae River	High	Negligible	Low
Medium Value Streams			
Muaupoko Stream	Medium	Negligible	Very Low
Wharemauku Stream	Medium	Negligible	Very Low
Low Value Streams			
Whareroa	Low	Negligible	Very Low
Drain 7	Low	Medium	Very Low
Mazengarb	Low	Low	Very Low
Waimeha	Low	Medium	Very Low
Ngarara Creek	Low	Medium	Very Low
Kakariki	Low	Low	Very Low
Smithfield	Low	High	Low
Paetawa	Low	Medium	Very Low
Hadfield/Kowhai	Low	Low	Very Low

22.3.1.4 Effects on freshwater fish

18 native fish species have been recorded within the Project area. Of these, 8 have a national threat status. These species are potentially affected by:

- The loss of habitat (culverting) which will potentially reduce populations;

- Habitat changes associated with new diversion channels and lengths of new stream being created; and,
- Entrapment and mortality during reclamation of streams and the prevention of migration (culverting).

While much of the stream (2,956m of stream works) that will be affected by construction of the proposed Expressway is highly modified, the quantity of habitat that will be affected is large. This will result the risk of major losses to native freshwater fish.

Mitigation measures to address the potential effects of loss of freshwater fish and habitat are discussed below (Section 22.4 of this Chapter).

22.3.1.5 Contaminant discharges (chemicals, fuel and oil)

There is a risk of spills such as chemicals, fuel and oil during construction activities, in addition to the release of contaminants by disturbing contaminated soils.

Mitigations measures to address these potential effects are discussed below in Section 22.4.

22.3.1.6 Sediment arising from earthworks

The main potential effect during construction that could have significant adverse effects on freshwater ecosystems is increased levels of sediment entering waterways from the large scale earthworks required for the Project. Sediment occurs naturally in streams in baseline levels; however, too much sediment can adversely affect ecosystems by smothering flora and fauna in waterbodies, interfering with the gills of fish and invertebrates, reduce periphyton growth (reducing food supply for many freshwater species); and restricting visual clarity in the water which affects the ability for fish to see their prey.

The preliminary ESCP (Appendix H of the CEMP) addresses sediment yield, transport and management during construction of the proposed Expressway and the Contaminant Load Modelling (Technical Report 25, Volume 3) addresses these matters during operation. Table 22.4 below shows predicted sediment increase in the various catchments as a result of the additional contribution from the earthworks footprint[175].

Table 22.4: Predicted sediment generation by catchment (pre and during construction)

DESCRIPTION	Baseline Sediment Whole Catchment (tonnes)	Total Contribution by Construction (tonnes)*	% Increase over baseline
Whareroa catchment	18.17	0.58	2.6%
Wharemauku catchment	38.02	4.50	9.5%

[175] The Universal Soil Loss Equation (USLE) was used to calculate sediment load generation. More information is provided in Volume 4, Appendix H.

DESCRIPTION	Baseline Sediment Whole Catchment (tonnes)	Total Contribution by Construction (tonnes)*	% Increase over baseline
Waikanae catchment	644.72	3.96	0.4%
Waimeha	2.37	0.77	25.3%
Ngarara catchment	50.56	6.83	9.8%

Overall, sediment yields are expected to increase to a total of 16.64 tonnes of sediment across the five affected catchments during construction. The preliminary ESCP provides for a range of mitigation measures to minimise sediment discharge levels, particularly where there are sensitive downstream receiving environments.

Based on the predicted sediment loads within the flat contours of the Project area, the effects on freshwater ecosystems will be low in the Whareroa, Wharemauku, Waikanae and Waimeha catchments. There is potential for greater effects as a result of the volume of sediment that could enter the Te Harakeke/Kawakahia wetland via the Ngarara Stream. If sediment is flushed through these waterways it may result in infilling of the stream and may have potential effects on low wetland vegetation and biological communities. Due to the difficulty of quantifying these effects, adaptive management and construction monitoring are recommended. These are discussed in further detail in the following sections.

22.3.2 Assessment of operational effects on freshwater ecology

22.3.2.1 Wetlands

Once the proposed Expressway is in operation, there is some potential to drawdown/dam or raise groundwater immediately surrounding the proposed Expressway which may result in potential adverse effects on wetland hydrology adjacent to the proposed Expressway. Wetlands identified as potentially at risk include the Raumati Manuka Wetland, Otaihanga Northern and Southern wetlands, El Rancho Wetland (Weggery), Ti Kouka Wetland and Ngarara Wetland, all of which include some proportion within 200m of the proposed Expressway alignment. An adaptive management approach is proposed to manage any adverse effects on these wetlands, as discussed below in section 22.4.

22.3.2.2 Stormwater discharge

The discharge of contaminated stormwater from the proposed Expressway to local streams and estuaries has the potential to impact on water and habitat quality. The Contaminant Load Modelling results (Technical Report 25) indicate that the effects of stormwater runoff to streams and estuarine systems is likely to lead to an overall reduction in contaminant loads generated from all catchments except for the Wharemauku and Waimeha stream catchments, largely as a result of the re-distribution of traffic from existing SH1 to the proposed Expressway and the increase of stormwater treatment proposed as part of the proposed Expressway. Mitigation for the potential adverse effects is discussed in detail below.

22.3.2.3 Fish passage

Due to the low-lying nature and low velocity of the majority of the watercourses traversed by the proposed Expressway, it is expected that fish passage can be provided to all streams traversed by the proposed Expressway where indigenous freshwater fish may be present.

With post construction monitoring and maintenance of culverts as outlined below, the risk of adverse effects on fish passage during the operation of the Project will be negligible, largely due to low gradients within the Project area.

22.3.3 Measures to avoid, remedy or mitigate actual or potential adverse effects on freshwater ecology

Section 11 of Technical Report 30 (Volume 3) identifies that mitigation, which may include management and monitoring, is required for a number of construction and operational aspects of the proposed Expressway, which are summarised below.

Further details relating to freshwater mitigation can be found in Technical Report 26 (Volume 3) and the Ecological Management Plan (Appendix M of the CEMP, Volume 4).

22.3.3.1 Adaptive management – overall approach

Adaptive management is proposed to be used as a tool to mitigate actual and potential effects of the Project on freshwater ecosystems throughout construction and in the first 3 years of proposed Expressway operation. This tool is used when a project may affect complex ecological ecosystems where it may be difficult to predict all the potential effects with absolute certainty. Adaptive management is an extension of the precautionary approach, and its application to this Project supports the continuous improvement processes that are increasingly best practice for large and complex construction projects.

The premise of adaptive management is to establish a baseline of pre-construction ecological conditions against which changes are measured. Technical Report 26 (Section 11) provides more detail on this approach. The mitigation described below outlines where adaptive management is proposed to mitigate the actual and potential effects of the Project.

22.3.3.2 Mitigation proposed for construction effects

a. Stream habitat loss or modification

Mitigation actions have been designed to fall immediately upstream and / or downstream, as far as practicable, within the waterbody(s) affected by the proposed Expressway. The potential adverse effects on freshwater systems associated with culverting and diversions are proposed to be mitigated primarily through stream restoration on the waterbodies affected upstream and downstream of the Project.

Ecological mitigation ratios were derived using the SEV model. The SEV model assesses how well the main ecological functions of a stream are being performed and represents a 'no net-loss' tool which

produces an ecological compensation ration (ECR) after taking these factors into consideration. This tool is discussed and applied in Section 11.3 of Technical Report 30 (Volume 3).

In order to mitigate the 1,431m of freshwater habitat loss and modification required for the construction of culverts and bridges, and the 1,525m of habitat loss through stream diversion and modifications, a total of 4,973m of stream restoration is calculated to be required. A range of mitigation (and management) actions are proposed covering a total of 4,716m of stream, the shortfall of which is proposed to be addressed by the additional ecological benefit provided by landscape planting and the development of large mass planted flood storage totalling 13ha in area (which have not been used for ecological mitigation elsewhere). The design for the mass planted flood storage areas will have habitat connections to adjacent waterbodies (the Wharemauku Stream and the Kakariki Stream) and this will provide a range of habitat benefits.

Riparian planting upstream and downstream is proposed at each of the 22 culvert locations within perennial and intermittent waterbodies. This would result in a total length of 880 lineal metres based on 20 lineal metres of planting (10m wide on both sides) upstream and downstream of the crossing. Where possible, these areas will be fenced and permanently protected.

Riparian re-vegetation of the Wharemauku, WWTP, Waimeha, Kakariki and Paetawa Streams and the Waikanae River will total 1,820 lineal metres (based on a minimum of 10m – 20m wide both sides of the waterbody). Areas of permanent restoration and retirement are also proposed along specific reaches of the Wharemauku, Waimeha, Kakariki and Paetawa Streams, and the Waikanae River in the vicinity of the proposed Expressway. The mitigation proposed will provide additional habitat enhancement immediately adjacent to the areas affected by the Project and long term benefits.

Diversions will total more than the lengths of stream lost and will include the construction of a number of new lengths of stream (totalling 1,260m) which will connect to the existing waterbodies.

Best practice erosion and sediment control mechanisms during construction will also assist in reducing potential sediment-laden run-off reaching the ecologically sensitive downstream receiving environments.

b. Effects on freshwater fauna

To assist in ensuring that detailed design allows for fish passage, ecological input will form an important component of the detailed design stage. All culverts in perennial or intermittent streams will be embedded and sized to allow stream bed habitat to pass through them. The methods used will ensure that fish passage is achievable.

Fish relocation will be carried out during the construction of culverts and stream diversions. Works in stream beds will be minimised during periods of fish migration (Spring 1 Oct – 30 Dec; Autumn 1 April – 30 May) to ensure work is only undertaken in short, prescribed periods during this time with appropriate ecological supervision.

c. Wetland hydrology

The long-term hydraulic effects on wetlands located in close proximity to the proposed Expressway remain uncertain. In order to monitor and manage these potential effects a number of measures are proposed. This includes adaptive management approaches to measure water levels in the Raumati/Manuka Wetland, Otaihanga Southern and Northern Wetlands and El Rancho Wetland (Weggery).

In addition to the baseline wetland condition monitoring undertaken as part of the ecological investigations, baseline hydrological monitoring will be undertaken in these wetlands prior to construction to determine existing water levels and the range of seasonal variation. The groundwater monitoring planned is outlined in the Groundwater (Level) Management Plan (Appendix I of the CEMP).

Through the construction phase, on-going monitoring of water levels and the ecological condition of wetlands will be undertaken as part of the adaptive management approach. If groundwater level changes are detected, potential effects on wetlands can be avoided by mitigating groundwater level change before the wetland is deleteriously affected. A range of options have been developed to manage construction-related effects associated with drawdown or damming, including consultation with statutory authorities.

Further details of the proposed adaptive management approach in relation to wetlands can be found in Technical Report 26 (Volume 3) and the Ecological Management Plan (Appendix M of the CEMP, Volume 4).

22.3.4 Mitigation proposed for operational effects

a. Stormwater Discharge

The Project design has incorporated a mix of linear stormwater swale treatments along the length of the Project and a number of larger treatment wetlands. These devices are expected to perform so that the levels of contaminants in stormwater discharging to streams (and out into the estuaries) will not increase. Overall, the level of stormwater treatment proposed, combined with the reduction in traffic from the existing SH1 (where untreated stormwater currently discharges directly into many of the waterbodies sampled for this assessment), is anticipated to lead to a reduction in the level of contaminants entering the waterbodies downstream of the Project alignment in the long-term.

A water quality treatment plan will require monitoring of the stormwater treatment devices during the first 3 years of operation to ensure these devices are operating effectively to meet the target removal rates.

b. Effects on freshwater fauna

Post construction monitoring (3 years) of fish passage in stream diversions and culverts will be undertaken to ensure the designs used are effective and continue to operate to their design standards.

23 Marine ecology

Overview

The Project does not involve any direct effects on marine ecological values, as the proposed Expressway alignment occurs at some distance from marine environments. However, potential indirect effects may occur as a result of sediment and contaminant release during construction and through stormwater runoff during operation, to streams and rivers that discharge to the marine environment.

There are three marine receiving environments with the potential to be adversely affected by the Project. These are the:

- Wharemauku Stream Mouth;
- Waikanae Estuary; and
- Waimeha Stream Mouth.

The mouths of the Wharemauku and Waimeha Streams are dynamic, high energy environments on the open coast. In contrast, the Waikanae Estuary is sheltered, calm and influenced by freshwater. All three marine habitats are considered to have high ecological values (as described within Technical Report 26, Volume 3).

Construction of the Project will result in increased levels of sediment entering the marine environment via streams, with potential impacts on habitats, vegetation and species reliant on these waterbodies. However, the predicted increase of discharge into the marine environment during construction is considered to be negligible (i.e. not able to be measured) above levels of discharge that are currently occurring. A comprehensive CEMP, contained in Volume 4, is proposed to be implemented which will minimise risks associated with potential spills of contaminants or the release of contaminants by disturbing contaminated soils. As a result, the risks of contaminant discharges associated with the construction of the Project on marine environmental values can be avoided, or managed so that effects are negligible. Overall, the effects of Project construction on marine ecological values will be negligible.

Once the Project is in operation, and the proposed Expressway is in use, treated stormwater runoff will discharge to the marine environment via streams or the Waikane River. When modelled against the current situation, the only catchments to show an increase in contaminant loads are the Wharemauku and Waimeha stream catchments. Due to the high energy receiving environments, however, contaminants will dilute and disperse which makes deposition and accumulation of contaminants highly unlikely. Accordingly, the operational effects of the Project on the marine environment will be negligible.

23.1 Introduction

This Chapter presents the findings of investigations undertaken to determine the potential effects of the proposed Expressway on marine ecology.

Information about marine ecology was obtained from desktop studies and marine ecological field investigations downstream of the proposed Expressway alignment. Once a baseline of marine ecology had been determined (refer to Technical Report 31, Volume 3), the impacts of construction and operation of the Project were assessed (refer to Technical Report 26, Volume 3).

It is noted that the Project ecologists worked closely with the Project design team to avoid adverse ecological effects where practicable. Where avoidance was not practicable, ecological mitigation has been proposed to mitigate those adverse effects.

The following Technical Reports (Volume 3) and Management Plans (Volume 4) have been cross referenced within this Chapter:

- Assessment of Operational Air Quality Effects (Technical Report 13)
- Assessment of Hydrology and Stormwater Effects (Technical Report 22)
- Contaminant Load Assessment (Technical Report 25)
- Ecological Impact Assessment (Technical Report 26)
- Avifauna Studies – Descriptions and Values (Technical Report 29)
- Marine Habitat and Species – Description and Values (Technical Report 31)
- Erosion and Sediment Control Plan (Appendix H of the CEMP)

23.2 Ecological investigations and modelling

The identification of the potential effects of the Project on marine ecology required the assessment of the composition and values of the existing marine ecosystems. This relied on two complementary methods:

- Desktop studies of available and relevant data and information on the ecological values (invertebrates, fish, sediment grain size, sediment quality and water quality) of the estuarine environments downstream of the proposed Expressway alignment were collated from a large number of sources; and

- Field surveys consisting of intertidal[176] surveys of infaunal[177] and epifaunal[178] invertebrates, sediment grain size, sediment quality, depth of oxygenation of sediment and macroalgal[179] cover were undertaken at the mouths of streams that are likely to receive both construction sediment and operational phase stormwater from the proposed Expressway. Because of the size of the Waikanae River estuary, two sites were sampled, one to the North and one to the South.

The description of the existing marine ecology given in this Chapter includes a brief overview of the investigations undertaken. Further details on the sources and methods used and the findings of the field survey investigations are contained in Technical Report 31, Volume 3.

23.3 Existing marine ecosystems characteristics

Three marine receiving environments have been identified as being potentially affected by construction and operational phase discharges to streams/rivers from the Project. These receiving environments are the:

- Wharemauku Stream mouth;
- Waikanae Estuary; and
- Waimeha Stream mouth (which is also the receiving environment for the Ngarara Stream which joins the Waimeha Stream just before it enters to sea at Waikanae Beach).

The Designation overlays or effects negligible portions of the Whareroa Stream catchment (in the northeast corner of Queen Elizabeth Park) and the Hadfield/Kowhai Stream catchment (north of Peka Peka). On this basis, the Whareroa and Hadfield/Kowhai Stream mouths are not considered to be sufficiently at risk of downstream disturbance and further detailed assessments were not considered necessary in these locations.

The physical and biological characteristics of the relevant marine environments are described in this section. Aspects described include:

- Morphology;
- Sediment characteristics;

---

[176] 'Intertidal' refers to the area between high and low tide.

[177] 'Infauna' are benthic animals that live in the substrates of the ocean floor, especially in a soft sea bottom. Infauna usually construct tubes or burrows and are commonly found in deeper and subtidal waters. 'Benthic' refers to flora and fauna (benthos) living on the bottom of a body of water (stream or sea).

[178] 'Epifauna' are benthic animals that live on the surface of a substrate, such as rocks, pilings, marine vegetation, or the sea or lake floor itself. Epifauna may attach themselves to such surfaces or range freely over them, as by crawling or swimming.

[179] Macroalgae are large-celled, photosynthetic algae.

- Water quality; and
- Habitat and species.

23.3.1 Wharemauku estuary

The Wharemauku Stream originates behind in the hills east of Raumati and Paraparaumu, and flows through the Paraparaumu town centre discharging into the sea via the open sandy coast of Raumati Beach. The main tributary is Drain 7, a channelised stream that flows through the low lying interdunal areas of Raumati and Raumati South.

Land use within the 1203 ha catchment includes pastoral and residential, with some land remaining in scrub and forest.

The Wharemauku Stream differs from the Waimeha Stream and Waikanae River in that the lower reaches of the stream are modified through channelisation, artificial embankments (wooden walls) and the relatively large proportion of the catchment which is urbanised. These features have constrained and altered the natural path of the stream, impeding the natural migration paths of several fish species.

The Wharemauku Stream mouth is a shallow, small tidal estuary that is approximately 3 to 5m wide. The margins of the stream mouth are highly modified with sea walls and houses located on the foredunes.

23.3.1.1 Sediment characteristics

Surface sediment grain size at the Wharemauku Stream mouth is dominated by fine sand (>70%). Approximately 95-99% of the sediment is within the medium to very fine sand range. The presence of silt and clay is negligible (<2%).

Contaminant concentrations (copper, lead, zinc and HMW PAHs[180]) are significantly below guideline values[181] (refer to Technical Report 31, Volume 3).

23.3.1.2 Water quality

Land use activities and land cover types in the catchment as discussed have resulted in poor stream water quality conditions primarily relating to elevated concentrations of faecal contaminants and nitrogen.

Water quality assessments undertaken as part of this Project (Technical Report 24, Volume 3) determined that the recorded levels of dissolved zinc and aluminium may be exerting a toxic effect on

[180] High molecular weight polycyclic aromatic hydrocarbons

[181] 'Guideline values' include the Auckland Regional Council (ARC) Environmental Response Criteria (ERC) and the Australian and New Zealand Environment and Conservation Council (ANZECC) Interim Sediment Quality Guidelines (ISQG).

freshwater organisms in the Wharemauku Stream. However, the Wharemauku Stream mouth is well flushed and is unlikely to suffer adverse effects from poor stream water quality.

23.3.1.3 Habitat and species

The Wharemauku Stream mouth is a high energy environment, with exposed sandy beaches, which are typically characterised by low abundance and diversity of intertidal marine invertebrates and macroalgae settlement. In addition, no known sensitive invertebrate species were detected.

Estuarine habitat diversity is low given the historic and ongoing modifications and the lack of salt marsh vegetation and tidal flats.

23.3.2 Waikanae estuary

The Waikanae River originates from the western base of the Tararua Ranges where the habitat is largely native bush. As the River flows towards the coast, it passes through the Reikorangi Basin where a number of major tributaries feed into the River. As the River nears the coast it runs through the urban areas of Waikanae and Otaihanga, feeding into the Waikanae Estuary and mixing with tidal seawater.

The Waikanae Estuary is a tidal river mouth estuary and covers approximately 80 ha. The Estuary is approximately 1.5km long, 40-50m wide with an average water depth ranging between 1 to 3m.

23.3.2.1 Sediment characteristics

Surface sediment grain size in the Waikanae Estuary is dominated by fine sand (>70%). Approximately 95-99% of the sediment is within the medium to very fine sand range. The presence of silt and clay is negligible (<2%).

The sediment collected from the Waikanae River Estuary North site during the field investigation survey had the highest contaminant concentrations of zinc (47 mg/kg dw), lead (9.3 mg/kg dw) and copper levels (7.4 mg/kg dw), all of which are significantly below guideline values (refer to Technical Report 31, Volume 3). The other estuarine environments surveyed have similar levels of these contaminants.

23.3.2.2 Water quality

The Waikanae River has good water quality, reflecting the large proportion of forest cover and low intensity pastoral land use in the 13,400 hectare catchment.

Water quality in the Waikanae Estuary is influenced by the large urban areas surrounding the estuary and the discharge of treated wastewater via the Mazengarb Drain, which enters the Waikanae River just upstream of the estuary.

23.3.2.3 Habitat and species

The Waikanae Estuary is relatively more sheltered than the other stream estuaries downstream of the proposed Expressway, and is influenced by the greater volumes of freshwater. As such, though not

found during the field investigation survey, epifauna such as mud crabs and small gastropods are likely to be present. The Estuary is unsuitable for macroalgae settlement due to the influence of freshwater and periodic high velocity flows during storm events.

The Waikanae Estuary contains a variety of habitats, including tidal mudflats, vegetated sand flats, sand dunes, two tidal lagoons and salt marsh. The intertidal sand flats (comprising 50% of the estuary) provide important habitat for native fish, as well as a feeding resource for a variety of resident and migratory (national and international) bird species.

For these reasons, the estuary environment is considered to be of high ecological value, and in 1978, DOC gazetted the estuary as the Waikanae Estuary Scientific Reserve which is managed by DOC.

The intertidal area within the Waikanae Estuary below mean high water spring is within the Kāpiti Marine Reserve, which was established in 1992. The Marine Reserve links the Waikanae Estuary Scientific Reserve with the Kāpiti Island Nature Reserve. The Marine Reserve incorporates a distribution overlap of species of cool temperature southern waters and warm temperate northern waters resulting in a mixture of northern and southern species. The Reserve is also unique as it contains four distinct habitat zones in close proximity. The habitat zone identified around the Waikanae River mouth is characterised as partly sheltered shallow sand habitat.

23.3.3 Waimeha Stream mouth

Waimeha Stream is a small, spring-fed stream originating from the outskirts of the Waikanae township, flowing down to enter the sea via the sandy coastline at Waikanae Beach. The small stream catchment drains a primarily residential area. Just upstream from the estuary, the Ngarara Stream joins the Waimeha. The Ngarara Stream catchment area consists mainly of pastureland and interdunal wetlands.

The mouth of the Waimeha Stream has been highly modified, and has been channelised. Originally, the Stream flowed south parallel to the beach to the mouth of the Waikanae River; however, in 1920, the Stream was re-directed to discharge across the beach to provide another white-baiting stream. A string of small lakes occupy where the Stream once ran and the old stream bed is now an artificial estuary.

The Waimeha Stream exits to a narrow (5-10 m) and shallow (0.5 m) tidal stream mouth. The Waimeha Stream mouth is a popular site for recreational activities.

23.3.3.1 Sediment characteristics

The Waimeha Stream mouth has the highest surface sediment grain size of all three marine areas, dominated by fine sand (84%). Approximately 95-99% of the sediment is within the medium to very fine sand range. Silt and clay are negligible (<2%).

Contaminant concentrations (copper, lead, zinc and HMW PAHs) were below guideline values (refer to Technical Report 31, Volume 3).

23.3.3.2 Water quality

Water quality from previous studies showed characteristics of typical lowland rural waterways influenced by agricultural run-off (elevated nutrient levels and low toxicant concentrations).

23.3.3.3 Habitat and species

The Waimeha Stream mouth is a high energy environment, with an exposed sandy beach, which is typically characterised by low abundance and diversity of intertidal marine invertebrates and macroalgae settlement. No known sensitive invertebrate species were detected.

Stream mouth habitat diversity is low due to upstream modifications, regular modification of the beach channel (in order to protect coastal residential property from erosion), lack of salt marsh vegetation, and high abundance of weeds.

The sand-flats are a feeding area for coastal and shore birds including black-backed and red-billed gulls, Caspian terns and pied stilts. The relative close proximity to the Waikanae Estuary suggests that a number of other species are likely to visit the stream mouth periodically.

23.4 Existing ecological values

Overall, the Wharemauku and Waimeha Stream mouths and the marine habitat of the Waikanae Estuary are considered to have high ecological values[182].

High ecological values are attributed to marine receiving environments with the following characteristics:

- Benthic invertebrate community typically highly diverse with high species richness;
- Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and mud;
- Marine sediments typically comprise <50% smaller grain sizes;
- Depth of oxygenated surface sediment typically >1.0 cm;
- Contaminant concentrations in surface sediment rarely exceed low effects threshold concentrations; and
- Habitat largely unmodified.

[182] Table 5 within Technical Report 26, Volume 3 lists the characteristics which have been used to assess the predominant ecological values of parts of the marine environment within the Project area, based on a weight of evidence approach.

Table 23.1: Ecological characteristics common to the Waimeha and Wharemauku Stream mouths and the Waikanae Estuary

	Ecological characteristics of Waimeha and Wharemauku Stream mouths	Ecological characteristics of the Waikanae Estuary
Sediment Grain Size	Dominated by fine sand grain size.	Dominated by fine sand grain size.
Sediment Quality	Contaminant concentrations in sediment significantly below guideline values.	Contaminant concentrations in sediment significantly below guideline values
Redox Discontinuity Layer[183]	No anoxic[184] sediment discernable.	Depth of anoxic sediment on average 2-4 cm.
Surface Macroalgae	No macroalgae present.	No macroalgae present.
Epifauna	No epifauna present.	No epifauna present.
Infaunal Invertebrates	Low diversity and abundance of invertebrates, which is typical and expected in the mobile sands of an exposed beach and does not reflect a degraded habitat in this case. Shannon Wiener Diversity below 0.4.	Invertebrate assemblage dominated by a high abundance of amphipods and gastropods. Shannon Wiener Diversity just below 1.
Sensitive Invertebrates	No known sensitive invertebrate species detected.	Sensitive invertebrate species detected e.g. pipi.
Habitat Modification	Modified habitat.	Largely unmodified habitat.

23.5 Assessment of effects on marine ecology

23.5.1 Assessment overview

It is not anticipated that there would be any direct effects on marine ecological values due to construction or operation of the Project, as the proposed Expressway alignment occurs at some distance from marine environments.

However, potential indirect effects may occur due to the discharge of runoff, during both construction and operation phases, to streams and rivers that discharge to the marine environment. Thus, in developing the methodology to investigate the marine ecology associated with the Project and surrounding area, the following potential effects were considered:

- Discharge of sediment-laden water to estuaries and open beaches;
- Discharge of road runoff contaminants via streams and rivers to the estuaries and open beaches; and

[183] The transition layer between oxygen-rich and oxygen-poor layers is called the 'redox discontinuity layer'

[184] Anoxic means oxygen-depleted.

- Impact on food resources for birds and fish within the Waikanae Estuary and the Wharemauku and Waimeha Stream mouths as a result of Project earthworks within the catchment area.

23.5.2 Assessment of construction effects on marine ecology

The indirect effects from construction on marine ecology have the potential to include:

- Impact on streams, wetlands and estuarine habitats through discharge of construction contaminants (oil, cement, lubricants) from stores or vehicles; and
- Impact on streams, wetlands and estuarine habitats and species through increased turbidity and blanketing of stream bed by sediment generated by construction activities.

23.5.2.1 Discharge of construction contaminants

The Project team considered the risks associated with spills of contaminants such as chemicals, fuel, and oil during construction and the release of contaminants by disturbing contaminated soils. These risks will be addressed by the measures identified within the CEMP in Volume 4. The CEMP describes standard methodologies and management that will avoid or minimise these risks. It includes management conditions that address spill minimisation, protocols for managing accidental discharges, planning of bunded storage areas, and refuelling sites.

Overall, with good construction environmental management, these risks can be avoided, or managed so that effects are negligible. On this basis, no additional mitigation is required.

23.5.2.2 Discharge of construction sediment

Sediment discharge into waterways can be an issue during the construction phase, when fine soils from areas of open ground associated with earthworks can be carried into waterways during rain events. Once the earthworks are completed and stabilised, sediment should not reach the waterways, except perhaps in extreme rain events or if ground cover is again disturbed. The proposed management of these potential effects is outlined in the ESCP (Appendix H of the CEMP, Volume 4).

Effects on marine ecology can occur from both suspended sediment and from sediment deposited on the seabed (benthos). Broadly, the magnitude of effect will relate to the concentration of suspended sediment and depth of deposition of sediment, in addition to the duration of exposure.

The field work carried out (Technical Report 31, Volume 3) found that the Waimeha and Wharemauku Stream mouths are high energy, exposed sandy beaches, which are typically characterised by low abundance and diversity of intertidal marine invertebrates. In comparison, the Waikanae River Estuary North and South sites are relatively more sheltered and are influenced by freshwater more than the Waimeha and Wharemauku sites. Typically, there is greater risk of adverse effects where discharges occur into sheltered, calm marine habitats, such as harbours and estuaries, as opposed to exposed, high energy habitats.

A range of measures are proposed for the management of erosion, and the capture and treatment of sediment during construction. Treatment devices will be designed with a target of 70% for on-site

capture of sediment from erosion on site, and 75% efficiency for stormwater pond treatment (refer to the ESCP Appendix H of the CEMP, Volume 4).

The 'pre-earthworks' or baseline sediment yields and the additional contribution predicted to result from the earthworks footprint is presented in Table 23.2[185]. The figures in the table are based on the two month duration of open earthworks areas for each stage of the works (refer to Chapter 8 of this AEE for details of staging). The figures represent the 'worst-case' as progressive stabilisation will occur.

Standard methodologies to ensure these discharge levels are achieved are outlined within the Contaminant Load Assessment (Technical Report 25, Volume 3) and the ESCP (Appendix H of the CEMP, Volume 4).

Table 23.2: Predicted sediment generation by catchment (pre and during construction)

DESCRIPTION	Baseline Sediment Whole Catchment (tonnes)	Total Contribution by Construction (tonnes) *	% Increase over baseline
Whareroa catchment	18.17	0.58	2.6%
Wharemauku catchment	38.02	4.50	9.5%
Waikanae catchment	644.72	3.96	0.4%
Waimeha catchment	2.37	0.77	25.3%
Ngarara catchment[186]	50.56	6.83	9.8%

* Predicted sediment generated over 2 month construction period.

The risk of adverse effects arising from the discharge of sediment, based on Table 23.2, has been considered for each of these habitats.

Sediment discharged to the Wharemauku Stream over a two-month period during construction is estimated to increase by 9.5% above the baseline (refer to Table 23.2). The stream discharges to the high energy open coast at Raumati Beach, where significant flushing and dilution of discharges occurs. As such, it is anticipated that the predicted increase in sediment discharge to the stream during rainfall events occurring when earthworks are open in this catchment will have negligible effects on the marine ecological values at this site.

The Waikanae Estuary is a tidal river mouth estuary that has high ecological values. The predicted increase in sediment discharge to the river/estuary over a two month period during open earthworks in the catchment is 0.4%. The baseline sediment discharge in this catchment over this period is relatively high at approximately 650 tonnes. Even though the Waikanae Estuary is a more sheltered low energy environment, the adverse effects on estuarine/marine ecological values resulting from the predicted increase of sediment (4.5 tonnes) are considered to be negligible (i.e. not able to be measured) above this baseline.

[185] Full details can be found in 'Appendix G1 USLE Calculation M2PP Pre Earthworks' & 'Appendix G5 - USLE Calculation M2PP during Earthworks' within the CEMP, Volume 4.

[186] Just upstream from the Waihema Stream Mouth, the Ngarara Stream joins the Waimeha Stream.

The Waimeha Stream discharges to the high energy open coast via a relatively narrow and shallow stream mouth. Sediment discharged to the Waimeha Stream is predicted to increase by 25% from 2.37 tonnes to 3.14 tonnes over a two month period during open earthworks in the catchment. Whilst the percentage increase is large, the actual volume of sediment is low. The discharge point is approximately 1.5 km upstream of the stream mouth, and sediment is expected to be carried to the open coast during rainfall events. At the open coast, sediment will be rapidly diluted and dispersed subtidally[187], with negligible effects on marine ecological values.

Whilst the Whareroa Stream mouth was not assessed as part of this Project due to the low potential for adverse effects, we consider that an increase of 2.6% in sediment discharged to the stream mouth would have negligible effects on marine ecological values due to the rapid dilution and dispersion of sediment provided by the ultimate receiving environment of the Tasman Sea.

Table 23.3: Assessment of the Magnitude of Effects of Sediment Discharge on the Marine Habitat During Construction (without mitigation)

Description	Ecological Value	Description of effect	Assessment of Impact Magnitude
Estuaries, stream and river mouths			
Whareroa Stream mouth	High	Sediment discharge (0.6 tonnes) to small, unmodified river mouth	Negligible
Wharemauku Stream mouth	High	Sediment discharge (4.5 tonnes) to small, highly modified river mouth	Negligible
Waikanae Estuary	High	Sediment discharge (3.9 tonnes) to very large, high value estuary	Negligible
Waimeha Stream mouth	High	Sediment discharge (6.8 tonnes) to large, somewhat modified river mouth	Negligible

This summary concludes that the magnitude of effects from construction on the high ecological values of the marine ecology is considered negligible[188].

23.5.3 Operational effects on marine ecology

During the operational phase of the Project, treated stormwater runoff from the proposed Expressway will discharge to the marine environments via streams or the Waikanae River. As with any stormwater discharge, there is the potential for cumulative effects in the long term arising from the accumulation of contaminants contained in discharges.

[187] 'Subtidal' refers to the area below water at low tide.

[188] Negligible in this context means a very slight change from baseline condition; change barely distinguishable, approximating to the "no change" situation.

The Project design has incorporated a mix of stormwater treatment swales along the length of the Alignment and a number of larger treatment wetlands. These devices are expected to perform so that the levels of contaminants in stormwater discharging to streams and the stream mouths and estuaries will not increase. The Assessment of Hydrology and Stormwater Effects (Technical Report 22 Volume 3) outlines these mechanisms and treatment efficiencies in more detail.

The Contaminant Load Assessment (Technical Report 25, Volume 3) modelled a number of scenarios to predict the potential contribution of contaminants (sediment, zinc, copper and TPH) from the operation of the proposed Expressway, in 2031. When compared to the current situation, contaminant loads within the Wharemauku and Waimeha stream catchments were the only catchments within the Project that showed an increase. Given that these streams discharge to the high energy open coast, deposition and accumulation of contaminants in the Wharemauku and Waimeha Stream mouths is highly unlikely. This is evidenced by the existing very low concentrations of contaminants in surface sediment at both these stream mouths.

Based on the results of contaminant modelling, the effects of stormwater runoff to estuarine systems will be negligible. This is as a result of the re-distribution of traffic from existing SH1 (from which untreated stormwater discharges directly to many of the same streams discussed in this Chapter) to the proposed Expressway and the increase in stormwater runoff treatment proposed as part of the Project design.

23.5.4 Summary of effects

This assessment considered the discharge of construction phase sediment and contaminants and operational phase stormwater to estuaries and stream mouths. Negligible adverse effects on stream, estuarine and marine ecological values are predicted to occur during both the construction and operational phases of the Project.

Overall, the biodiversity and ecological values of the marine environment can be maintained in the long-term. No additional mitigation is considered necessary.

24 Stormwater and hydrology

Overview

The proposed Expressway could potentially result in flooding effects resulting from changes to stormwater and surface water hydrology over the Project area. The Project area crosses a number of low-lying and flood prone areas that provide significant floodwater storage.

The design approach of the Project sought to achieve hydraulic neutrality (i.e. no exacerbation of the existing situation), taking into account both the increased run-off from the proposed Expressway footprint and the loss of flood plain storage under the footprint.

To assess potential stormwater and surface water hydrology effects, calibrated models from both KCDC and GWRC were used, with the proposed Expressway alignment superimposed into the existing environment as represented in the models. Further stormwater modelling was undertaken by the Project team, the results of which were incorporated in the KCDC and GWRC models. The models tested the efficiency of the proposed mitigation used in the design of the proposed Expressway.

The modelling demonstrates that the potential effects of the proposed Expressway on stormwater and surface water will be mitigated by a number of methods. The proposed mitigation measures are: attenuation in swales and wetlands to no more than 80% of pre-Expressway peak flows; creation of off-set storage areas; low head culvert designs; rip rap protected culverts and outlets; and the creation of new open channel drains resembling natural streams.

The potential adverse effects of the proposed Expressway on flood risk are able to be avoided or satisfactorily addressed through mitigation.

24.1 Introduction

Stormwater is water that originates during precipitation events and runs off impervious surfaces such as roads, driveways, footpaths and rooftops. Stormwater either flows directly into surface waterways or is channelled into stormwater sewers, which eventually discharge to surface water. Stormwater design features of the proposed Expressway shape the nature of hydrological effects from the Project. Hydrology refers to the movement, distribution and interaction of water with the ground. The hydrological system comprises the continuous movement of water on, above and below the land surface of the Earth.

The information contained in this Chapter is based on the following Technical Report:

- Assessment of Hydrology and Stormwater Effects (Technical Report 22, Volume 3).

Technical Report 22 has been prepared in association with a number of other stormwater related Technical Reports and Management Plans as documented in the introduction to Technical Report 22.

This Chapter describes the potential stormwater and hydrological effects of the proposed Expressway and the actions that are proposed to be taken to mitigate these effects (where not avoidable) in terms of:

- The potential for increased flooding caused by the introduction of impervious surfaces and the infilling of floodplains; and,
- The disruption to watercourses from new culvert and bridge crossings and watercourse realignments.

The assessment of hydrological effects has involved comprehensive hydrological and hydraulic modelling which informed the design of the proposed stormwater systems and watercourse crossings. The modelling and how it relates to the assessment of hydrological effects is summarised in Section 24.3 of this Chapter, and further details are contained in Technical Report 22, Volume 3 and the Drainage Plans in Volume 5.

Where stormwater and hydrological effects have the potential to impact on other aspects of the environment, these effects are discussed in the relevant assessment Chapters of the AEE. In particular, this relates to potential effects on:

- Cultural values associated with water bodies (Chapter 14).
- Freshwater ecology (Chapter 22);
- Groundwater (Chapter 25);
- Contamination (Chapter 27);
- Receiving watercourse water quality (Chapter 28); and,
- Recreational uses of water bodies (Chapter 30).

24.2 Existing hydrological environment

The proposed Expressway crosses the low-lying coastal plains and dune areas of the Kāpiti District. This land is characterised by a mix of low peat flats and sand dune formations. There are many wet areas and wetlands along the route, the majority of which have been heavily modified by farm or urban development.

The Waikanae River is the largest watercourse that will be crossed by the proposed Expressway. There are also a number of streams and drains that will also be crossed. As with the wetlands, all of the watercourses in the Project area have been heavily modified by farm and/or urban development.

The majority of the low lying areas of land within the Project area are floodplains and as such are subject to significant flooding during large rainfall events. These floodplains also generally coincide with peat flats and are particularly dominant at the southern and northern ends of the Project.

The rainfall patterns of the District are strongly influenced by the prevailing westerly winds along with the presence of the coastal hills and, further east, the Tararua Ranges. Mean rainfall across the Project area is of the order of 1100 to 1200mm per year[189], with a strong west to east increasing gradient, with higher rainfall in the hills than on the coast. There is also a tendency for greater rainfall in winter than in summer.

A brief description of the existing hydrological and stormwater features in each of the sectors is provided below.

24.2.1 Sector 1 – Raumati South

The key stormwater features in this Sector, are described and illustrated in Section 2.2 of Technical Report 22, Volume 3 and include:

- Queen Elizabeth (QE) Park Drain;
- Drain 7 south; and
- Flood storage area along Drain 7.

The main watercourse in south Sector 1 is the Whareroa Drain in QE Park which eventually flows into the Whareroa Stream. It drains part of the hillside catchments east of SH1, the railway, SH1 itself, the northeastern end of QE Park and a small partially urbanised catchment north of Poplar Avenue.

Drain 7 serves the area west of Leinster Avenue and runs north to Raumati Road where it is culverted under Raumati Road. Drain 7 has limited capacity, leading to significant flooding issues along its length all the way down to its confluence with the Wharemauku Stream near Paraparaumu Airport.

There is an area of low lying land around the Raumati wetland (adjacent to Drain 7 between Leinster Avenue and Raumati Road) that functions as flood storage area. The land northwest of this flood storage area, through to north of Raumati Road, contains sand dunes that, aside from a small marshy depression at the Raumati Road, are relatively free of flooding issues.

24.2.2 Sector 2 – Raumati/Paraparaumu

The key stormwater features in this Sector, which are described and illustrated in Section 2.3 of Technical Report 22, Volume 3, include:

- Drain 7 north;
- Wharemauku Stream;
- Wharemauku flood storage area;
- Drain 5 and Kāpiti Road; and

[189] Figures from NIWA's Water Resource Explorer (WRENZ), as of September 2011.

- Mazengarb Drain.

Drain 7 flows northwards from Sector 1, to pass under Raumati Road, through residential areas to Rata Road where it is culverted under Rata Road and then runs in an open drain through pastoral land at the foot of a sand dune formation. It is then culverted under Kiwi Road before draining into the Wharemauku Stream at the south end of the Airport.

The Wharemauku Stream is the main watercourse through Paraparaumu town centre and is fed by many smaller tributary watercourses that generally all come together in the area between the town centre and the Airport. The Wharemauku discharges to the sea at Raumati Beach, west of the Airport. Upstream of the Airport, the Stream passes through a narrow gap between sand dunes at the end of Kiwi Road, which acts to constrict flood flows so that floodwater overflows into upstream paddocks. This large open area is zoned as a KCDC flood storage area and is integral to KCDC's flood management for the Wharemauku catchment.

The residential area between Kāpiti Road and Mazengarb Road is drained by KCDC's sump and pipe network that discharges into the top of Drain 5 on the southern side of Kāpiti Road, opposite Arawhata Road. Drain 5 joins the Wharemauku Stream upstream of Kiwi Road.

The Mazengarb catchment is similar to the Wharemauku in land use, but on a smaller scale. The wider Mazengarb catchment includes the Waikanae Wastewater Treatment Plant (WWTP) and the Otaihanga Landfill (now closed). The Mazengarb Drain discharges into the lower reaches of the Waikanae River.

24.2.3 Sector 3 – Otaihanga/Waikanae

The key stormwater features in this Sector, which are described and illustrated in Section 2.4 of Technical Report 22, Volume 3, include:

- WWTP Drain;
- Landfill Drain and wetlands;
- Otaihanga Drain;
- Muaupoko Stream;
- Waikanae River and floodplain;
- Te Moana floodway;
- Wetlands north of the Waikanae River; and
- Waimeha Stream.

The WWTP drain serves a relatively small catchment upstream of the proposed Expressway and its main source of flow is the discharge from the WWTP. Downstream of the proposed Expressway, this drain passes through the southern end of a line of sand dunes and the southern end of the Otaihanga Landfill wetland complex. It then flows west through low lying rural properties before joining the Mazengarb Drain.

The Otaihanga Landfill is drained by an open channel drain that runs through a series of wetlands that have formed between bands of sand dunes. The drain then passes through private rural lifestyle properties west of the proposed Expressway and ultimately drains into the Waikanae River.

North of Otaihanga Road there is a relatively small open channel farm drain that serves a small rural catchment. The drain ultimately outfalls into the Waikanae River, much further downstream from where the proposed Expressway will cross the Waikanae River.

The Muaupoko Stream has a relatively large catchment east of the existing SH1, linking several important ecological areas along the way. Ultimately draining into the Waikanae River, the lower reaches of the Stream frequently flood the low lying farm land along its bank, which are part of the southern flood plain of the Waikanae River.

The Waikanae River is the largest watercourse along the proposed Expressway alignment. It is a large gravel and sand bed river. The River is actively managed by GWRC for flood and erosion protection purposes and gravel is intermittently extracted from the bed for construction and river management purposes. The area of the combined Waikanae and Muaupoko catchment upstream of the proposed Expressway is approximately 13,000ha of which most is located in the steep hills east of the existing SH1. The Kāpiti Coast water supply draws from the Waikanae River, upstream of SH1.

Floods in the Waikanae River rise and fall relatively rapidly due to the steep upper catchment and a flat lower catchment. The proposed Expressway crosses a relatively narrow (150m wide) point on the floodplain. GWRC's modelling has shown that flooding from the River near the proposed crossing is not significantly affected by high tides.

GWRC is responsible for managing the River and it is progressively constructing flood and river management works. GWRC's policy is to generally to maintain the main river channel so that it is kept within its preferred 35m wide corridor. For example, if the river breaks out significantly from the preferred 35m design alignment, then GWRC will act to re-train the River back into the corridor. Stopbanks and a pump station have been installed on the northern side of the River to protect the residential development along Greenaway, Kauri and Puriri Roads from flooding.

The gradient of the river flattens out as it crosses the coastal lowlands, causing deposition of sediment. GWRC has consent to remove gravel from this area, as well as to excavate the sand bar at the River mouth to avoid any restriction of the discharge to the sea.

The KCDC District Plan includes a protected floodway from the Waikanae River to Waimeha Stream, termed a "residual overflow" as this is still the route floodwater would take if the stopbanks in this location were to be overtopped or breached. The critical location for a stopbank breach in regard to any effects of the proposed Expressway is at the Chillingworth stopbank. A breach in this stopbank would flow north through residential areas arriving at Te Moana Road near to the location of the proposed Expressway crossing.

There are several significant wetlands north of the Waikanae River. To the immediate west of the proposed Expressway is the large El Rancho wetland that has no formal surface drainage outlet and is isolated in a pocket within the sand dunes. The proposed Expressway will cross the edges of two modified wetlands known as the Tuku Rakau ponds. Historically, these wetlands would have been a

single wetland complex before the land was drained and developed. These areas are now highly modified.

The Waimeha Stream is fed by a mix of natural springs and discharges from the municipal stormwater network for Waikanae Township. The Stream runs along the southern edge of a line of sand dunes that separate it from the Te Harakeke/Kawakahia wetland. Further downstream the Waimeha Stream is joined by the Ngarara Stream prior to its outfall to the sea at Waikanae Beach. The Waimeha Stream is very low lying and tidally affected as far up as the proposed Expressway crossing.

North of the Waimeha Stream is a small catchment that has not formal surface drainage outlet. It is an isolated basin in the sand dunes. Stormwater collected in this area percolates into the ground over time.

24.2.4 Sector 4 – Waikanae/Peka Peka

The key stormwater features in this Sector, which are described and illustrated in Section 2.5 of Technical Report 22, Volume 3, include:

- Ngarara Stream and Te Harakeke/Kawakahia wetland;
- Ngarara Creek;
- Kakariki Stream and floodplain;
- Smithfield Drain;
- Paetawa Drain and floodplain; and,
- Hadfield's/Te Kowhai Stream.

North of Smithfield Road, the watercourses have been highly modified and channelised as part of making the land suitable for farming. However, this area also contains the Te Harakeke/Kawakahia wetland, the largest and most ecologically significant wetland in the region. All of the watercourses between the Waimeha Stream and Peka Peka Road drain into Te Harakeke/Kawakahia. The largest of these are the Ngarara Creek, Kakariki Stream and Ngarara Stream (of which Paetawa Drain is a tributary). The Ngarara Stream continues through the Te Harakeke/Kawakahia and joins with the Waimeha Stream prior to its outfall to the sea.

Ngarara Creek drains part of the Waikanae township and its lower reaches pass through pastoral land. The proposed Expressway will cross the creek where it runs through some forestry blocks prior to discharging to the Te Harakeke / Kawakahia wetland.

The Kakariki Stream runs from the steep western slopes of the hills, through Waikanae township before passing Nga Manu Bird Sanctuary and flowing into the Te Harakeke/Kawakahia wetland. The Kakariki Stream forms an important part of an ecological corridor being developed by the community to enhance the linkages from Kāpiti Island through Te Harakeke and Nga Manu to the Tararua Ranges beyond. Surrounding pastoral land and access to Nga Manu is occasionally cut off by flooding from the Kakariki Stream.

The Smithfield Drain is a significant tributary of the Kakariki Stream. The drain generally runs parallel to the proposed Expressway, with a substantial length that will run directly beneath the proposed Expressway corridor.

The Paetawa Drain is a large tributary of the Ngarara Stream and is the main drain for the peat flats south of Peka Peka Road. Much of the low lying land on either side of the Paetawa Drain becomes inundated during floods and stores large volumes of ponded floodwater. The Paetawa Drain passes through a gap in a local dune formation that acts as a flood control, holding back floodwater and creating a floodplain.

Hadfield's/Te Kowhai Stream serves a moderately sized steep hillside catchment east of SH1. The stream runs west through rural / pastoral land to outfall at the coast to the near Peka Peka beach settlement. Gravel deposits are evident at the culvert inverts which pass the stream under both SH1 and the railway.

24.3 Hydrological and hydraulic modelling and design principles

Stormwater assessment and design for the proposed Expressway falls into three broad components:

i. Hydrology – rainfall, catchments and runoff;

ii. Hydraulics – flow, velocity, water levels and pipe sizes; and

iii. Water Quality – treatment of runoff[190].

The design process started with investigating and assessing catchments, their characteristics, determining rainfall intensities and calculating subsequent runoff quantities (flow rate and volume).

Once the hydrology of a catchment had been determined and the design flows understood, then the hydraulic design was investigated. This includes determining flood level and water depth, sizing of structures (bridges and culverts) and investigating how these behave under various scenarios.

KCDC has calibrated hydrological and hydraulic models for the majority of the catchments crossed by the Project. GWRC has a calibrated model of the Waikanae River and its flood plain. Rather than duplicating these models, the Project team reached an agreement to use both models, and to superimpose the proposed Expressway onto the existing environment as represented in these models. The models were run for the Project team by KCDC/GWRC's incumbent modelling consultants, with the details of the proposed Expressway and the modelling scenarios supplied by the Project team.

The key design storms modelled were:

- 10% Annual Exceedance Probability (AEP);
- 1% AEP;

[190] Effects on water quality are assessed in Chapter 28 of this AEE Report.

- 1.5 x 1% AEP; and,
- 0.04% AEP (Waikanae River only)

The models have also included mid-range climate change effects estimates out to 2090. These parameters are:

- 16% increase in rainfall intensity; and
- 0.8m rise in sea level.

While KCDC and GWRC have developed and used these models to set building floor levels and to quantify flood risks, the Project team were primarily interested in understanding the effect of the proposed Expressway on existing flood levels, determining the extent of any consequences and developing mitigation as required. In this respect, it is the relative difference between the pre-Expressway (existing) and post-Expressway (after) that the Project team sought to understand rather than absolute flood levels. This is why modelled water surface levels, rather than with freeboard[191] added (as per KCDC and GWRC practice), was determined to be the most appropriate method to ascertain potential hydrological effects. Appropriate freeboard was then added on a site-specific basis to meet the NZTA and GWRC standards at culverts and bridges.

The key methodologies applied to each facet of the design are summarised below:

- Where available, use existing KCDC and GWRC hydrological and hydraulic models to:
    - determine design flows;
    - determine pre and post Expressway flood levels (in both floodplains and watercourses);
    - confirm culvert/bridge waterway sizing;
    - determine the effects of proposed Expressway discharges and the efficiency of proposed Expressway peak flow attenuation;
    - determine the effects of in-fill of floodplains and size any subsequent offset storage; and
    - confirm the adequacy of proposed mitigation measures.
- All design storms to include mid-range climate change effects estimates out to 2090 in accordance with KCDC practice for the District and to allow for this increase when sizing culverts, bridges and when determining peak flow attenuation requirements – i.e. this is one part of achieving hydraulic neutrality.
- Mitigate for the effect of the proposed Expressway partially filling in existing floodplain storage – i.e. this is the other part of achieving hydraulic neutrality.
- Proposed Expressway stormwater will be treated prior to discharge.

[191] The amount of watertight surface between a given level of river water and the lowest possible entry point during flooding.

- Culverts will be designed to "fish friendly" guidelines.
- Culvert alignment and structural form will be designed to reduce the extent of culverts and disturbance of watercourses, as far as practicable.
- Where watercourses and open channel drains will need to be diverted, a "natural" stream channel cross section will be applied wherever practicable.

In order to meet the above criteria, the design process undertook to avoid adverse effects through good design wherever practicable. The potential effects are described in more detail below.

24.4 Assessment of hydrological and stormwater effects during construction

The ESCP (Appendix H of the CEMP Volume 4) provides an assessment of methods to adequately mitigate potential adverse stormwater and hydrological effects during construction.

ESC measures to manage erosion and sediment effects during construction have been designed in accordance with Wellington Regional Council and draft NZTA guidelines[192]. All sediment retention ponds have been sized based on a volume of 2% of the catchment area, length to width ration of 3:1[193], side slopes of 2:1 and a depth of 1m. Cleanwater channels and dirtywater run-off diversion channels have been based on a conveyance system that will transfer up to the 1% AEP[194] storm event to the treatment device. In addition, and to the extent practicable, ESC devices will be located outside the 5% AEP flood level.

Temporary culverts required during construction will be determined through the development of site specific CESCPs. This determination, including specific culvert sizing, will be undertaken with the endorsement of Wellington Regional Council and will be based upon stream flows and upstream catchment areas, timing and duration of works.

Methods to avoid and mitigate the release of sediment into receiving watercourses during construction are summarised in Chapter 28 of this AEE, and detailed in the Appendix H of the CEMP, Volume 4.

24.5 Assessment of hydrological and stormwater effects during operation

A summary of the potential effects associated with the operation of the Project is provided below. Technical Report 22, Volume 4, provides a detailed description of each Sector and the potential effects of the proposed stormwater design for the Project.

---

[192]Wellington Regional Council, Erosion and Sediment Control Guidelines for the Wellington Region, September 2002 (GWRC Guidelines) and the New Zealand Transport Agency, draft NZTA Erosion and Sediment Control Standard for State Highway Infrastructure, August 2010.

[193] Sediment retention pond 4 has been designed at a length to width ration of 5:1 to ensure it can be accommodated within the designation boundary.

[194] Annual Exceedence Probability.

24.5.1 Potential adverse effects

A brief summary of the potential adverse stormwater and hydrological effects is provided below:

- Increased peak flow discharge - the proposed Expressway will replace existing pervious surfaces with impervious surfaces. During heavy rainfall events, this change will result in greater peak flow rate and volume of runoff, therefore increasing the peak flow discharged to the receiving environment, and hence potentially increasing flood levels downstream.
- Watercourse crossings – culverts required for the proposed Expressway will change the form of that watercourse and potentially introduce flow (and fish passage barriers).
- Increased flood levels – from the infill of floodplains and/or from constraints resulting from culverts and bridges leading to flooding in areas that do not currently flood; and,
- Increased scour and erosion of watercourses - alteration of stream beds through the installation of culverts/bridges, diversion of stream beds and discharge from new stormwater drains can cause scouring and erosion to the receiving watercourse.

As detailed in the following section, adverse effects will be avoided through design to the extent practicable. Where avoidance is not possible, the effects of the proposed Expressway will be suitably mitigated through design.

Because of this design approach, the overall change in the environment from a hydrological perspective will be a positive one.

24.6 Measures to avoid, remedy or mitigate actual or potential adverse effects on hydrology and stormwater

The stormwater design for the Project has followed the broad principles outlined above in Section 24.3, and is consistent with NZTA's Stormwater Treatment Standard for State Highway Infrastructure.[195]

Overall, the Project design seeks to avoid and/or mitigate adverse effects and to provide an opportunity for potential positive hydrological and stormwater effects to occur. Technical Report 22 details (Project Sector by Project Sector) the proposed mitigation measures that have been incorporated into the stormwater and hydrology design to avoid and/or mitigate the potential adverse effects of the Project. These measures are summarised below.

[195] Stormwater Treatment Standard for State Highway Infrastructure (May 2010)

24.6.1 Flood effects

24.6.1.1 Peak flow attenuation

The proposed Expressway will change the existing ground surface from pervious grass/bush/scrub cover to impervious pavement, causing stormwater to run off much faster than it currently does from the same footprint.

Both NZTA and KCDC design standards require attenuation of peak flows prior to discharge in order to avoid downstream effects on flooding and watercourse erosion. KCDC refers to this as "hydraulic neutrality", meaning that areas outside the proposed Expressway are not anticipated to experience any increased flood risk from increased peak flow discharges and/or loss of floodplain storage.

The design of the Project provides attenuation of peak flows from the proposed Expressway through the use of swales and/or wetlands. These have been modelled to target restricting peak flow discharges to no more than 80% of pre–Expressway peak discharges for the 1%, 10% and 50% AEP storms, in accordance with KCDC practice.

The complex undulating sand dune topography and the linear nature of the proposed Expressway has required the modelling to focus on attenuation to areas that drain to an existing watercourse instead of at every local low point and gully in every sand dune along the alignment. This approach allows the assessment to focus on the potential effects on flooding associated with each watercourse which, in terms of assessing the overall effects, is the most important relationship to identify and understand.

The proposed swales and wetlands will provide attenuation to varying degrees, ranging from 6% to 82% of pre-development flow for the 1% AEP event. In overall terms, this attenuation will generally achieve the targeted 80%, although in some cases significantly better results will be achieved. While results in a few areas are not predicted to achieve the 80% target at this stage of the design, the final design can and will be optimised to achieve this target during later design stages of the Project.

At this stage of the design, attenuation is focused on the 1% AEP storm. Some of the proposed swales at this stage of the Project design are not currently predicted to achieve the 80% target for the other storms but this is a reflection of how the outlet orifice has been modelled rather than an actual effect. Further refinement of the outlet design will see the swales meet the target attenuation requirements.

Therefore, the proposed Expressway swales and wetlands will fully mitigate the effects of increased peak flows on flood levels.

24.6.1.2 Floodplain storage

Where the proposed Expressway crosses low-lying floodplains, it will need to be built on a low embankment to protect it from flooding. This will result in parts of the floodplain being filled in and consequently the loss of some of the volume currently available for flood storage. Without mitigation, this change would have the effect of raising flood levels in adjacent areas. In the majority of cases, this effect has been fully mitigated through the proposed provision of large areas of offset storage and in overall terms, this attenuation would have the effect of slightly lowering flood levels across the Project area.

The proposed offset storage areas will be formed by lowering local ground levels to hold more floodwater than these areas currently can. In addition, flows in the proposed stormwater wetlands and swales will act to attenuate flood flows, and reduce the need for offset storage.

The largest offset storage areas will be located at:

- Drain 7 South;
- Wharemauku Stream;
- Kakariki Stream; and
- Paetawa Drain/Peka Peka interchange.

The effect of the proposed mitigation will be an overall improvement of flood levels during the 1% and the 10% AEP storms when compared to existing flood levels.

24.6.2 Watercourse crossings

Bridges or culverts will be used where the proposed Expressway crosses watercourses.

24.6.2.1 Bridges

Watercourses of high environmental value (i.e., the Waikanae River and the Waimeha and Kakariki Streams) are proposed to be bridged in order to achieve the desired design standards to protect their environmental values.

Several large bridges are needed along the route to span watercourses and their floodplains. These bridges are designed to span the entire width of the watercourse: i.e. no piers are proposed to be located within the main channel of any of these watercourses.

The length and clearance of the proposed bridge over the Wharemauku Stream was predominantly derived from the need to accommodate a future local road underneath (the Ihakara Street extension). As a result, this structure will not adversely affect the flood flow on the Wharemauku Stream.

The Waikanae River Bridge needs to be 180m long to minimise potential effects on flooding. The works to the river channel will actually result in flood levels decreasing slightly upstream of the bridge. The outlet of the Muaupoko Stream will need to be slightly diverted in order for rock armouring to be placed around the Waikanae Bridge piers. The downstream end of the Stream will be relocated out from under the bridge to allow the re-establishment of a more natural planted stream. As the effects of this realignment will be mainly ecological and aesthetic (rather than flood related) the mitigation of these aspects is not summarised here, but is covered in Chapters 17 (Landscape and Visual), 21 (Terrestrial Ecology) and 22 (Freshwater Ecology) of this AEE.

The Waikanae River bridge design has been peer reviewed by GWRC's consultant river designer who considers that the proposed crossing position, length, freeboard and span arrangement are acceptable. The peer reviewer's recommendations have been adopted into the design.

The responsibility for the future maintenance of those areas of the Waikanae River not directly related to protecting and maintaining the new bridge structure will remain with GWRC, which will then manage them as part of its overall responsibility for the river.

The length and height of the Te Moana Interchange Bridge has been designed to clear both the road and the Waimeha Stream, as well as to provide for continuity of the residual flow path from the Waikanae River to the Waimeha Stream. Without such a long bridge, the proposed Expressway would present a barrier to the passage of flood flows potentially resulting in a breach of the Waikanae River stopbanks, which could result in significant additional localised flooding. The proposed bridge and associated floodway mitigates this potential effect and is anticipated to allow Te Moana Road to remain flood free through the proposed Interchange.

The spring-fed Waimeha Stream will be crossed by three bridges near Te Moana Road, one for the proposed Expressway itself and one for each for the two north-facing ramps. Bridges were chosen for the ramps due to the potential difficulty in realigning the Stream into culverts, and the effects on flood levels and ecological values that culverting would create.

The Kakariki Stream is an important ecological corridor. If a culvert was to be used, instead of a bridge as currently proposed, it could significantly increase flood levels or be so large as to be a bridge in all but name.

The Paetawa Drain is to be bridged primarily due to the very large peak flow that needs to pass under the proposed Expressway. A culvert was ruled out as it would need to be so large that it would, in effect, be a bridge.

Under all of the proposed bridges, the existing vegetation will no longer be able to be relied on to protect against scour of the river banks and berms. This is because the bridge decks will block direct sunshine and rainfall, thus will limit the viability of planting. In order to mitigate this effect, rock rip rap will be placed on areas under the footprint of the decks (both floodplain and waterway). Where practicable, the introduced rip rap will be inter-planted with shade tolerant vegetation species to soften its appearance, albeit to a limited degree.

24.6.2.2 Culverts

The culverts proposed as part of the Project have been sized and tested in KCDC's models. As for any structure in a watercourse, it is inevitable that there will be some effect on water levels, however small. As a result, the culverts have been sized to be large enough to have a minimal practical effect on flooding. Often the effect will be offset in an overall reduction in flood levels provided by the proposed stormwater attenuation and offset storage.

The proposed culverts have generally been aligned with the direction of the existing watercourses. However, in some cases this alignment will result in long culverts which could have adverse ecological effects (e.g. hinder and / or prevent fish passage). As a result, reduced skew (shorter) alignments will be investigated during later design stages. If implemented, this will result in a reduction of these adverse effects.

All culverts will have fish friendly design features. The larger box culverts will have “natural stream bed” features consistent with naturally occurring streams in the vicinity, while the smaller pipe culverts will have “low slope” features. In one part of the Project, the use of such culverts will restore fish passage into the wetlands west of the proposed Expressway via the Muaupoko Stream where access has been historically severed by farming practices. Due to the naturally flat topography, all culverts will have very little fall along them, resulting in relatively low flow velocity and the ability to maintain water in them in times of low flow.

The inlets and outlets will be protected from scour and erosion through rock rip rap armour and planting or by using similar means of protection.

For further details of the mitigation proposed to offset the “culverting in” of watercourses refer to Ecological Impact Assessment in Technical Report 26, Volume 3,

24.6.3 Stormwater improvements

The construction of the proposed Expressway will result in several improvements to existing stormwater management, relative to the existing SH1:

- Flat, grassed or planted swales (which have little fall in either direction) will provide for stormwater attenuation, treatment and conveyance all at once;
- The development of wetlands for stormwater treatment and flood storage purposes will provide flora and fauna habitat, attenuation and treatment. In particular, there will be an opportunity to reduce existing local flooding problems in low rainfall events in some areas by reducing high water tables. Furthermore, there is an opportunity to alleviate local flooding problems during moderate to large rainfall events as a direct result of low lying and poor draining land (for example, Kiwi Pond adjacent to the Wharemauku Stream); and,
- Offset flood storage areas will be provided by large planted or grassed areas adjacent to the proposed Expressway.

25 Groundwater

Overview

Construction and operation of the proposed Expressway will require formation of embankments with localised surcharge/preload or excavation/replacement of peat (peat treatment) that in places requires cuts below the groundwater table, construction of stormwater devices for treatment, conveyance and attenuation of run-off, and short term groundwater take for construction water supply. These activities have the potential to cause a change (lowering or rise) in groundwater levels.

Two and three-dimensional groundwater modelling has been undertaken to assess the effects of the construction (short term) and operation (long term) of the proposed Expressway on regional and local groundwater flows.

The modelling suggests that the construction groundwater take is likely to result in small changes to groundwater levels, flow directions and aquifer through-flow, but that such changes will be limited to the period of proposed Expressway construction. In the longer term the proposed Expressway embankment (and associated peat treatment) will result in very small long term changes to groundwater levels and flow directions, with no discernible changes in aquifer through-flow. Where stormwater devices are constructed at the approximate groundwater level there will be no discernible changes to the existing groundwater regime. However, where such devices are constructed above or below the existing groundwater level, and modelling indicates that without mitigation a change in groundwater level might result that would be deleterious to the existing environment, it is proposed that they are lined to reduce groundwater interactions.

The results of numerical modelling indicate maximum changes in water level of up to 0.2 m within six existing private groundwater take wells, and this level of drawdown is unlikely to have an adverse impact on existing users. However, in the event that these are very shallow, low volume wells there could be a corresponding affect on their yield and a temporary replacement supply or longer term solution may be required.

To ensure that appropriate mitigation measures are triggered in the event that actual effects differ from those predicted, a monitoring programme will be implemented prior to construction to record natural variations in groundwater levels and surface water flows. This will establish a benchmark against which actual changes recorded during and following construction can be assessed.

25.1 Introduction

This Chapter provides an assessment of the potential changes that could occur to the existing groundwater regime as a result of the construction and operation of the proposed Expressway, and comprises a summary of the more detailed assessment contained in Technical Report 21 Assessment of Groundwater Effects, Volume 3 of this AEE.

Inter-related information and assessments are also contained in the following Technical Reports in Volume 3:

- Technical Report 22 – Assessment of Hydrology and Stormwater Effects;
- Technical Report 23 - Assessment of Land and Groundwater Contamination Effects;
- Technical Report 26 – Ecological Impact Assessment;
- Technical Report 27 – Ecological Technical Report 1: Terrestrial Vegetation and Habitats (including Wetlands);
- Technical Report 35 – Assessment of Ground Settlement Effects; and
- Technical Report 36 – Geotechnical Interpretive Report.

25.2 Existing environment

The existing groundwater environment in the Project area is characterised by the following matters which are discussed in further detail below:

- Hydrogeology;
- Groundwater levels, gradients and flow;
- Groundwater use; and
- Groundwater/surface water interaction.

25.2.1 Hydrogeology

There are eight primary hydrogeological units[196] in the vicinity of the proposed Expressway. These are as follows:

Hydrogeological Unit	Description	Thickness (m)	Depth (mRL)[197]
Holocene Alluvium	Alluvial gravel deposits in and around the present course of the Waikanae River and debris deposits (alluvium/colluvium) from the adjacent greywacke hills	0 to 20 (thickest at foothills and River bed).	Surface or beneath cover of peat/sand
Holocene Peat	Fibrous woody material to amorphous, silty peat, organic silt, organic clay, organic sand	0 to 8	Surface

[196] These are broad geological types that exhibit similar hydrogeological properties and behaviours.

[197] Refers to 'metres relative level' and relates to the elevation in metres above (if positive) or below (if negative) sea level.

Hydrogeological Unit	Description	Thickness (m)	Depth (mRL)[197]
Holocene Sand	Fine to medium dune sand; coastal and inland sand dunes	5 to 30	Surface to 8
Pleistocene Sand	Sand deposits that lie below the Holocene sand boundary and include reworked dune sands, beach and estuarine sands	5 to 40	10 to -105
Pleistocene Silt/Clay	Silt and clay at depth often packed with carbonaceous leaves and wood	0 to 30	0 to -60
Parata Aquifer	Pleistocene sand/gravel and clay-bound gravel; thinning to the south and surfacing at the foothills in the north	10 to 40	-10 to -20
Waimea Aquifer	Terrestrial sand/gravel and clay-bound gravels.	5 to 40[198]	-20 to -100
Greywacke		Basement rock	0 - > -100 m

The proposed Expressway alignment passes through the Waikanae Groundwater Zone (WGZ), one of six broad groundwater management zones on the Kāpiti Coast. The key aquifers within the WGZ are the deep Waimea and Parata Aquifers. Water from both of these aquifers is abstracted by KCDC for public water supply purposes. Domestic wells generally abstract water from the shallow Pleistocene and Holocene Sands.

The construction of the proposed Expressway has the greatest potential to affect the shallow groundwater system (i.e. the Holocene Sand, Peat and Alluvium) as associated works will be largely carried out within these materials.

The Holocene Peat is variable in nature, ranging from amorphous organic silt and clay through to fibrous woody peat. Generally, the peat is more fibrous towards the northern end of the alignment, with amorphous peat dominant at the southern end of the alignment.

25.2.2 Groundwater levels, gradients and flow

Hydrographic data indicates that there is a seasonal variation in groundwater levels on the Kāpiti Coast, with the lowest water levels typically recorded in April (end of summer) and the highest levels in October (end of winter). Recorded water levels in the deeper bores in the region appear to be rising slightly, while in the shallow bores the water level trend remains generally constant from year to year.

Comparison of recorded rainfall data collected at the Waikanae Treatment Plant indicates that there is a strong correlation between changes in water level in the shallow unconfined aquifers and rainfall events, suggesting that the shallow aquifers respond rapidly to rainfall recharge.

[198] Base of layer not encountered in all boreholes (therefore may be thicker in some areas).

25.2.3 Groundwater use

Approximately 3000 domestic garden irrigation wells are estimated to be spread across the populated area included in the groundwater flow modelling undertaken for the Project. The pumping schedules, as-built details and abstraction rates for these wells are presently unknown, but they are generally thought to be between 3 - 5 m deep with each abstracting between 1 – 5 m3/day. Although the volume of each individual take is relatively small, the cumulative volume is significant (i.e. 3,000 m^3/day to15,000 m^3/day).

25.2.4 Groundwater/surface water interaction

There are a large number of surface water features within the WGZ that interact with the shallow and deeper groundwater system:

- Waikanae River – the river has a direct connection with the underlying gravel aquifer with large losses and gains to and from groundwater;[199]
- Waimeha and Wharemauku Streams – these streams have a direct connection to groundwater, being almost entirely spring-fed through shallow gravels and sands with flows of 100 - 300 l/s, and 20 - 50 l/s respectively;
- Wetlands – wetlands and lagoons have typically formed in the low lying areas between dunes where peat has been deposited and the groundwater level is very close to the surface. Wetlands are generally thought to be points of groundwater "discharge" with flows largely sustained by shallow groundwater. However, there is also evidence to suggest that many of the wetlands within the Kāpiti Coast are "recharge" wetlands fed by rainfall and run-off that has settled on the low permeability peat. Data collection and modelling carried out as part of the Project confirms that both types of wetland occur depending on the particular site conditions; and
- Drains - there are several large drains that were historically constructed to lower the water table in the area,[200] the largest being the Mazengarb Drain which is thought to discharge approximately 50 l/s of shallow groundwater into the surrounding environs.

25.3 Potential groundwater issues

The construction of the proposed Expressway has potential implications for groundwater on the Kāpiti Coast. These are outlined in further detail below.

[199] For example, a flow loss of up to 300 l/s from the river to groundwater has been calculated between SH1 and Jim Cooke Memorial Park.

[200] These are described in more detail in Technical Report 22, Volume 3.

25.3.1 Construction issues

There are a number of elements associated with constructing the proposed Expressway that have the potential to affect groundwater:

- Embankment construction:
  - Cuts below the groundwater table, some requiring short term dewatering[201];
  - Excavating and replacing peat with sand; and
  - Potentially surcharging[202] peat to accelerate ground settlement.
- Stormwater attenuation:
  - Constructing stormwater attenuation ponds;
  - Constructing swales for conveying surface run-off from the proposed Expressway; and
  - Earthworks to provide flood storage areas (cuts resulting in permanent lowering of the groundwater level and/or bunds).
- Installation and pumping of water supply wells to provide a short-term source of water for construction.

Construction of the embankments and stormwater devices, cuts and at-grade activities will be limited to the upper, unconfined groundwater system (upper marine sands, alluvium, dune sands and peat), but may result in changes (lowering or rise) in groundwater levels that could potentially result in:

- Consolidation settlement in the peat;[203]
- Reduced groundwater through flow, and groundwater levels in surface water bodies that may change ecological habitats;[204]
- Changes to direction and flow of groundwater, potentially altering contaminant migration paths;[205] and
- Reduced water levels in existing wells.

---

[201] Allowing water to seep into an open face, be collected in a sump and pumped out of an excavation for disposal.

[202] The controlled placement of fill materials that will later be removed (or partially removed) to induce settlement before a structure is constructed.

[203] This issue is discussed in Technical Report 35, Volume 3. Consolidation settlement is the lowering of original ground level resulting from the weight of a structure or additional materials applied at the surface.

[204] The significance of wetlands and potential changes to ecological habitats are discussed in Technical Report 26, Volume 3.

[205] This issue is addressed in Technical Report 23, Volume 3.

25.3.2 Geotechnical issues

25.3.2.1 Excavations in peat (construction phase):

- Dewatering of the peat over a few days may be required to allow the optimal placement and compaction of sand, but any related drawdown will be transient in nature and unlikely to extend beyond the designation.
- In areas where an upward groundwater gradient is present and the full thickness of peat is removed, 'boiling'[206] may occur in the base of an excavation potentially resulting in increased groundwater flow and instability in the excavation cut.
- Dewatering/groundwater inflow into the peat is unlikely to be uniform, with greater volumes in areas of more fibrous/woody peat and lesser volumes in areas of amorphous peat/organic silt.

25.3.2.2 Embankments on peat (construction and operation phase):

- Localised dewatering for excavation or surcharging of the peat might result in consolidation settlement.
- As the peat is not uniform in nature, vertical thickness or lateral extent it may experience differential effects in some areas; some local discharge of water may also occur due to its very high natural water content.

25.3.2.3 Deep cuts (construction phase):

- There is a possibility that perched aquifers[207] may be encountered and that local discharge may occur resulting in drainage of small volumes of groundwater.

25.3.2.4 Consolidation of peat and sand:

- Where peat is surcharged its hydraulic conductivity[208] could be reduced by a factor 1:10 to 1:1000 and result in a decrease in groundwater through-flow.
- In areas where peat is excavated and replaced with sand, the sand will have a higher hydraulic conductivity than the in-situ peat it replaces thereby increasing the rate of groundwater through-flow.

[206] Upward discharge of groundwater in the base of an excavation that resembles boiling water.

[207] A zone capable of supplying water to a well (an aquifer) that overlies a zone of dry sands and/or gravels.

[208] A measure to determine the ability of soil or rock to transmit a specific fluid.

25.3.3 Sector specific issues[209]

25.3.3.1 Sector 1 – Raumati South

The proposed Expressway passes in close proximity to the Raumati Manuka Wetland and over a significant surface drain (Drain No. 7). Key groundwater issues identified in this sector are:

- The interaction between the constructed stormwater Wetland OA and the Raumati Manuka Wetland on the opposite side of the proposed Expressway; and
- The potential for peat surcharge to reduce groundwater through-flow to the Raumati Manuka Wetland.

25.3.3.2 Sector 2 – Raumati/Paraparaumu

The proposed Expressway will pass through the Kiwi Wetland, Wharemauku and Mazengarb Streams (and their tributaries) and close to several other small wetland areas. Key groundwater issues identified in this sector are:

- The interaction between storage areas 2 and 3 and the Wharemauku Stream and the possibility that groundwater lowering may reduce the groundwater flow to the stream over a 600 m length before being re-introduced from the storage areas to the stream;
- The effect of potential groundwater lowering on aquifer systems and yield from existing wells;
- The potential for groundwater lowering to result in consolidation settlement for neighbouring residential areas; and
- The potential effects of peat treatment methodologies (for example, damming or lowering of the local water table).

25.3.3.3 Sector 3 – Otaihanga/Waikanae

The proposed Expressway alignment passes close to several wetlands of significant ecological and cultural value, most notably the El Rancho Wetlands.[210] It also crosses two significant surface water bodies, the Waikanae River and the Waimeha Stream. Key groundwater issues identified in this sector are:

- Potential interactions with the El Rancho wetland - while groundwater lowering may address surface flooding in the area, it could also potentially reduce the water level in the El Rancho wetlands and induce ground settlement; and

[209] A diagram and detailed description of each of these Sectors is included in Chapter 6 of Volume 2.

[210] Information regarding the ecological and cultural significance of these wetlands is included in Technical Report 26, Volume 3.

- The potential effects of peat treatment methodologies (for example, damming or lowering of the local water table).

25.3.3.4 Sector 4 – Waikanae North

The proposed Expressway alignment passes through the Te Kouka Wetland and between the ecologically significant Nga Manu Nature Reserve and Te Harakeke/Kawakahia Wetland. Key groundwater issues identified in this sector are:

- Peat treatment methodologies and their affect on natural wetlands (for example, the damming or lowering of these wetlands); and
- The potential effects of groundwater lowering if this is required to facilitate flood offset storage.

25.4 Investigations and groundwater modelling

In order to understand and assess the groundwater regime in the vicinity of the proposed Expressway fieldwork was undertaken that comprised:

- Ground investigations;[211]
- Groundwater level monitoring; and
- Peat excavation trials.

The data derived from these investigations was used to develop a conceptual hydrogeological model. It was also used to inform the development of two and three dimensional groundwater flow models, including their calibration. A site specific model was also developed to consider the interactions of the Otaihanga Landfill and adjacent wetlands with the proposed Expressway construction.

The three dimensional modelling was employed to evaluate the aquifer budget[212] and to assess the likely local and regional effects of the proposed Expressway construction on groundwater, wetland and river levels. The two dimensional modelling was used to assess the potential effects of embankment construction on aquifer through-flows and groundwater levels, particularly those effects associated with peat excavation and replacement or peat surcharge.

A detailed description of the groundwater investigations and subsequent modelling is contained in Technical Report 21 (Volume 3).

[211] These consisted of site investigations comprising boreholes, test pits, hand augers, cone penetration tests and standpipe piezometers.

[212] This refers to the volume of water flowing into and out of the model.

25.5 Assessment of potential construction and operational effects on groundwater

25.5.1 Groundwater levels and flow directions

Construction of the embankments, stormwater devices and cuts associated with the proposed Expressway is likely to affect the existing groundwater levels. The results of numerical modelling suggest overall that:

- Abstraction of water from construction water supply wells is likely to result in changes in groundwater level of less than 0.7 m in the shallow groundwater system within a couple of hundred metres of any wells that are used on a continuous basis. It is also likely that there will be very small associated changes in flow directions and aquifer through-flow in the vicinity of these wells. However, such changes will be limited to the construction period and recovery will occur rapidly following cessation of use;
- The embankments (and associated peat treatment) will result in small (generally 0.3 m but up to 0.5 m) long-term changes to groundwater levels and flow direction immediately adjacent to the proposed Expressway, with no discernable change in groundwater levels, flow direction or aquifer through-flow at a distance of 50 m to 70 m from the proposed Expressway;
- Where storm water devices are constructed at the approximate existing groundwater level there will be no discernible changes to groundwater levels, flow direction or aquifer through-flow;
- Where the water level maintained in stormwater devices is more than 0.5 m above or below the existing groundwater level, and modelling indicates that without mitigation a change in groundwater level might result that would be deleterious to the existing environment, the devices will be lined to avoid lowering of the groundwater level beneath and adjacent to the them; and
- Where storm water devices are constructed less than 0.5 m below or above the existing groundwater level, they are likely to result in a small (< 0.5 m) change to groundwater levels and flow direction immediately adjacent to the devices, reducing to no discernable change in groundwater levels, flow direction or aquifer through-flow beyond a distance of 200 to 300 m from the device in the worst case (upgradient of storm water storage areas 2 and 3), but typically less than 50 m.

Given the relatively small scale, magnitude and extent of these changes, it is unlikely that adverse effects on groundwater levels and flows will occur as a result of constructing the proposed Expressway. The exception is in the area upgradient of storage areas 2 and 3, where some ground settlement is expected to occur.[213]

[213] This is discussed in further detail in Technical Report 35, Volume 3.

25.5.2 Wetlands and surface waters

The results of numerical modelling suggest that overall changes to the groundwater budget are unlikely to be discernible.

Modelling undertaken suggests there will be no discernible long term effect on groundwater contributions to rivers and streams or to water levels in natural wetlands. This is due to the relatively limited extent of construction drawdown, along with stormwater ponds being lined in areas where effects might otherwise arise.

However, during construction the groundwater contribution to rivers and streams may reduce by up to 1.5% (peak) as a result of the water take. Also, groundwater that would have directly discharged to the Wharemauku Stream will instead be discharged to flood offset areas 2 and 3 before being directed to the stream. Although this is a non-consumptive take, it will result in a 17% reduction in the groundwater base flow over a 600 m length of the Stream adjacent to the pond during the construction period, and stream gauging is proposed as a mitigation measure.[214]

25.5.3 Contaminant migration

As changes in groundwater levels, gradients and flow are expected to be very small; the potential for changes in contaminant migration as a result of the Project is also very small.

Both regional and site-specific 3D groundwater modelling of the proposed Expressway in the vicinity of the Otaihanga Landfill indicate no noticeable change in groundwater levels, gradients and flow as a result of proposed Expressway construction (refer Appendix F, Technical Report 21, Volume 3). Consequently, changes in contaminant migration from the landfill as a result of proposed Expressway construction are considered to be negligible.

25.5.4 Groundwater users

The results of numerical modelling indicate maximum changes in water level of up to 0.2 m within six existing wells, and this level of drawdown is unlikely to have an adverse impact on existing users. However, in the event that these are very shallow, low volume wells there could be a corresponding affect on their yield and a temporary replacement supply or longer term solution may be required.

25.5.5 Sector specific effects

25.5.5.1 Sector 1 – Raumati South

Assuming that Wetland OA is lined, the construction of the proposed Expressway and associated stormwater devices may draw down the water table by up to 0.5 m immediately adjacent to this wetland and the Raumati Manuka Wetland. However, as the numerical modelling undertaken indicates that this

[214] Further detail is contained in Appendix I of the CEMP in Volume 4.

effect is unlikely to extend beyond a range of 20 m to 40 m from the devices, a drawdown of the water level in the Raumati Manuka Wetland is not anticipated. Monitoring will be undertaken during construction to confirm that effects are within the range modelled.

Some minor, localised seepage out of the base of Wetland OA is likely. This will raise the water level immediately below the wetland (by up to 0.5 m), but no effects are expected beyond the boundary of the wetland.

Lowering of the groundwater level around Wetland OA will also reduce the amount of surface flooding west of the alignment, therefore reducing the volume of groundwater that will discharge to Drain No. 7 in this area.

25.5.5.2 Sector 2 – Raumati/Paraparaumu

Lowering of the groundwater level associated with flood offset storage areas 2 and 3 will result in up to 0.5 m of drawdown immediately adjacent to the wetlands within this sector, with drawdown extending radially outwards for a distance of 200 m to 300 m from these storage areas. While this may help alleviate surface flooding experienced in the area, there is potential for consolidation settlement[215] of ground beneath the neighbouring residential properties to occur.[216]

Because of the upward groundwater gradient in this area (as indicated by the spring fed Wharemauku Stream and artesian water levels in deep piezometers[217]), some drawdown will also occur in the upper Marine Sand layer (up to 0.5 m directly beneath the pond) when peat is excavated from the pond footprint and the confining head is removed. In deeper layers drawdown of less than 0.2 m is predicted.

Lowering of the groundwater level around storage areas 2 and 3 will reduce the amount of groundwater which naturally discharges to the Wharemauku Stream and Drain No. 7 over a length of some 600 metres.[218] However, as the groundwater that would have naturally discharged to the stream will instead discharge to the flood offset area and be redirected to the stream further down gradient, overall down gradient flows will be unaffected (i.e. the take is non-consumptive).

Monitoring will be undertaken during construction to confirm that effects are within the range modelled.

25.5.5.3 Sector 3 – Otaihanga/Waikanae

The construction of the proposed Expressway (peat excavated and replaced with sand) may draw down the water table by up to 0.4 m immediately adjacent to the proposed Expressway, with measurable

[215] Gradual subsidence of the ground or structure due to compression of the soil.

[216] Refer to Technical Report 35, Volume 3, for a detailed assessment of ground settlement effects and associated mitigation.

[217] Instruments used to measure or monitor fluid pressure.

[218] These reductions will be in the order of 17% and 13% respectively.

drawdown (0.1 m) typically extending for a distance of less than 50 m (but up to 100 m). Drawdown of the water table beneath the adjacent natural wetlands is not expected.

Although Wetland 9 will be constructed with a low permeability liner in order to limit interactions between the wetland and groundwater level, some very small changes in groundwater level are expected. Immediately adjacent to constructed Wetland 9 a maximum drawdown of 0.3 m is likely, reducing to less than 0.1 m at a distance of 20 m to 30 m.

As changes in groundwater level are of limited magnitude and extent, there is no measureable change to the volume of groundwater that naturally discharges to the Waikanae River in this area.

Monitoring will be undertaken during construction to confirm that effects are within the range modelled.

25.5.5.4 Sector 4 – Waikanae North

As the alignment in this sector is largely above the groundwater level, the effects on water levels in the adjacent Te Kouka Wetland, Nga Manu Nature Reserve and Te Harakeke/Kawakahia Wetland are expected to be negligible.

Large flood offset storage areas are proposed near Kakariki Stream, but these are planned to be at or above groundwater level and will therefore have little effect on the groundwater system. A system of drains proposed north of Ngarara Road will also result in local lowering of the groundwater level, which may result in consolidation settlement affecting existing SH1 and the railway embankment. The final design solution for this area is yet to be determined.[219]

25.6 Measures to avoid, remedy or mitigate actual or potential adverse effects on groundwater

Measures to address the groundwater effects identified in Section 25.5 comprise monitoring in addition to a range of mitigation strategies. While a detailed outline of these measures is included in the CEMP Appendix I, Volume 4, they are summarised below.

25.6.1 Monitoring

Monitoring of groundwater levels, ground surface elevations (settlement) and surface water flow is proposed for a period of 1 year prior to and 3 years following construction. The purpose of undertaking this monitoring is to confirm the results of predictive modelling and to refine models if early monitoring indicates that actual behaviour differs from that predicted.

Monitoring will also serve as a trigger to initiate more comprehensive monitoring and / or implementation of mitigation measures if required.

[219] Refer to Technical Report 22, Volume 3, for further discussion on hydrological and stormwater effects and associated mitigation.

To facilitate this process a groundwater monitoring programme (GWMP) has been prepared as part of the CEMP (in Volume 4) comprising:

- Standpipe piezometers (single and paired) in proximity and at distance from the proposed Expressway to monitor changes in groundwater levels as set out in Appendix A of the GWMP;
- Baseline monitoring data taken in advance of works to obtain information on seasonal and annual variations (this has been underway since November 2010);
- Flow meters or continuous flow monitoring of key surface water features to provide additional data for groundwater model calibration at detailed design;
- Monitoring of key indicators of mobile contaminants in selected bores down gradient and below landfills (as detailed in Appendix K – Contaminated Soils and Groundwater Management Plan, CEMP, Volume 4);
- Monitoring groundwater elevation;
- Monitoring of spring flows at Te Puna o Rongomai;
- Establishing various trigger levels (Alert and Action) with appropriate remedial action plans if those trigger levels are reached; and
- A system of review to determine at what stage monitoring can be reduced or cease post-construction.

25.6.2 Mitigation

In the detailed design of the proposed Expressway the following strategies will be applied to mitigate potential effects on groundwater:

- Lining and other refinements to the design of large stormwater devices where they involve excavations below the water table and modelling indicates that, without mitigation, a change in groundwater level might be detrimental to the existing environment; and
- Optimising construction activities, including where practicable:
    - Drilling a larger number of construction water take wells spread out along the prosed Expressway alignment, with each taking a small volume at different times depending on the construction programme rather than relying on fewer wells pumping continuously at higher rates;
    - Limiting the open length of excavation to reduce the area and period of any dewatering; and
    - Using the starter layer in embankment construction as a drainage blanket to minimise damming effects up-gradient of surcharged peat.

In addition, the following strategies commonly used during the construction phase of works will be considered to reduce the amount of drawdown and associated effects should acceptable levels of drawdown be exceeded:

- Responding appropriately to any information obtained from monitoring groundwater elevation, flow and quality;
- Altering the excavation methodology to reduce the period of time that excavations are drained;
- Altering the peat treatment methodology to balance drawdown / damming effects;
- Using active drainage measures beneath embankments (e.g. pipe) to facilitate flow through the embankment;
- Redirecting treated surface water to wetlands or surface water bodies;
- Where private water supply wells are affected, tankering water from construction wells to users or deepening wells to increase the available drawdown; and
- Controlling the recharge of groundwater to limit the amount of drawdown.

Appropriate mitigation method(s) will be selected by NZTA at the time that the need for further mitigation is identified, with the method selected dependent on the nature, extent and location of the exceedance.[220]

[220] Refer to Appendix I of the CEMP in Volume 3 for further detail regarding proposed mitigation.

26 Ground settlement

Overview

Potential ground settlement associated with the construction and operation of the proposed Expressway has been estimated. Potential sources of settlement considered include:

- direct loading within the construction footprint from the road embankments,
- groundwater drawdown associated with the modification of the foundation materials below the road embankments,
- groundwater drawdown associated with new stormwater features,
- retaining walls, and
- vibration.

Key geotechnical considerations for settlement potential are the presence of peat deposits, and the thickness and nature of them. The potential effects of the estimated settlement on existing buildings, services and transport infrastructure have also been assessed and are set out in Technical Report 35, Volume 3, Assessment of Ground Settlement Effects, and associated Plan Sets in Volume 5. Key conclusions are:

- The predicted risk settlement effects on residential buildings are assessed to be low.
- The predicted risk of settlement effects on commercial and industrial buildings are also identified as negligible. It is proposed that for buildings in close proximity to the proposed Expressway, individual assessments of potential settlement effects will occur during detailed design.
- The predicted risk of settlement effects on services beyond the Project footprint is assessed as being low. The services located outside the proposed earthworks extents are likely to be subject to relatively small changes in grade and horizontal strain. Discussions are on-going with all of the service providers to seek to ensure that appropriate circumstance specific solutions are used. Services located below the footprint and founded above the base of the peat deposits will require relocation or active protection due to either the predicted settlement effects or physical construction works.
- The predicted risk of settlement effects on local roads has been assessed as low.

A settlement monitoring regime is proposed which will utilise a method for measuring the actual occurrences of settlement and resulting effects. The monitoring will include building condition assessments for structures within a conservatively assessed corridor, together with measurement and reporting of ground settlement and groundwater levels and the results against trigger levels. Further mitigation measures can be implemented should the measured settlement or its effects require it.

26.1 Introduction

Potential ground settlement associated with the construction and operation of the proposed Expressway has been calculated, and an assessment of the expected effects of this settlement on existing buildings, services and transport infrastructure was undertaken.

The Project incorporates design elements to address the potential for ground settlement effects. A monitoring regime is proposed and there are mitigation measures available that can be implemented should the measured settlement or its effects require it.

Technical Report 35 Assessment of Ground Settlement Effects (Volume 3) and the Ground Settlement Effects Management Plan in Appendix J of the CEMP (Volume 4) inform this Chapter. This assessment relies in part upon modelling of groundwater effects and so should be read in conjunction with Technical Report 21 (Volume 3).

26.2 Existing environment

The consideration of the existing environment in this Chapter focuses on ground conditions that may result in ground settlement, and the structures that may be impacted by such settlement.

The proposed Expressway route traverses the sand dune and swamp deposits of the Kāpiti coastal lowlands. The sand dunes form areas of higher relief, rising to around 20m in elevation, between the intervening low lying areas. These low lying areas and depressions are located a few metres above sea level and typically contain peat deposits. The dune sands are often inter-laced with peat deposits, where the dune sands have in places advanced over the swampy ground.

Low lying terraces of recent river and fan alluvium are located adjacent to the Waikanae River.

The predominant characteristics of the existing environment by Project sector are:

Sector 1 – Raumati South

From south of Poplar Avenue to just north of Raumati Road, the topography is fairly low lying, comprising peat and/ or organic silts overlying Holocene alluvium and sand, and Pleistocene gravel at depths of 5 to 10m below ground level until chainage 4000 of the proposed Expressway, where dunes of around 15m height overly the Pleistocene sand and gravel. The peat deposits in Sector 1 are typically described as silty peat, with some organic silt, and vary in thickness from 1.0 to 3.5m.

Sector 2 - Raumati/Paraparaumu

From north of Raumati Road to north of Mazengarb Road, the topography is undulating. The route crosses dunes which reach up to 15m in height, with lesser amounts of lower lying inter-dunal areas in between. It appears that much of this sector of the road corridor preserves a remnant of what was a larger dune field which has undergone extensive earthworks for residential development in Paraparaumu.

The geology generally comprises Holocene sand (dune), overlying Pleistocene sand, with peat and organic silt in low lying areas. The peat deposits in Sector 2 are typically described as silty peat, with some organic silt and vary in thickness from 1.0 to 3.5m. It is understood the peat deposits have been excavated from below the newer subdivisions and replaced with sand. Anecdotal evidence suggests that this is the case west of the proposed Expressway between Milne Drive and Mazengarb Road.

Sector 3 - Otaihanga/Waikanae

From north of Mazengarb Road to north of Te Moana Road, the topography is undulating, with the route passing over dunes (which reach up to 20m height) and lower-lying inter-dunal areas.

The geology generally comprises Holocene sand (dune) overlying Pleistocene sand, with peat and organic silt in low lying areas. Toward the centre of this sector, the Waikanae River cuts through the route east-west with associated low-lying alluvial terraces on either side. Geology at depth beneath the Waikanae River area comprises very dense Pleistocene gravel, and some Pleistocene silt. The peat deposits in Sector 3 are typically described as organic silts and sands, and vary in thickness from 1.0 to 2.5m.

Sector 4 - Waikanae North

From north of Te Moana Road to Peka Peka, the topography is undulating, dominated by dunes until Smithfield Road, east of which the route flattens out.

The geology comprises Holocene (dune) sand overlying Pleistocene sand and at depth, Pleistocene gravel. Beyond Smithfield Road there are areas of peat and organic silt in low lying areas, particularly north of chainage 15600 of the proposed Expressway. From chainage 16200 to 16700 the alignment crosses the Hadfield Fault. The peat deposits in Sector 3 are typically described as silty peat, with some organic silt and vary in thickness from 0.5 to 4.5m.

Built Environment Features

The main features of the existing built environment that are relevant to ground settlement effects are buildings, services and transport infrastructure.

In general, the land use adjacent to the proposed Expressway is a mix of urban residential and rural in nature. As part of the general development of the Kāpiti Coast, the ground conditions have been modified in some areas. Rural farming and lifestyle properties are located between Otaihanga Road and the Waikanae River, and north of Te Moana Road. Elsewhere the land use is primarily urban residential with some commercial development on Kāpiti Road.

Commonly adopted urban development techniques have included excavation of the peat and replacement with dune sand to provide adequate foundations and excavation of the sand dunes to provide a fill resource. The construction of surface drainage networks in the past has increased the productivity of the land. The techniques proposed to construct the proposed Expressway are consistent with these activities, and the resulting ground settlement effects are known and widespread in the Project area.

The majority of residential buildings have been built over the last 50 years with a number of newer subdivisions. There are commercial and light industrial buildings in the Paraparaumu town centre near the proposed Expressway alignment. These are typically two storey portal frame structures.

The Kāpiti Coast District Council (KCDC) Wastewater Treatment Plant and the Waikanae Christian Holiday Park (El Rancho) are adjacent to the proposed Expressway and have been specifically considered in this assessment.

There are multiple services crossing or in close proximity to the proposed Expressway alignment. These services are typical of residential areas, and include water, wastewater and stormwater networks, electricity and gas distribution and telecommunications.

The Vector Gas Transmission Pipeline Corridor crosses the proposed Expressway alignment at several locations within a 1.6 km stretch north of the Waikanae River.

The proposed Expressway passes under the Transpower Bunnythorpe to Haywards A and B 220kV Transmission Lines north of Smithfield Road.

The proposed Expressway crosses the existing local road network at nine locations, including secondary arterial roads. There are also local roads that are in close proximity to the proposed Expressway. The existing local roads are generally two lanes (one lane in each direction) and are finished with a chipsealed surfacing.

The North Island Main Trunk (NIMT) Railway line runs roughly parallel with the existing SH1. At the southern and northern extents of the proposed Expressway, the NIMT is located on an embankment to the east of the existing SH1. There are no proposed crossings of the NIMT.

26.3 Methodology

The methodology used to assess potential settlement effects incorporated an assessment of the four potential sources of settlement associated with the construction and operation of the proposed Expressway.

The settlement associated with the proposed Expressway will predominantly result from consolidation of the peat deposits, which will occur due to direct loading from the new road embankment, as well as by the lowering of the groundwater as a result of altering the embankment foundation materials, new stormwater features and construction activities.

The likely extent of ground settlement resulting from the Project is determined by superimposing, as applicable, settlement caused by the various sources. These are as follows:

Consolidation of the ground due to the construction of the embankments

This potential source of settlement is time dependent and represents by far the largest component of predicted ground settlement. Such settlement will occur beneath and for a small distance beyond the earthworks embankments where they are constructed on peat. As a result, they primarily affect the completed highway pavement and any services buried within the underlying peat.

Consolidation settlement is directly related to the embankment height and to the nature, thickness and permeability of the peat. Most of this movement will occur during construction, with on-going secondary compression (creep) settlement continuing at a reducing rate through the operation (i.e. after the proposed Expressway is in use). Up to 1300mm settlement is calculated to occur beneath the higher embankments where they are underlain by several metres of peat.

Calculated settlement beyond the earthworks footprint range from 0mm to 20mm, and extend up to approximately 10m from the embankment toe.

Consolidation of the ground due to lowering of the groundwater

The lowering of the groundwater level will result in consolidation of the peat deposits over time. This will occur due to the change in material permeability below the proposed Expressway and at some of the unlined stormwater features. Lowering of the groundwater level will occur as a result of excavation, which may be either temporary (for example, short-term undercutting to remove peat from beneath the embankment footprint) or long term around excavated stormwater ponds.

This form of settlement is also time dependent and extends beyond the earthworks footprint. It is predicted to be much smaller in magnitude than the movement resulting from embankment loading, typically reducing to 12.5mm within 70m of the embankment toe.

Mechanical settlement

Mechanical settlement will occur as a result of the new retaining walls and construction vibration. Mechanical settlement will occur in the dune sands and in close proximity to the source of vibration, and due to this mechanical settlement due to retaining walls and due to vibration have been considered independently. Consolidation settlement is predicted to be significantly larger, in both magnitude and extent, compared to mechanical settlement.

Mechanical settlement of the ground due to the movement of retaining walls

Lateral movement of embedded retaining walls (as the ground is excavated in front of them) results in localised settlement of the ground above.

This form of settlement occurs relatively quickly, during and immediately following wall construction.

Mechanical settlement of the ground due to vibrations

Vibration is used in construction to densify sandy or gravelly soils. This densification results in immediate settlement of the ground surface extremely close to the vibration source.

Vibration resulting from general construction activities, and from traffic on the completed Expressway, is not expected to generate sufficiently high shear stresses to cause ground settlement. Consequently, vibration induced settlement is predicted to be confined to the construction footprint and is essentially “built out” by the construction operation.

26.3.1 Elements of ground settlement analysis

Compression Parameters

The geotechnical compression parameters used to predict consolidation settlement in the peat deposits have been derived from available laboratory data, in situ testing and a number of field trials, as well as from historic data. These information sources are detailed in Technical Report 36, Volume 3.

Soil Profiles & Cross Sections

The soil profile was analysed based on an assessed peat thickness for each specific reference cross-section location. The groundwater level was modelled at 0.5m below the existing ground surface at all locations to represent reasonable long-term average conditions.

The reference cross-sections were selected to be representative of the varying peat thicknesses and peat treatment methodologies for the new road embankment. In addition, the cross-sections cover the new stormwater treatment ponds and flood storage areas that may result in lowering of the groundwater level, as identified in Technical Report 21, Volume 3.

Embankment Settlement Methodology

Consolidation settlement resulting from direct embankment loading has been analysed.

Groundwater drawdown settlement methodology

The predicted groundwater drawdowns are based on 2 dimensional groundwater modelling, with the extent of drawdown predicted from the regional 3 dimensional groundwater model.

There are a number of proposed stormwater features along the proposed Expressway alignment, including treatment ponds and offset flood storage areas. Detailed 3-dimensional models have been used to predict the groundwater lowering at the key stormwater features.

The sensitivity of the settlement predictions to a number of variables has been considered, including the unit weight of the peat deposits, existing groundwater levels and initial building surcharge.

Retaining Wall Settlement Methodology

Vertical settlement will occur behind the retaining walls as a result of lateral movements. These lateral movements will arise as the retaining wall is loaded, including during construction, and by excavation in front of the wall and backfilling behind the wall. These settlements have been assessed.

Vibration Settlement Methodology

Construction stage vibrations will be generated by earthworks, the installation of ground improvement (stone columns) and piling. The assessment of vibration effects is detailed in Technical Report 18, Volume 3.

Mechanical settlement of loose sand deposits may occur due to construction stage vibration. The potential settlement is expected to be of relatively small magnitude and is anticipated to occur in extremely close proximity to the vibration source. It is therefore not expected to occur outside the proposed Expressway footprint. This settlement does not occur concurrently with the settlement from other sources. As such, the vibration settlement is expected to have a negligible effect and has not been considered further. The vibration settlement and subsequent effects on the built environment are expected to be significantly less than the direct vibration effects. The management of the vibration effects are detailed in CEMP Appendix F, Volume 4.

Combination of Settlement Predictions

Predicted total consolidation settlement has been calculated based on a combination of both embankment and groundwater drawdown settlement. The settlement from each source has been superimposed by adding individual values at the same points across each cross-section. The extent of vibration and retaining wall settlement is considerably more localised in extent than for the embankment and groundwater drawdown consolidation settlement.

26.3.2 Methodology for assessment of effects

Buildings

The method described by Burland (Burland, 1997) is used to assess the effects of settlement on buildings. The concept of Limiting Tensile Strain enables a classification of the expected severity of damage of an “idealised” building at each location where vertical and horizontal ground movement data is available.

All buildings will exhibit a degree of restraint against a bending action imposed by the ground and this restraint will be a function of the building stiffness and continuity. For this reason, the effects of an assessment using the method described by Burland can generally be taken as conservative.

No buildings have been identified that lie within an area where the settlement modelling estimates greater than “negligible” effects (i.e. damage category 0).

The building damage category has been specifically assessed, based on the predicted settlement contours, for the following buildings and structures:

- Commercial and industrial buildings,
- KCDC Wastewater Treatment Plant buildings and structures,
- Waikanae Christian Holiday Camp (El Rancho),
- All buildings within 10m of the proposed Expressway.

The buildings within the expected area of effects have been visually assessed to determine the structural form and susceptibility to settlement.

Services

Existing Service Plans have been prepared from as-built records provided by the service providers (refer Drawings M2PP-AEE-DWG-GT-SE-200 to 232 in Appendix I). Collection of further information on the construction of the services and existing condition investigations are on-going.

Services directly impacted by the proposed Expressway will need to be protected or relocated, either temporarily or permanently. NZTA is working with the service providers and their representatives to seek to ensure appropriate solutions are used.

In addition, the Vector Gas Transmission Pipeline Corridor and the Transpower Bunnythorpe to Haywards A and B Transmission Lines have been considered specifically.

Modelling Uncertainties

There are a number of inherent uncertainties within the settlement predictions. While a conservative approach has been adopted there remains a risk that actual settlement will exceed the predicted values. If the predicted values are exceeded, the dwellings with the greatest potential to be affected by settlement are:

- Dwellings within 20m of the proposed peat treatment extents,
- Dwellings adjacent to new stormwater features with predicted groundwater drawdown of greater than 0.2m, and
- Dwellings in areas where the predicted settlement is greater than 12.5mm, including (as a precautionary measure) 10m beyond the predicted 12.5mm settlement contour.

These dwellings are proposed to be inspected prior to construction commencing to identify any pre-existing defects or sensitive features. For the more vulnerable building construction types, individually assessed during detailed design, considering the specific structural foundations and soil conditions.

26.4 Assessment of construction effects on ground settlement

This section presents the assessment of effects beyond the earthworks footprint based on the estimated settlement occurring from the construction phase onwards. The impacts on the main features of the existing built environment have been assessed, including buildings, services and transport infrastructure.

Plans showing the area of expected effects are provided in Technical Report 35 Assessment of Ground Settlement Effects in Volume 4. The predicted settlements are generally less than 25mm beyond the edge of the earthworks. In areas of deeper peat deposits (3.5 m thick and above), the predicted settlements are in the order of 25 to 50mm up to 20m from the earthworks footprint, reducing to less than 25mm beyond this.

Based on these relatively small estimated levels of settlement, the assessed effects on the existing buildings, services and transport infrastructure adjacent to the proposed Expressway are expected to be low.

The actual settlement and associated effects will be monitored to confirm this assessment, as detailed in the CEMP Appendix J, Volume 4.

26.4.1 Effects on buildings

The predicted groundwater lowering, from both the embankment construction and localised stormwater features, and the resulting consolidation settlement extend a distance from the proposed Expressway. Potential settlement effects on dwellings and other buildings in the Project area have been assessed. This assessment ignores the (commonly beneficial) interaction between building foundations and the ground, and is consequently considered to be conservative. The actual risk of damage is therefore likely to be less than the assessed damage category. All buildings assessed fell in Damage Category 'negligible' described as hairline cracks at worst. As a result, the potential ground settlement effects on buildings are assessed as being low.

At the KCDC Wastewater Treatment Plant, the settlement is estimated to be less than 12.5mm, based on limited geotechnical investigation data at this site. Accordingly, there is the potential that the actual settlement is greater than the predicted. There are a number of sensitive buildings and structures, including concrete tanks and pipe network that have the potential to be affected by settlement. Therefore, a detailed assessment of these structures is proposed, including confirmation of the structural forms and soil conditions across the site.

The Waikanae Christian Holiday Camp is not within the area of predicted settlement. Assessment has been undertaken however for buildings on this site identified as sensitive to differential movements. It is proposed that these be inspected prior to construction commencing to identify any pre-existing defects or sensitive features and again following completion of construction.

For the commercial and industrial buildings that have been identified based on the proximity to the alignment and the potential sensitivity of these structures to settlement effects, individual assessments will be undertaken during detailed design to confirm the assessed 'negligible' Building Damage Category.

26.4.2 Effects on services

Services may be impacted by settlement due to potential changes in grade and horizontal strain (i.e. elongation). The sensitivity of a service to these changes is dependent on the type of service, construction material, joint type and the age and condition of the service. The predicted total settlement contours have been combined with the as-built service drawings where available to show the potential settlement effects on the services (refer Drawings M2PPAEE- DWG-GT-SE-200 to 232 in Appendix I of the CEMP).

The services that are located below the footprint and founded above the base of the peat deposits will require relocation or active protection due to either the predicted effects of settlement or physical construction works. The services located below the peat deposits or in areas where peat deposits are not present will not be affected by settlement resulting from the Project.

The services located outside the proposed earthworks extents are likely to be subject to relatively small changes in grade and horizontal strain, as indicated on the settlement effects plans provided with Technical Report 35. Discussions are on-going with all of the service providers regarding the existing condition of their assets, their ability to tolerate the predicted settlement values and monitoring and mitigation options. Many of the services require relocation and or active protection measures regardless of the estimated settlement effects.

Vector Gas transmission pipeline corridor and delivery point station

The Vector Gas pipes are to be relocated as part of the Project. The Project team and Vector Gas are currently assessing the relocation options and likely timing of these works. Any potential settlement effects will be addressed as part of the relocation design.

Transpower Bunnythorpe to Haywards A and B Transmission Lines

Transpower transmission towers are located in close proximity to the edge of the proposed Expressway. The tower foundations are expected to be founded on sand deposits based on historical construction methods. Therefore, settlement effects are expected be negligible.

The Project team is in on-going discussions with Transpower, as some of the towers may require either foundation strengthening or relocation as a result of the proposed physical works.

26.4.3 Effects on transport infrastructure

Local road network

The effects of the predicted settlement and subsequent changes in road gradients have been assessed for the road network. The effects on the local roads outside the proposed construction designation are assessed as negligible, with all changes in grade less than 1 in 2000.

Appropriate monitoring and mitigation measures will be undertaken as part of the proposed Expressway detailed design.

North Island Main Trunk (NIMT) railway

The NIMT Railway is not within the area of predicted settlement. Therefore, the potential for a settlement effect on the railway line is considered to be negligible. The proposed settlement monitoring will be used to confirm that no detectable settlement extends to the railway.

Preconstruction and Construction Reporting and Actions Arising

Ground settlement monitoring and resulting effects will be reported to GWRC and KCDC. Preconstruction monitoring will be carried out and reported prior to the start of construction. This monitoring data will be factual in nature, with assessment only required for anomalous results. The report will form part of the input for the construction phase assessments.

The monitoring data will be processed and compared to the design analyses. Once construction starts, the data will be used to reassess the building damage categories and these categories will then be compared to the results in the settlement assessment report. The effects on services will also be assessed from the settlement gradients. If the reassessment indicates that the damage category has increased by a significant amount, then additional analyses or more frequent monitoring may be required and the affected buildings identified for potential mitigation work. Similarly, an increase in estimated effects on the services will require additional review and potentially amended monitoring and mitigation.

Consideration may also need to be given to modifying the construction approach to reduce ground settlement, if groundwater drawdown is greater than expected due to ground excavation.

Reporting will be determined by the stage of construction and actual results. During the active construction stage it is anticipated that initial internal review of monitoring results will take place shortly after receipt of the processed data. As long as the results show no significant anomalies or assessed significant increased risk to buildings, these monitoring results would be presented on a quarterly basis.

If there are any significant anomalies or significantly increased risk to buildings, then, following a more detailed review of the data, the owners and occupiers of those buildings would be notified and mitigation measures determined. The results of this more detailed work and the outcomes, along with the proposed way forward would then be reported.

26.5 Assessment of operational effects on ground settlement

Monitoring of the actual ground settlement and the resulting effects will be undertaken to confirm the estimated settlement and the predicted effects of the settlement. The majority of settlement beyond the footprint is expected to occur during the construction phase, with little additional settlement occurring during the operational phase.

Groundwater monitoring will be carried out for a defined period to confirm the predicted groundwater drawdown, which has been used to estimate the settlement.

Post- construction Reporting and Actions Arising

Ground settlement monitoring and resulting effects assessment will be reported to GWRC. The post active construction stage results (quarterly and six monthly) will be reviewed and reported shortly after receipt of the processed data.

Where any significant anomalies or after assessment significantly increased risk to buildings occurs, then the reporting will follow the process as described for the active construction phase.

26.6 Monitoring

Monitoring is required prior to construction, during construction and immediately following construction to provide a comprehensive assessment of effects. The measured settlement and resulting effects will be compared with the predicted values. The settlement predictions will be calibrated as the monitoring results become available and the assessment of potential effects updated.

The settlement monitoring set out in Technical Report 35, Volume 3, extends beyond the earthworks extent and the expected area of resulting effects.

Groundwater monitoring will also be carried out to confirm the predicted groundwater drawdown, which has been used to estimate the settlement.

The monitoring will be used to refine the settlement predictions. The results will serve as a trigger to require more comprehensive monitoring and/ or implementation of mitigation measures if required.

Table 26.1 sets out the proposed survey monitoring regime.

Table 26.1: Survey Monitoring Regime

Project Phase	Survey Monitoring Frequency of Framework Marks Vertical Survey Monitoring
Preconstruction	Monthly for 12 months
During Construction	Quarterly
During Active Construction	Monthly
Post Active Construction (1)	Quarterly for 6 months, reducing to half yearly for 3 years post-construction.
'active construction' can be defined as: ■ Starting when earthworks commence within 500m of a particular location and ending when pavement construction is complete at that location, and ■ Starting when excavation in front of a retaining wall comes within 50m of a section and ending when the permanent wall supports are in place beyond a distance of 50m.	

If the monitoring results indicate the movements are outside the expected range, or if there are other reasons for concern, then the monitoring frequency and / or extent can be increased to cover those areas of concern.

Services monitoring

In addition to the survey marks monitoring, CCTV inspections of some stormwater and wastewater services will be carried out to assess the effects of the settlement. As the construction progresses, additional CCTV inspections may be carried out depending on the results of the survey monitoring and feedback from service providers.

For other services identified as being susceptible to damage or particularly critical, visual inspections may be undertaken by excavating to expose the service if required.

26.7 Managing unanticipated ground settlement effects

The Project is predicted to give rise to negligible actual or potential adverse settlement effects beyond the construction footprint. In the unlikely event that unanticipated adverse effects arise beyond the construction footprint then measures outlined in Table 26.2 can be put in place.

Table 26.2: Methods to Manage Ground Settlement Effects

Actual or Potential effect	Possible method to avoid, remedy or mitigate potential effect
Road embankment settlement contingency measures If the actual settlement beyond the earthworks footprint are of greater magnitude than predicted and/ or extend further beyond the footprint affecting local roads	▪ Change the ground improvement approach where the proposed Expressway is constructed over peat deposits by interchanging treatment methods of: – Excavate and Replace or – Preload and Surcharge. ▪ Locally modify the ground improvement approaches such as a load transfer platform combined with foundations, to avoid excavating or loading the underlying peat. ▪ Reduce the embankment footprint over localised areas. This may be achieved by using geogrid reinforcement to allow steepening of embankment slopes, to increase the distance between the construction activity and the sensitive items.
Groundwater drawdown settlement contingency measures Lowering of the groundwater level will occur due to construction of the road embankment and at unlined stormwater features. In addition, short term ground water lowering will occur due to temporary excavations. If the actual settlement are beyond modelled levels, the groundwater drawdown contingency measures are detailed in Section 4.1 of the GWMP (Appendix I of the CEMP) and summarised in the next column.	▪ Change the construction methodology, including: – Alternative peat treatment – Lining (temporary and/ or permanent) of cuts below the groundwater level – Limit the length and drained duration of temporary excavations – Local cut off (clay bund or slurry wall) – Recharge trenches/ walls.
Retaining wall settlement contingency measures Lateral movement of embedded retaining walls (as the ground is excavated in front of them) will result in localised settlement of the ground above. These settlements occur relatively quickly, during and immediately following wall construction. Potentially the retaining wall deflections could exceed the anticipated limits.	▪ Review of the design undertaken to assess the increased load in the piles. If required, the following actions may be taken: – Remove surcharge close to the wall – Place a berm in front of the wall – Reduce the extent of temporary over excavation in front of the wall – Install additional or stiffer piles – Install props or ground anchors
Building damage repair measures *Non-structural effects* If the proposed Expressway works result in building damage	▪ General repairs required. These repairs may include repointing of brickwork, repainting and redecorating. ▪ If cases are more severe, repairs may require some partial re-building work. This is considered highly unlikely. The timing of such repairs would depend on the stage of construction, the building owner's preference and the degree of damage.

Actual or Potential effect	Possible method to avoid, remedy or mitigate potential effect
Building damage repair measures *Structural effects* The settlement effects assessment has not identified any buildings with a Building Damage Criteria of greater than 'negligible'. As such, structural building damage is highly unlikely and not envisaged on this Project. However, it is theoretically possible that effects of a structural nature could be identified during the course of the monitoring programme	■ A detailed evaluation undertaken by a Structural Engineer and recommendations for repair and an increased level of monitoring arising from this evaluation will then be implemented. ■ If an extreme case arose where local repair or re-construction was not sufficient, then additional measures such as underpinning or strengthening might be required.
Services repair measures Services located below the footprint and founded above the base of the peat deposits	■ Relocation or active protection due to either the predicted settlement effect or physical construction works. ■ These works determined with the service providers prior to Project works commencing.
Services repair measures The services outside the earthworks extents will be monitored. If this monitoring indicates damage may have occurred measures available to mitigate damage to services would depend on the type of service, location and severity of the damage and discussions with the service provider.	■ Undertake detailed investigation of the area and affected services. Include detailed examination of the site, and coordination with the relevant service providers to ascertain what effects their network is experiencing, and assess what remedial action is required. Any remedial works will be carried out as soon as practicable. If the investigation revealed no immediate damage, the services would continue to be monitored closely until all parties were satisfied no damage had occurred. ■ Permanently divert the service through another nearby service and abandon the original service line (the capacity of the nearby service would need to be checked). ■ Temporarily divert the service and repair the original service. ■ Expose the service and undertake a repair. ■ Replace the service. In cases of severe damage, a length of the service might be replaced.
Transport infrastructure repair measures The potential for settlement effects on the local roads outside the proposed construction designation is assessed as negligible, with the predicted changes in grade being relatively small. However, settlement might result in grade changes and differential movements and the measured effects might be greater than anticipated.	■ Overlay the road surface to raise to the previous level and re-shape any differential movements. ■ Reconstruct the kerb channels and footpaths to mitigate changes in grade and/ or differential settlement. ■ Install additional drainage if new areas of ponding are identified.

27 Land and groundwater contamination

Overview

This Chapter assesses the potential effects of the proposed Expressway on identified areas of contaminated land with the Project area. The contamination assessment has identified areas of soil and groundwater contamination along proposed Expressway alignment to determine the potential environmental effects of the Project. The involved the investigation and assessment of soil, surface and ground water contamination, human health risk to the general public and construction workers and soil classification for re-use or disposal.

The contamination assessment identified four existing sites along the proposed Expressway alignment that have the potential to affect human health and the environment within the Project area.

Based on investigations undertaken as part of the contamination assessment, human health guidelines were exceeded at 55 Rata Road (a site previously used by a transport operator where hydrocarbons were stored on site in bulk quantities). Human health guidelines were not exceeded at the Kāpiti Road Interchange (potential for illegal dumping), 124-154 Te Moana Road (horticultural activities) or 160 Otaihanga Road (Otaihanga Mountain Bike Park, formerly the Otaihanga Landfill).

The disturbance and/or use of contaminated land identified through the contamination assessment has the potential to affect human health and the receiving environment during construction and operation of the proposed Expressway. The potential adverse human health and environmental effects will be mitigated by measures including:

- Employment of a contaminated land specialist during construction;
- Adherence to the relevant management plans in the CEMP and a Contractor Health and Safety Plan;
- Compliance with resource consent conditions;
- Containment of contaminants on-site; and/or,
- Disposal of contaminated soil to licensed landfills.

27.1 Introduction

This Chapter assesses the actual and potential land and groundwater contamination effects arising from the construction of the proposed Expressway. The assessment contained in this Chapter is based on the following technical reports:

- Assessment of Groundwater Effects, Technical Report 21, Volume 3
- Assessment of Hydrology and Stormwater Effects, Technical Report 22, Volume 3; and,
- Assessment of Land and Groundwater Contamination Effects, Technical Report 23, Volume 3.

In order to investigate and assess any areas of potentially contaminated land in relation to the Project area, a land and groundwater contamination assessment was undertaken along the proposed Expressway alignment. The purpose of the assessment was to:

- Identify and characterise any areas of soil and groundwater contamination along the proposed Expressway alignment;
- Identify the risks of adverse effects on the environment and human health from the disturbance and/or use of contaminated land in the construction and operation of the proposed Expressway; and,
- Identify measures to avoid, remedy or mitigate the identified contamination risks.

27.2 Existing environment – contaminated land and groundwater

27.2.1 Geology

The underlying geology within the Project area is alluvial deposits (sands and gravels) with areas of superimposed swamps and sand dunes. The inter-dunal areas are generally low lying and poorly drained. This topography and geology combined with relatively high rainfall are conducive to the formation of wetlands.

27.2.2 Hydrology/hydrogeology

There are several streams and watercourses in the Project area. The Waikanae River is the predominant water body. There are several wetlands along the Project area – many of these water bodies have been heavily modified by farm or urban development. These water bodies are described in detail in Technical Report 22, Volume 3.

The hydrogeological characteristics of the area are described in detail in Technical Report 2, Volume 3, and summarised below:

- Shallow unconfined aquifers – to a depth of 30m, supplies water for portable and irrigation use. These are often hydraulically connected to the Waikanae River and smaller streams in the area;
- Deep groundwater – lies further below the unconfined aquifer and would not be directly affected by the proposed Expressway; and,
- Groundwater Abstraction – a large number of groundwater abstraction bores are located along the Project length. The assessment investigated boreholes within 300m down hydraulic gradient from the areas of potential contamination. None of these bores were identified as being used for drinking water.

27.3 Areas of potential contamination

A desktop study was undertaken to identify sites that have had historical or existing activities within the proposed Expressway alignment with the potential to cause land and groundwater contamination

(Technical Report 23, refer Appendix F). This study identified the following sites for further investigation:

Table 27.1: Identification of sites identified as potentially contaminated

Sector	Site	Potential contaminants
1	No sites recommended for further investigation	
2	55 Rata Road	HAIL[221] site – previously used by transport operator. Hydrocarbons stored on site in bulk quantities.
	Area of designated land behind commercial/industrial zone of Manchester/Sheffield St (Kāpiti Road Interchange)	Potential for illegal dumping to have occurred.
3	160 Otaihanga Road (Otaihanga Mountain Bike Park)	Historical landfill area – potential contaminants may include metals, fuels, oils, landfill gas and leachate.
	124-154 Te Moana Rd – Market Gardens	Pesticides/metals from horticultural activities.
4	No sites recommended for further investigation	

27.4 Assessment of contamination effects to land and groundwater during construction

27.4.1 Construction of the proposed Expressway

Potential effects from the disturbance and/or use of contaminated land during construction of the proposed Expressway are risks to both human health and the environment.

Risks to human health are assessed against the human health 'guidelines' outlined in the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011 (NES CSHH) while environmental risks are assessed against 'criteria' contained in the Wellington Regional Discharges to Land Plan (WRDTLP).

27.4.2 Human health risk

Human health guidelines are outlined in the NES CSHH. Assessments have been undertaken to determine the potential human health effects on workers within the construction footprint and members of the public or other workers outside the construction footprint.

Concentrations of contaminants found in the soil at 55 Rata Road exceeded human health guidelines outlined in the NES CSHH for construction workers at the site and for the general public outside the site.

[221] Hazardous Activities and Industries List (HAIL) is a compilation of activities and industries by GWRC that are considered likely to cause land contamination resulting from hazardous substance use, storage or disposal.

These contaminants have human health risks when people are exposed to contaminants through dermal contact, accidental ingestion and / or inhalation of dust.

There were no contaminants in excess of human health criteria at the other investigated sites (Kāpiti Road Intersection, 124-154 Te Moana Road and 160 Otaihanga Road.

27.4.3 Environmental risk

The provisions for managing the discharge of contaminants are outlined in the WRDTLP. Technical Report 23 details the relevant environmental criteria under the WRDTLP.

The arsenic levels found at the Kāpiti Road Interchange and the levels of benzo(a)pyrene (BaP) found at 55 Rata Road exceeded the environmental criteria in the WRDTLP. There is the potential for adverse environmental effects to arise from these contaminants being discharged to the environment during construction.

The environmental criteria for zinc was exceeded at 124-154 Te Moana Road. The assessment shows that the location of the elevated zinc levels is within the construction footprint for the Te Moana interchange. There is the potential for zinc to discharge to groundwater and land during construction.

Soil analyses taken at the boundary of the Otaihanga Landfill and Otaihanga Mountain Bike Park (referred to collectively above as 160 Otaihanga Road show that no contaminant exceeded its background concentration or environmental criteria in the WRDTLP. Groundwater samples have also been taken, the results of which are assessed in combination with the development of the conceptual groundwater model for this area, as detailed in Technical Reports 21 and 23 in Volume 3. In summary, while there is evidence of contamination from leachate from the landfill, groundwater modelling indicates there will be no noticeable change in groundwater levels, gradients or flow as a result of the proposed Expressway construction.

27.5 Assessment of contamination effects to land and groundwater during operation

Once the proposed Expressway has been constructed and is in operation, the contamination identified is not likely to pose an adverse effect on human health or the environment. This is due to the fact that soils containing levels of contaminants in excess of human health guidelines or environmental criteria will either be excavated and disposed of to an appropriate landfill or cement bound for reuse to prevent leaching of contaminants.

If soil containing contaminants in excess of environmental criteria at the Kāpiti Road Interchange site or the Te Moana Road is to be reused on site or at another location, it will be cement stabilised to prevent the leaching of contaminants. Alternatively, these soils will be excavated and disposed of to an appropriate landfill.

Soil containing contaminants exceeding human health guidelines at 55 Rata Road will be excavated and disposed of to an appropriate landfill. If soil containing contaminants in excess of environmental criteria at 55 Rata Road is to be reused on site or at another location, it will be cement stabilised to prevent the

leaching of contaminants. Soils remaining at 55 Rata Road will either be clean or contain low levels of contamination below guideline values and are not likely to pose an adverse effect on human health or the environment.

27.6 Measures to avoid, remedy or mitigate actual or potential adverse effects of contamination to land and groundwater

From the assessment that was undertaken (outlined in detail in Technical Report 23, Volume 3), the sites within the proposed Expressway alignment that present the greatest risk to human health and the environment due to the presence of contaminants are:

- 55 Rata Road;
- Kāpiti Road Interchange; and
- 124-154 Te Moana Road (Te Moana Interchange).

A series of Management Plans in Volume 4 have been developed to mitigate any actual and potential effects of construction activities. Management Plans that will provide mitigation for effects relating to contaminants are detailed below:

- CEMP – Appendix K: Contaminated Soils and Groundwater Management Plan:
    - procedures to protect human health;
    - procedures to prevent discharge of contaminants to land and discharge of contaminants to water;
- CEMP – Appendix G: Construction Air Quality Management Plan – detailing dust suppression controls; and,
- A Construction Health and Safety Plan.

For the contaminated sites at 55 Rata Road, Kāpiti Road Interchange and at 124-154 Te Moana Road, remedial works will be required to protect human health and the environment from contaminants found during investigation. Remedial works will include the containment of contaminants on-site and / or the excavation and disposal of contaminated soils to a licensed landfill. A contaminated land specialist will also be employed during construction phase with the responsibility for:

- Co-ordinating additional soil and groundwater testing;
- Advising on classification of excavated materials for re-use and disposal;
- Co-ordinating groundwater management and disposal; and,
- Training of staff in contaminated land identification and control procedures.

The adverse environmental effects will be suitably mitigated by the implementation of the management framework outlined above, as well as adherence to relevant resource consent conditions.

28 Water quality

Overview

The construction and operation of the proposed Expressway has the potential to adversely affect water quality in downstream freshwater watercourses and the marine environment. Construction of the proposed Expressway will involve major earthworks, which have the potential to increase sediment run-off to streams/rivers and the coast. Once in operation, the proposed Expressway has the potential to increase contaminants levels in streams/rivers and the marine environment associated with stormwater runoff from road surfaces.

Existing freshwater quality in watercourses along the proposed Expressway alignment are characteristic of lowland waterways draining predominantly pastoral land use with elevated nutrient concentrations, bacteriological counts and low toxicant concentrations.

A high level of erosion and sediment control will be used to manage sediment generated from the construction of the proposed Expressway entering watercourses. All discharges will be treated to at least a minimum standard in accordance with best practice methodologies and will include retention devices, some chemical treatment, stabilisation techniques and monitoring.

Once operational, all stormwater generated from the proposed Expressway will pass through swales and / or wetlands that are explicitly designed to improve the water quality of stormwater prior to discharge. As traffic volumes and the congestion on the existing SH1 will be reduced, contaminant loading from that source will also be reduced. The fully operational Expressway is likely to lead to an overall reduction in contaminant loads generated from most catchments relative to the existing scenario.

There are not anticipated to be any direct effects on marine water quality values due to construction and/or operation of the proposed Expressway. The proposed Expressway alignment is located some distance from marine environments and stormwater will be suitably treated prior to being discharged.

The potential adverse environmental effects on the quality of water through both construction and operation of the proposed Expressway will be suitably avoided and / or mitigated. During construction, potential adverse effects will be suitably managed through an Erosion and Sediment Control Plan(s). During operation, potential adverse effects will be suitably managed through the use of swales and wetlands. Overall, there will be water quality benefits.

28.1 Introduction

Water quality refers to the physical, chemical and biological characteristics of water.

This Chapter discusses the actual and potential water quality effects arising from the construction and operation of the proposed Expressway. The information contained in this Chapter is based on the following Technical Reports in Volume 3:

- Assessment of Hydrology and Stormwater Effects, Technical Report 22, Volume 3;

- Baseline Water and Sediment Quality Investigation Report. Technical Report 24, Volume 3;
- Contaminant Load Assessment, Technical Report 25, Volume 3;
- Marine Habitat and Species, Technical Report 31, Volume 3; and,
- Erosion and Sediment Control Plan, Appendix H of the CEMP, Volume 4.

Effects were assessed by gathering information about existing water quality in both freshwater (i.e. streams/rivers) and coastal waters. The potential effects on water quality arising from the proposed Expressway were then modelled and assessed.

The potential ecological effects from changes to water quality on freshwater and marine ecology are discussed in Chapters 22 and 23 of this AEE, respectively. Potential stormwater and hydrology effects are discussed in Chapter 24 and contamination effects are discussed in Chapter 27.

28.2 Existing water quality

A baseline water and sediment quality investigation was undertaken to evaluate existing surface water and sediment quality within watercourses along the proposed Expressway alignment. The baseline investigation allowed the potential impacts of the proposed Expressway construction on water quality to be predicted. This investigation comprised the following:

- Literature review of existing information;
- Ambient water quality monitoring programme;
- Sediment and water quality investigation near the Otaihanga Landfill; and,
- Characterisation of groundwater associated with peat soils

28.2.1 Literature review

The literature review drew on a number of information sources as detailed in Technical Report 24, Volume 3. The results of existing information pertaining to each of the major watercourses through the proposed Expressway area are summarised in Table 28.1 below. Only those water quality parameters and / or contaminants which the literature showed as regularly exceeding ANZECC Guidelines[222] (the Guideline) are shown below.

[222] ANZECC Guidelines were principally used to provide a broad indication of water and sediment quality. All references to 'Guideline' values in this Chapter refer to the ANZECC 95% ecological guidelines.

Table 28.1: Literature Review Summary of Water Quality Parameters / Elevated Contaminants

Watercourse	General Water Quality	Base Flow Water Quality Exceedances	Stormwater Quality Exceedance (in sampled watercourse)
Whareroa Stream	Poor	Nutrients, TSS, turbidity, water clarity, bacteriological counts	
Wharemauku Stream	Poor		pH, dissolved oxygen, E coli, aluminium (acid soluble), copper (dissolved), zinc (dissolved)
Mazengarb Drain	Poor	Boron, nutrients, suspended solids, Biochemical Oxygen Demand	DO, E coli, aluminium (acid soluble), copper (dissolved), zinc (dissolved)
Waikanae River	Good	Dissolved reactive phosphorus	E coli, aluminium (acid soluble)
Waimeha Stream	Fair	Nutrients	E coli
Ngarara Stream	Poor	pH, dissolved oxygen, nutrients, suspended solids, turbidity, bacteriological counts, aluminium	

28.2.2 Ambient water quality monitoring programme

Complementing the literature review, an ambient water quality monitoring programme at key sites on the major watercourses[223] along the extent of the proposed Expressway area generated a database of information from which the existing water and sediment quality could be assessed. The programme included the collection and analysis of water and sediment samples over a 7-week period between 2 May 2011 and 16 June 2011 (detailed information relating to the water quality monitoring programme is contained in Technical Report 24, Volume 3).

Information on the following indicators and parameters was collected:

- Dissolved and total heavy metals (aluminium, arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel and zinc)
- Total petroleum hydrocarbons (TPH)
- Semi volatile organic compounds (SVOC)
- Carbonaceous biological oxygen demand (cBOD)
- Chemical oxygen demand (COD)
- Nutrient suite (dissolved reactive phosphorus, nitrate, total nitrogen oxides, nitrite, TKN, total nitrogen, total phosphorus and ammoniacal-nitrogen)
- Total suspended solids; and,
- E. coli.

[223] Whareroa Stream, Wharemauku Stream, Mazengarb Drain, Waikanae River, Waimeha Stream and Ngarara Stream

The results showed that water quality in the watercourses sampled along the proposed Expressway area is generally characteristic of lowland waterways draining predominantly pastoral land use, with elevated nutrient concentrations, bacteriological counts and low toxicant concentrations. Nevertheless, there were some clear differences in the water quality between the watercourses, which generally reflected the differences in the catchment areas they drain.

Detailed results of the ambient water quality monitoring are contained in Technical Report 24, Volume 3. In summary:

- All metal and organic contaminant concentrations in the bed sediment samples were below the Guideline value;
- Water quality at the sampling location in the Wharemauku Stream, west of the proposed Expressway, was 'poor' due to upstream pastoral, residential and industrial/commercial land use activities. The base and high flow waters had elevated nutrient concentrations, ammoniacal-nitrogen, and dissolved and total zinc relative to the corresponding Guideline values.;
- Base flow and stormwater quality at the sampling location in the Mazengarb Drain was 'poor' with elevated nutrients, ammoniacal-nitrogen, suspended solids, organic matter, copper and zinc. The water quality in the drain is probably impacted by in-catchment urban land uses and in part, by the 'eastern' tributary that drains the former Otaihanga Landfill and which discharges into the Mazengarb Drain upstream of the sampling location;
- Water quality at the site sampled in the Kakariki Stream west of SH1 was 'poor' due to elevated nutrient concentrations, suspended solids and bacterial counts. While water quality in the Waimeha Stream was generally good, there were some slightly elevated nutrient concentrations and suspended solids in some of the water sampled. Water quality of both sampled sites is likely to be impacted by agricultural land use activities;
- Water quality of the base flow waters in the Waikanae River and Hadfield Drain/Te Kowhai Stream was generally good, with most indicators and contaminant concentrations within the limits of the corresponding Guideline values. However, during high flow conditions due to elevated stormwater run-off from agricultural land uses in the draining catchment, water quality in the Hadfield Drain/Te Kowhai Stream appeared to be 'poor' due to elevated suspended solids, ammoniacal-nitrogen, nutrients and bacterial counts;
- Organic and total petroleum hydrocarbons concentrations in all samples taken were below analytical detection limits across the proposed Expressway extent;
- Total and dissolved aluminium was above the corresponding Guideline value at many of the sites sampled in the watercourses across the proposed Expressway area, which is likely to be due to general elevated background soil concentrations of aluminium across the Wellington region. The concentration of total aluminium was higher in almost all stormwater samples relative to base flow waters due to eroded soils from the wider catchment area and a corresponding increase in the aqueous suspended solids concentration;
- All organic contaminants (SVOCs and TPH) were below the analytical detection limits except for TPH (C7 – C36), which was present as a low, but measurable, concentration in the Wharemauku Stream during one low flow sampling event; and,

- Except for aluminium, there was little difference in the concentration of most metal and organic contaminants between the base and high flow sampling events. However, copper and zinc were likely to exceed the Guideline values in some base and high flow waters (impacted by the 'eastern' tributary of the former Otaihanga Landfill, The Paraparaumu Waste Water Treatment Plant and urban land uses).

28.2.3 Sediment and water quality investigation near Otaihanga Landfill

A sediment and water quality investigation was undertaken in the stormwater/leachate drainage channel and wetlands along the western edge of the Otaihanga Landfill. The purpose of the investigation was to characterise the sediment quality in the wetlands within the footprint of the proposed alignment, and the water quality in the stormwater/leachate drainage channel. The results showed that:

- Sediment in the wetlands was predominantly organic with some elevated dieldrin (potentially through high insecticide use within the catchment), arsenic and zinc concentrations relative to the corresponding Guideline values;
- Metal and organic contaminant concentrations in the sediment sample collected from the stormwater/leachate drainage channel were at low concentrations; and,
- Water quality in the drainage channel was 'poor' with low dissolved oxygen and pH, and some elevated bacteriological counts, aluminium, manganese and zinc concentrations relative to the corresponding Guideline value.

28.2.4 Chemical characterisation of groundwater associated with peat soils

Groundwater associated with peat was tested for a range of water quality indicators and parameters. The results of the study found the following;

- The groundwater associated with the peat had low pH and dissolved oxygen;
- The groundwater run-off from peat may have elevated organic carbon and nutrient concentrations which may impart a 'tea' to dark brown coloured staining to receiving waterways (which may lead to reduced water clarity and increased turbidity); and,
- In waters with a high content of suspended solids, the groundwater may contain elevated metal concentrations.

28.3 Water quality modelling

Models were developed to assist in the assessment of potential water quality effects associated with the construction and operation of the proposed Expressway. These were:

- To assess construction effects:
    - A sediment yield estimate following procedures within the Universal Soil Loss Equation (USLE)) – see Appendix H (Erosion and Sediment Control Plan) of the CEMP, Volume 4.
- To assess operational effects:
    - A contaminant load model (CLM) – see Technical Report 25, Volume 3.

28.3.1 Construction effects modelling

A sediment yield estimate was used as a comparative tool to gain an appreciation of the expected increase in catchment-wide sediment yields as a result of the proposed earthwork activity. The sediment yield estimate was also used to provide a measure of the risk of sediment generation and yields, and to assist in identifying controls required for managing this risk to the environment from sediment discharges from earthwork sites. The sediment yield estimate followed procedures within the USLE and is described in the Erosion and Sediment Control Plan (Appendix H of the CEMP, Volume 4).

The USLE allowed for greater consideration to be given to areas which are likely to produce higher sediment yields (for example, areas of greater slope) and for these areas to be targeted with more comprehensive control methodologies.

28.3.2 Operational effects modelling

A contaminant load assessment (CLM) was undertaken for the following catchments through which the proposed Expressway will pass: Whareroa Stream, Wharemauku Stream, Waikanae River, and Ngarara Stream. The model provides a basis whereby the effects of the proposed Expressway, both with and without stormwater treatment, could be considered against the existing (without the proposed Expressway) land use scenario.

The model required input for the total area of the catchment including roof, road and paved surfaces associated with each residential, commercial and industrial land use area; road lengths; urban grass lands; exotic production forest; stable bush; farmed pasture; and, horticulture.

The CLM calculated the annual contaminant loads of sediment, zinc, copper and TPH (primarily oil and grease) within each of the defined catchments, based on the different land use types and their contaminant yields. The following scenarios were modelled:

- Existing scenario (Year 2011);
- Future scenario (Year 2031[224]) with full operation of the proposed Expressway (without stormwater treatment); and,
- Future scenario (Year 2031) with full operation of the proposed Expressway (with stormwater treatment).

The information from the CLM allowed the efficiency of proposed treatment measures to be assessed and the potential stormwater contaminant effects of the proposed Expressway to be identified.

[224] The year 2031 was selected as the basis for the future land use scenarios to align with the modelled future traffic counts.

28.4 Assessment of water quality effects during construction

Construction of the proposed Expressway will involve a number of activities that have the potential to generate sediment, including:

- Earthworks;
- Works in and around watercourses (such as construction of bridges, retaining walls and culverts);
- Temporary stockpiling of material; and
- Pumping of sediment laden water from excavations.

Sediment can be generated in two main ways:

- when rain falls on exposed earth (i.e. un-vegetated cut faces or fill slopes); or,
- When works in stream beds disturb and entrain sediment.

Increased sediment levels could have a number of adverse effects, including:

- Damaging aquatic (freshwater and marine) habitat;
- Altering the morphology of rivers / streams; and
- Reducing the aesthetic properties of water (e.g. visual clarity and odour).

Sediment has been assessed as the only contaminant with the potential to have adverse environmental effects during construction. There is always risk during a major construction project that accidental spills will result in other contaminants (such as fuel) entering waterways. While this risk can never be completely eliminated, it can be effectively managed through sound environmental management. The CEMP contains protocols for working with contaminants on-site, as well as emergency spill procedures to apply in the unlikely event that a contaminant is spilt near a waterway.

The limited areas of contaminated land identified within the proposed Expressway area are also a potential source of contaminants to waterways. The CEMP contains sound procedures for managing contaminated material safely, and this includes managing the risk to waterways. More detail in relation to the proposed measures to address risks arising from contaminated land is contained in Chapter 27 of this AEE.

Accordingly, contaminants other than sediment have not been considered further in the assessment of potential water quality effects during construction in this Chapter.

28.4.1 Sediment yields

USLE calculations (refer ESCP, Appendix H of the CEMP, Volume 4) have predicted the following sediment yields during earthworks:

Catchment	Tonnes
Whareroa	0.58
Wharemauku	4.50
Waikanae	3.97
Waimeha	0.77
Ngarara	6.38

This equates to a total sediment yield of 16.64 tonnes, with an estimated exposed area of 138.8ha over the construction duration (although on a proportion of this area would be fully exposed at any one time).

28.4.2 Erosion and sediment control (ESC)

A Erosion and Sediment Control Plan (ESCP) has been prepared. The ESCP provides the general principles and methodology for undertaking earthworks. As more detailed design occurs with progression of the proposed Expressway, site specific ESCPs (CESCP) will be prepared and implemented prior to construction commencing at the relevant site.

The ESCP is consistent with both the GWRC's erosion and sediment control guidelines[225] and the draft NZTA[226] erosion and sediment control guidelines. Fundamental ESC principles contained within the ESCP include, so far as is practicable:

- Minimising disturbance;
- Staging construction;
- Protecting steep slopes;
- Protecting waterbodies;
- Undertaking progressive and rapid stabilising of disturbed areas;
- Perimeter controls; and
- Deployment of detention devices[227].

[225] Wellington Regional Council, Erosion and Sediment Control Guidelines for the Wellington Region, September 2002 (GWRC Guidelines)

[226] New Zealand Transport Agency, draft NZTA Erosion and Sediment Control Standard for State Highway Infrastructure, August 2010

[227] Principles listed are contained in the draft NZTA Erosion and Sediment Control Standard for State Highway Infrastructure, August 2010

Table 28.2 below outlines key ESC measures (as outlined through Section 6 of the ESCP (see Appendix H of the CEMP, Volume 4)) and their proposed application to the proposed Expressway.

Table 28.2: Key ESC Measures for the proposed Expressway

Key ESC Measure	Applicability
Sediment retention ponds	Sediment retention ponds will be the main tool for retention and treatment of sediment laden run-off.
Chemical treatment (flocculation)	Chemicals will be utilised on a limited basis (as a risk management tool) to 'clump together' fine particles into a 'floc'. Sediment laden water may be treated with chemicals to help achieve necessary water quality thresholds on an 'as required' basis.
Decanting earth bunds	Treatment of sediment laden run-off via decanting earth bunds will be used when space requirements restrict the use of sediment retention ponds. This will typically be used on large cut slope faces.
Silt fences / super silt fences	Perimeter controls both around and within earthwork sites, especially in close proximity to watercourses.
Diversion channels	Perimeter controls around earthwork sites
Innovative measures	Innovative products may be used (e.g. filter socks).

Sediment retention ponds (or decanting earth bunds if required) are likely to be the main sediment control device used to remove sediment prior to discharge to a receiving waterbody. Silt fences and / or other perimeter controls will be used to limit sediment laden water entering these devices.

Sediment retention ponds operate by allowing the sediment to settle out from suspension of the main runoff, and be retained in the pond. The rate at which sediment falls is called the particle settling velocity (or particle fall velocity). The settling velocity is governed by the flow regime in the pond, particle size and the density of the particle (relative to water). In general, as particles increase in size, they have an increased settling velocity – i.e. they settle faster. The effectiveness of ponds can be improved by adding a chemical agent which binds multiple particles together, forming a larger particle with accelerated settling properties.

28.4.3 Effects of sediment on stream water quality

All discharges will be treated to at least a minimum standard and methods used will include retention devices, some chemical treatment, stabilisation techniques and monitoring.

Overall, there are predicted to be negligible effects on water quality, provided the measures identified in the ESCP are appropriately installed, monitored and maintained.

28.5 Assessment of water quality effects during operation

Once the proposed Expressway is in operation, it will have the potential to adversely affect water quality in streams and coastal waters due to stormwater run-off from road surfaces.

28.5.1 Stormwater design philosophy

The stormwater design approach for the proposed Expressway is based on the application of a set of key principles and standards[228] as detailed in the Assessment Hydrology and Stormwater Effects (Technical Report 22, Volume 3). The approach aims for hydraulic neutrality[229], taking into account both increased runoff from the proposed Expressway footprint, and loss of flood plain storage under the footprint in some areas.

28.5.2 Attenuation

Stormwater attenuation will be generally provided by swales. Where swales are located in low-lying peat areas, wetland planting will be used in the base of the swale. Where swales are located in sand, grassed swales will be utilised.

Where swales are not able to provide for the treatment and/or attenuation required, wetlands and/or storage areas will be used to achieve the required performance before discharge. In some areas, both swales and wetlands will be utilised to achieve the required attenuation. The proposed Expressway will also use siphon sumps that trap gross litter more efficiently than do standard barrel sumps.

The swales and wetlands proposed at the current stage in the design of the proposed Expressway provide attenuation to varying degrees, ranging from 6% to 82% for the 1% annual exceedence probability (AEP) flows[230]. This generally achieves the NZTA's target of providing attenuation to achieve an average of 80% of the AEP flows; in some cases achieving results significantly better than this. Where results in some few areas do not achieve the 80% target, the final design will be optimised to achieve this target during later design stages.

At this stage of the design, attenuation is focused on the 1% AEP storm. Some of the swales do not currently achieve the 80% target for other potential storm events, but this is considered to be a reflection of how the outlet orifice has been modelled rather than indicative of a real effect. It is anticipated that further refinement of the outlet designs (through detailed design stage) will see the swales meet the target attenuation for all the events that have been assessed.

---

[228] Stormwater Treatment Standard for State Highway Infrastructure, 2010, NZTA; Bridge Manual, 2003, Transit NZ; Alliance/KCDC Guiding Objectives, 2010; Kāpiti Stormwater Management Strategy, KCDC; and Austroads Guidelines for the Collection and Discharge of Stormwater from Road Infrastructure, 1994, ARRB.

[229] Hydraulic Neutrality has been agreed with KCDC to mean, with respect to the proposed Expressway, not discharging greater than the existing peak flows and not causing a significant increase in flood levels by filling in more floodplain storage than is compensated for.

[230] Hydrologists define the likelihood of flood peak flows by their annual exceedence probability (AEP). A so-called 100-year flood does not mean that there is exactly one flood of this size every 100 years. It means that there is a 1 in 100 chance in any given year that a flood of this size or bigger will happen; it is therefore more correctly called a 1% AEP flood.

28.5.3 Stormwater effects on stream water quality

Overall, the proposed Expressway will provide water quality benefits in two main ways: first in reducing traffic volumes on the existing SH1 which currently has no stormwater treatment; and second in having all of the stormwater generated from the proposed Expressway passing through swales and / or stormwater treatment wetlands that are explicitly designed to improve the water quality of stormwater prior to discharge. While there will now be two roads, the traffic volumes and the congestion on existing SH1 will be reduced, thereby reducing the contaminant loading.

The CLM assessment showed that, when fully operational, in 2031 the proposed Expressway without stormwater treatment would be likely to lead to an overall improvement over the existing situation in the contaminant loads (sediment, zinc, copper and total petroleum hydrocarbons (TPH)) discharging to the receiving environment from most catchments modelled (except for the Wharemauku, Ngarara and Waimeha stream catchments). However, when fully operational with stormwater treatment, the proposed Expressway is likely to lead to a further reduction in the contaminant loads generated across the proposed Expressway area. The sediment load is likely to reduce by < 2% in all catchments relative to the no-stormwater treatment scenario. This equates to a corresponding reduction for zinc, copper and TPH range of between 1 and 6% for zinc, 2 and 12% for copper and 1 and 21% for TPH.

The contaminant loads generated from the Wharemauku Stream catchment and Waimeha Stream sub-catchments for the stormwater treated future scenario are likely to increase relative to the existing land use scenario.

28.6 Assessment of marine water quality effects

There are not anticipated to be any direct effects on marine water quality values due to construction or operation of the proposed Expressway, as the alignment occurs at some distance from marine environments. However, potential indirect effects could occur due to the discharge of runoff, during both construction and operation phases, to streams and rivers that discharge to the marine environment.

Technical Report 31 (Volume 3) identified the potentially affected estuaries being: the Waimeha and Wharemauku Stream and the Waikanae Estuary.

The Waimeha and Wharemauku Streams discharge to high energy, open sandy beaches, affording significant and rapid dilution and removal of any stormwater discharges.

The Waikanae Estuary is lower energy and has more potential to accumulate sediment and associated contaminants. Therefore, it is particularly important to ensure that at both the construction and operational phases that stormwater discharged to the Waikanae River from the proposed Expressway is treated to a high standard to protect the ecological values of the estuary and the adjacent marine reserve.

All stormwater discharges during the construction period will be suitably treated prior to discharge. As outlined above, once operational, overall the proposed Expressway will provide water quality benefits due to the proposed level of stormwater treatment, and the reduction of traffic on the current SH1.

28.7 Measures to avoid, remedy or mitigate actual or potential adverse effects on water quality

28.7.1 Construction

During construction of the proposed Expressway, the need to avoid and mitigate construction effects and adhere to best practice has led to the preparation of management plans. The principal management plan relating to avoiding, remediating and mitigating water quality effects during construction will be the ESCP (contained in Appendix H of the CEMP). As more detailed design occurs, development of site specific CESCPs will be prepared and implemented prior to construction commencing at the relevant sites.

As detailed in the ESCP (section 5.3), and as part of the ESCP methodology, on-going monitoring of ESC measures will occur prior to, and throughout the duration of, the works to ensure that the proposed measures have been installed correctly and are functioning effectively. This will include regular monitoring of:

- ESC devices;
- Chemical treatments (flocculation);
- The visual appearance of receiving watercourses; and
- Weather forecasts.

28.7.2 Operation

During operation of the proposed Expressway, the need to mitigate the potential effects on water quality has led the design to make extensive use of swales (both wetland–planted and grassed) and treatment wetlands. These have been designed in accordance with NZTA's Stormwater Standard[231], which reflects current international best practice. Overall, once in operation, the proposed Expressway will provide water quality benefits.

28.7.3 Summary

The potential adverse environmental effects on the quality of water through both construction and operation of the proposed Expressway will be suitably avoided and / or mitigated.

This will be achieved through the implementation of management plans during construction of the proposed Expressway and the use of wetlands and swales for stormwater attenuation purposes during operation of the proposed Expressway.

[231] Stormwater Treatment Standard for State Highway Infrastructure, 2010, NZTA

29 Economic effects

Overview

The construction and operation of the proposed Expressway is anticipated to bring about a net increase in the economic wellbeing of the District.

As with any realignment of a major road, there will be some redistribution of economic activity, as some businesses and residents take advantage of the changes in the roading network, while others experience disruption of the current dynamics of passing traffic.

29.1 Introduction

This Chapter addresses economic effects as they related to the Resource Management Act's focus on enabling economic wellbeing. The potential economic effects of the proposed Expressway for local residents and businesses are canvassed.

This Chapter does not address the Project's overall economic assessment, which involves cost benefit analysis and the calculation of a benefit/cost ratio for the Project using the New Zealand Transport Agency's (NZTA's) Economic Evaluation Manual (EEM) procedures.

The economic assessment focuses on the economic consideration of effects at the regional, district wide and suburban levels in terms of enabling economic wellbeing. As the Resource Management Act (RMA) is not a vehicle for ascertaining the best use of resources, the Chapter does not seek or need to deal with the issue of whether or not the Project would constitute the greatest return on investment.

29.2 Existing economic environment

An assessment of potential economic effects for the purposes of considering the economic effects of a proposal under the RMA is generally undertaken at the aggregate district or regional level.

Assessment of the existing environment in relation to potential economic effects for residential, business and other stakeholders starts with a Wellington region-wide perspective. Economically, Kāpiti is strongly intertwined with the wider Wellington region, and the District has a relatively high dependence on the wider region for employment.

The 70% local employment retention rate for Kāpiti is third lowest in the Wellington region after Upper Hutt with 62% and Porirua with 67%. This means that a sizeable proportion of residents rely on employment opportunities outside District boundaries (in that about 30% of the labour force travel outside the District). The town centre and the business and industrial areas in Paraparaumu are the principal sources of employment and economic activity in the District.

Forecasts for Kāpiti's economic environment are for on-going population increase, and associated demand for housing and business development[232]. Some key indicators in this regard are estimates for the period 2010 to 2031 of:

- Population growth of circa 10,000 persons or 20% (medium growth assumptions).
- Total employment counts growing between 3,400 (23%) to more than 6,000 (53%).
- Increases of over 50,000 m² in sustainable retail Gross Floor Area.

The assessment was undertaken at a broader aggregated urban scale, although, where appropriate, a suburban level was applied. The suburban level equates to an economic footprint which broadly encompasses a combination of Project Sectors 1 and 2 (the southern portion of the Project centred on Paraparaumu), and Project Sectors 3 and 4 (centred on the Waikanae Town Centre).

Effects on the amenity of individual properties and other RMA effects (which may affect the value of those properties) are most appropriately addressed by consideration of whether location specific design or mitigation measures are appropriate and compensation for land acquisition or injurious affection to land is dealt with under the Public Works Act.

29.3 Methodology for assessing economic effects

The assessment has been structured to categorise whether there are potential 'enablement' effects for people and communities in terms of:

a. Increased economic activity during the proposed Expressway's construction;

b. Traffic related effects for local residents and businesses;

c. Business redistribution effects;

d. Increased economic activity once the proposed Expressway is operational; and

e. Lifeline benefits.

In relation to increases in economic activity, there are assocated benefits related to:

- changes in economies of scale
- changes in competition
- effects on unemployment and underemployment of resources, and
- quality of central government provided services.

Generally under the RMA retail or business redistribution effects are not relevant insofar as they impact on individual businesses. Such impacts are only relevant under the RMA if, cumulatively, they are of such

[232] Kapiti Employment Areas Study, October 2011 produced by Property Economics Limited for Kāpiti Coast District Council (referred to as PEL Report).

significance that they threaten the public amenity values of city, town or suburban centres through the loss of critical mass, sustainability, vibrancy and vitality.

Assessment of economic effects on residential settings (encapsulated in property values as a proxy for overall effects experienced) follows a similar logic in that they are assessed at a district or region wide level, rather than looking at effects on the value of individual properties.

29.4 Investigation and assessment process

The Assessment was informed by:

- site visit and survey information;
- analysis of regional and district level demographic and business statistics;
- review of regional and district strategies and policies; and
- specialist assessment reports on the local economy and employment such as the Kāpiti Employment Areas Study, October 2011, produced by Property Economics for Kāpiti Coast District Council.

29.5 Assessment of economic effects

The summary findings of the economic effects assessment are:

a. Increased economic activity during the proposed Expressway's construction –

A temporary boost to local economic activity and employment is likely to occur, with positive benefits for Kāpiti and the wider region.

b. Traffic related effects for local residents and businesses –

Positive economic effects are likely to arise from the reductions in vehicle operating costs, travel times and accident costs and improvements in trip time reliability for local residents and businesses (for example, freight movement and employee travel). These effects are likely to occur for both (a) making journeys within the District; and (b) making journeys to the south or north of the District.

c. Business redistribution effects –

A review of commercial areas adjacent to SH1 indicates that likely changes are not of such significance that they would threaten the public amenity values (through a loss of critical mass, sustainability, vibrancy and vitality) of Waikanae, Paraparaumu or other suburban centres.

Investigation work undertaken jointly between NZTA and Kāpiti Coast District Council has identified 'enabling' opportunities arising from the reduction of traffic on the existing State Highway 1 after the proposed Expressway is completed. At Waikanae and Paraparaumu, potential exists for improving areas adjacent to the current SH1 through improvements to amenity, safety, and the pedestrian environment,

plus improving ease of access to public transport facilities. While not part of the proposed Expressway, KCDC is working with NZTA to progress these opportunities.

d. Increased economic activity once the proposed Expressway is operational –

Net positive economic welfare enhancing benefits are predicted to occur when the proposed Expressway becomes operational.

Employment area projection work commissioned by Kāpiti Coast District Council shows the proposed Expressway delivering stronger employment growth compared to that which would occur under current conditions (Kāpiti Employment Areas Study, PEL: October 2011). An opportunity highlighted in the report would be to address, via the Council's District Plan review, the promotion of the quality and differentiation of town centres to assist in addressing out of district 'retail leakage' dynamics currently experienced by Kāpiti. Associated with increased levels of economic activity can be economic benefits from increased economies of scale, increased competition, and reductions in unemployment and underemployment of resources.

e. Changes to the value of properties -

Changes to the value of individual properties are a reflection of a combination of tangible and intangible effects on matters such as amenity values that are addressed elsewhere in the AEE. It is important not to double count these effects by treating likely changes to individual property values as a separate additional effect.

At the district-wide level, an overall increase in attractiveness of the District for business and residential development is likely to support property values.

For properties adjacent to the existing WLR designation, property values will already include a market allowance for the fact that development of a major road of some form has been flagged for many decades.

For the discrete number of property owners next to the proposed Expressway alignment where it has deviated from the previous designation (i.e., in the vicinity of Leinster Avenue and Puriri Road), Project design and mitigation measures aim to mitigate adverse effects (including amenity effects). Mitigation includes the NZTA seeking a wide designation to enable greater separation distance from properties, the design quality of structures, provision of planted bunds, landscaping, noise barriers, and use of noise reducing surfacing.

f. Lifeline benefits –

Economic benefits accrue from the additional road crossing of the Waikanae River provided by the proposed Expressway, and in addition leads to better network resilience in the event of road accidents or natural disasters closing the existing SH1 alignment.

29.6 Measures to avoid, remedy or mitigate actual and potential adverse economic effects

The economic assessment above identifies a range of benefits potentially arising from the construction and operation of the Project.

The following section outlines the measures which have been identified to avoid, remedy or mitigate potential adverse economic effects:

29.6.1 Managing potential economic effects during construction

During construction, there will be some adverse temporary effects from construction activity and traffic. The specific routes and locations that will be affected have been identified and assessed and measures to address these are detailed in the Construction Traffic Management Plan (CTMP) in Appendix O, of the CEMP (Volume 4). While these measures will not totally avoid effects on some businesses from construction activity, they should assist in reducing such effects and in providing business operators with sufficient information to plan appropriate responses.

29.6.2 Managing operational economic effects

Given that the proposed Expressway is anticipated to bring about a net increase in the economic wellbeing of the District, it is not appropriate to propose any specific mitigation measures.

As with any realignment of a major road, there will be some inevitable redistribution of economic activity, as some businesses take advantage of the changes in the roading network, while some others respond to the disruption of the current dynamics of passing traffic. As part of the construction of the proposed Expressway, directional signs will be used to assist travellers in wayfinding, including interchange signage to clearly identify the presence of the Paraparaumu and Waikanae town centres and other key destinations points (for example, Kāpiti Airport). In addition, opportunities will be available through standard NZTA State Highway management processes to establish tourist information signs on the proposed Expressway to indicate key visitor attractions in the District.

30 Social effects

Overview

From a social perspective, Kāpiti Coast communities have transformed significantly since their establishment, with population and business growth driving an on-going transition from a series of beach oriented communities and small service centres to an increasingly distinct sub-regional urban hub. The Project will add to, and possibly accelerate, this change dynamic in response to a combination of beneficial and adverse social effects. The social effects would range in significance, between adverse and beneficial, across the community and along the Project length. These effects would also vary over time through the Project's construction and operation phases.

From a regional perspective, it is anticipated that there would be significant social benefits, derived from the economic and transport/accessibility benefits of the proposed Expressway.

The construction and use of the proposed Expressway will alter the existing local social environment as it would affect those factors that influences people's social well-being, including its effects on connectivity and movement, amenity values and local character, open space and recreational values.

Arising from its economic and transportation benefits, the Project would have social benefits for the District. However, there would be negative social effects which will be largely borne by those in neighbourhoods immediately adjoining the proposed Expressway.

The Project design sought to mitigate a number of potentially negative social effects; for example, by maintaining or improving local road accessibility throughout the communities. The Project design also sought to reconcile its impact on adjoining neighbourhoods with the requirements for safety and functionality.

Many of the negative social effects would occur during construction, and it is therefore important that these effects are mitigated through effective construction management, communication and community liaison. The Construction Environmental Management Plan (CEMP) and its subsidiary plans for traffic, noise, vibration and air quality have been informed by the social effects assessment and are designed to ensure adverse effects arising from construction will be at acceptable levels. Monitoring is proposed through a proposed community liaison group to identify any adverse social effects that may occur during construction.

Once in operation, the scale of the social impacts from the proposed Expressway will diminish as people and communities adjust to the presence of the road. Any long-term issues will be addressed through the ongoing relationship between NZTA and KCDC.

30.1 Introduction

This Chapter sets out an assessment of Project-induced social effects. The information in this Chapter is drawn from the Social Impact Assessment (SIA) (Technical Report 20, Volume 3), as well as the findings of other technical assessments which are relevant in considering social effects.

Social effects can be experienced at individual, family / household, and community levels. Effects can be actual or perceived; direct or indirect; and positive or adverse in character. The focus of the SIA is on communities and groups rather than on individuals.

By their nature, social impacts are the 'human' experiences of other effects individually or in combination. Avoiding "double counting" of effects is therefore important where there are overlaps with other AEE specialist assessments. For example, the operational effects of the Project on air quality and the proposed mitigation are discussed in the Air Quality Assessment (Technical Report 13, Volume 3) and in Chapter 20 of this AEE. Nonetheless, as part of discussions on the Project's social effects, people have raised concerns about the effects of the Project on air quality in respect of their living experiences and day-to-day lives.

Given the inevitable overlaps, effects dealt with in other specialist reports are acknowledged within this Chapter where relevant. However, while perceptions of changed amenity values are acknowledged in this social assessment, overlapping or repetition of discussion in other assessment sections on these effects has been kept to a minimum.

The Project has been assessed both within the broader context of the wider Wellington Region and within the District in terms of its effects on the local communities between MacKays Crossing and Peka Peka (the local communities). To carry out the assessment within these contexts, the following were prepared:

- A SIA framework, incorporating a study area profile and assessment framework to identify the social consequences and impacts (benefits and disbenefits) of the Project on a regional and local scale;
- An assessment using the SIA framework of the social impacts of the Project on a regional and local scale. Impacts were assessed for the planning, construction and operation phases of the Project; and
- An assessment of appropriate measures to avoid, remedy or mitigate the social effects identified in the planning, construction and operation phases of the Project.

The Project is of national and regional significance; however, the potential for social change as a result of the Project is distinctly different between the local and regional communities; in particular, the nature of the potential adverse social effects are considered to be experienced relative to proximity to the physical works for the Project and its ongoing operational effects. Thus, the assessment includes a brief overview of Wellington Region's social environment in which the Project is located, and then focuses on the social environment in the MacKays to Peka Peka section which includes the local communities of Raumati, Paraparaumu, Waikanae and Peka Peka.

The description of the existing social environment provides the basis on which the social effects are assessed. The following are described:

- characteristics of the local communities and their people;
- the communities' wellbeing and way of life through the locations/accessibility of education facilities, social services, reserves and recreational areas, and transport routes and connections;
- people's culture through the recognition of the local communities' values, archaeological / heritage / cultural sites and places of religious assembly; and
- people's attitudes, expectations and aspirations identified in existing documents and from feedback received during consultation.

30.2 Existing social environment

At a district scale, Kāpiti's social environment is transforming through population growth, changing employment dynamics, continuing increase in the average age of residents, and on-going demand for housing and new business development[233]. Some key indicators in this regard are estimates for the period 2010 to 2031 of:

- Population growth of circa 10,000 persons or 20% (medium growth assumptions)[234]
- Total employment growing between 3,400 (23%) to more than 6,000 (53%)[235]
- An ageing population profile with the proportion of those over 65 years forecast to increase from 24% to 32% of the population[236], and
- A decline in the proportion of the population who are of working age (20 to 65 years) from 52% to 46%[237].

For the purposes of profiling the existing environment and for assessing local social impacts, the SIA study area profile identifies four community areas within the Project area. These use Census Area Units (or combinations of area units) to describe the community within these them and are grouped as:

- Raumati

---

[233] Kāpiti Employment Areas Study, October 2011 produced by Property Economics Limited for Kāpiti Coast District Council, & Monitoring and Evaluation Research Associates Ltd (MERA) Population Projections 2011.

[234] Kāpiti Employment Areas Study, October 2011 produced by Property Economics Limited for Kāpiti Coast District Council.

[235] Ibid.

[236] MERA Population Projections 2011

[237] Ibid

- Paraparaumu
- Waikanae
- Peka Peka

Raumati: This community area includes QE Park (a significant regional recreational and environmental asset), and the Raumati South, Raumati Beach and Raumati residential areas which have a local focal point at Raumati Village. The 2006 resident population was 8,013.

Paraparaumu: This community area includes Paraparaumu, Paraparaumu Beach and Otaihanga. The community's focal points are primarily at the Paraparaumu town centre and Paraparaumu Beach Village, which are also major concentrations of business activity within Kāpiti. Residential communities give way to peri-urban and rural environments moving north into Otaihanga. The 2006 resident population was 17,247.

Waikanae: This community area includes Waikanae, Waikanae Beach and the locality of Ngarara. The community focal points are at the Waikanae town centre and Waikanae Beach Village. Residential development stretches from the coast to the Kāpiti foothills. North of Te Moana Road, land use shifts to peri-urban and includes future residential growth zones through to a growth management boundary under the District Plan in the vicinity of Smithfield Road. The 2006 resident population was 10,230.

Peka Peka: This community area includes Peka Peka village, adjacent to SH1, and the Peka Peka coastal residential development; these communities are located in an otherwise predominantly rural setting. The rural area is generally rolling open farm land, bounded on the east by current SH1. It is traversed north to south through its centre by transmission lines. The 2006 resident population was 252.

Community areas described and used in the Social Assessment are shown in Figure 30.1.

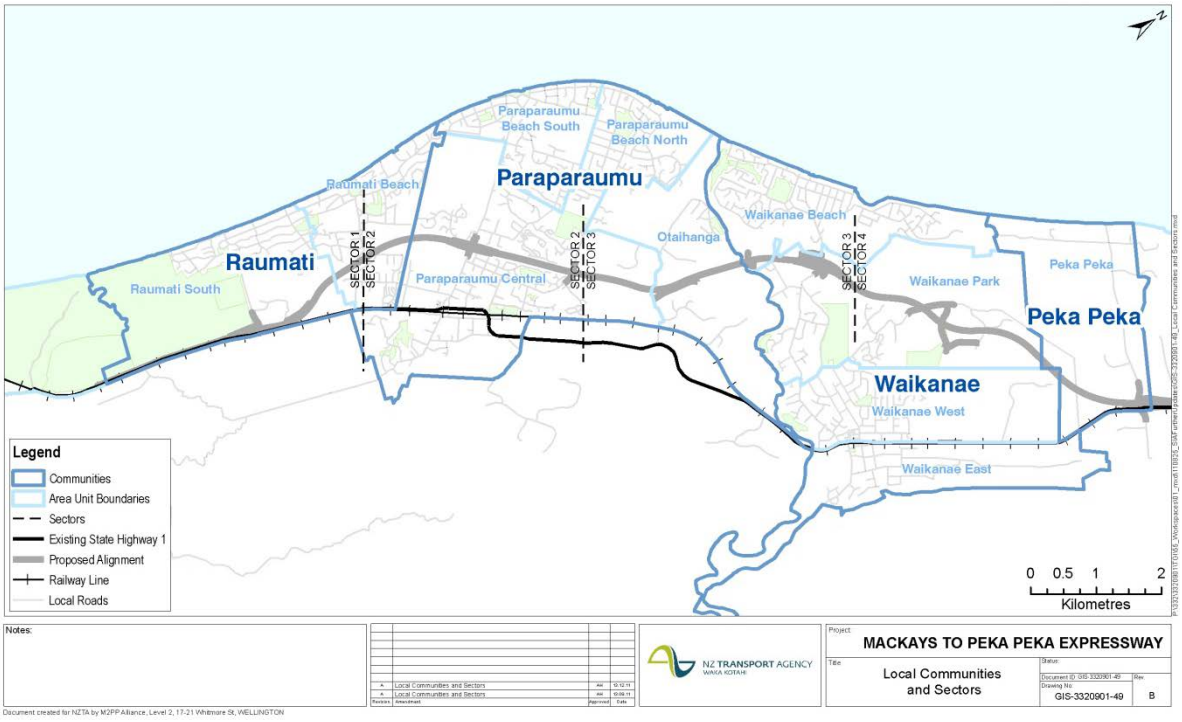

Figure 30.1: Local Communities and Sectors

30.2.1 Investigation and assessment process

As one part of the overall environmental assessment which contributes to the wider decision-making process, the SIA addresses the effects of the Project on people and communities' social well-being.

The assessment of the social effects of the Project includes consideration of the potential effects of a project on social / cultural factors, economic factors, population-based services, individual / behavioural factors as part of the assessment of impacts on people's 'attitudes, expectations and aspirations', 'wellbeing and way of life', 'culture' and 'community'. Overall, relevant health impact issues for the Project have been considered either through Project specific assessments (for example, the assessment of contaminated sites: Technical Report 23, Volume 3), or as part of the Wellington Regional Land Transport Strategy Health Impact Assessment (2006)[238].

The SIA was informed by a number of relevant technical assessments, the findings of which are reported in the SIA where relevant to potential social impacts: examples include air quality and noise impacts on local residents. The SIA therefore considers the effects identified by other technical assessment from the perspective of social wellbeing.

The SIA was informed by:

- site visits and observational surveys in residential, rural and business locations;
- attendance at public expos;
- meetings and interviews with community and stakeholder groups;
- regional and district level demographic and business statistics;
- review of regional and district strategies and policies (particularly the social and community outcomes identified in those strategies and policies); and
- specialist assessment reports commissioned by KCDC.

The SIA was structured to categorise potential effects for people and communities in terms of effects prior to construction, during construction and during operation when the proposed Expressway is in use.

This Chapter does not address the social effects of the route relative to the other route options that were assessed, as these form part of the Multi-Criteria Assessment of Alternative Route Options, outlined in Chapter 9. In addition, this Chapter does not address tangata whenua values, which are addressed in separate cultural impacts assessments (Technical Reports 11 and 12, Volume 3), and summarised in Chapter 14 of this AEE.

[238] The Wellington Regional Land Transport Strategy Health Impact Assessment (2006) provided a strategic level assessment of road crashes / safety, the availability of travel modes / choices and the accessibility of public transport in vulnerable socio-economic areas.

30.2.2 Themes informing the social assessment

The following themes, identified by the International Association for Impact Assessment (IAIA), informed the social assessment for the Project:

- **People's Way of Life**: How people live, work, play and interact;
- **Community**: Its cohesion, character, services and facilities, and stability;
- **Culture**: People's shared beliefs, customs, values and language;
- **The Environment**: The quality of the environment in which people live, work and socialise (e.g. dust and noise they are exposed to, their physical safety, the level of hazardous risk);
- **People's Health and Wellbeing**: The state of physical, mental, social and spiritual wellbeing;
- **People's Personal and Property Rights**: In particular, whether people are economically affected or experience disadvantage; and
- **People's Fears and Aspirations**: Perceptions about people's safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

30.2.3 NZTA policies on social effects

In addition to the IAIA recommendations, the NZTA has its own policies for the social and environmental management in the planning, construction and operation of State Highway projects[239]. Matters that must be addressed include:

- Access and mobility, the ability of State highway projects to connect users to community educational, health and recreational facilities;
- Community cohesion, particularly effects from accessibility and severance;
- Environmental externalities, including air quality, noise and vibration;
- Effects on culture and heritage, e.g. archaeological sites and people's customs;
- Visual quality and urban design, the aesthetics of the built environment; and
- Public health.

These matters were also factored into the assessment of the social effects of the Project. The overview conclusions of this work are set out below, followed by sections providing more specific assessment.

[239] NZTA Minimum Standard Z/19: Social and Environmental Management

30.3 Summary of regional social effects

30.3.1 Transport, accessibility and connectivity

The operation of the proposed Expressway is anticipated to result in significant positive social benefits for transport, accessibility and connectivity to the Wellington Region in terms of more reliable travel, improved accessibility (through reduced travel time and accessibility resilience in the event of an accident or natural disaster) and enhanced connectivity and travel safety through the Region and in and out of the local area. Construction of the Project is anticipated to cause moderate to minor adverse effects on connectivity in terms of temporary delays and inconvenience, mainly at the two locations where the proposed Expressway will join the current SH1.

30.3.2 Economic growth and development

The operation of the Project is expected to have significant positive social benefits derived from the growth and economic development that would occur through reduced travel time, travel time reliability, and improved accessibility. Construction of the proposed Expressway is expected to provide employment and opportunities to improve people's economic and social wellbeing throughout the Wellington Region (such as for those providing services for the Project and people employed in the Project).

30.3.3 Healthy communities

A reduction in traffic congestion, improved access to recreation/leisure opportunities and health services, improved traffic safety, and increased access to active modes of transport are anticipated from the Project: these improvements are anticipated to have health benefits. Vehicle emissions are anticipated to be within health standards, although some people are likely to be continue to be concerned that vehicle emissions will adversely affect their health.

30.4 Summary of social effects on the community during construction

30.4.1 Overview

Construction activity, although temporary, will affect the local communities and particularly those near construction activities.

Commencement of construction will end uncertainty about the Project proceeding or not, and as a consequence will enable people to move on with planning their lives, and to solidify their expectations and aspirations for the future. Effects on peoples' attitudes, expectations and aspirations will depend on their individual perspectives and on the level of nuisance they experience during construction.

The main social effects arising from construction activities are considered to relate to:

- physical disruption of communities and severance effects;
- construction noise and vibration effects;

- air quality effects;
- traffic and access effects;
- effects on recreational activity;
- landscape and visual impacts; and
- cultural effects

Additionally, the following are described as potential adverse social effects arising from the Project's construction:

- anxiety about construction effects; and

disruption to the community from the relocation of residents or businesses.

30.4.2 Disruption of neighbourhoods

The Project is largely within the designation footprint which has been in place in one form or another since the 1950s for prior roading project proposals, and therefore occupies an area long set aside within the community for transport purposes. However, some sections of the Project deviate from the existing WLR designation footprint, primarily near Leinster Avenue in Raumati, and in the vicinity of Puriri Avenue in Waikanae.

A total of 84 property owners (excluding the Crown and KCDC) have land that needs to be acquired in whole or in part to construct the Project. Of these, land has been acquired from 21 property owners as at February 2012. The land required from the remaining 63 property owners includes 24 houses to be removed for Project works. This in turn will require the residents to relocate, some of whom already have. Most of the households that are required to be relocated are in the vicinity of interchanges at Poplar (Raumati) and Te Moana Road (Waikanae). Five commercial businesses are also affected. The neighbourhoods in which such disruptions are:

- Disruption of the existing residential area north of Poplar Avenue in the vicinity of Leinster Avenue and SH1, with 21 properties[240] required in full, and nine in part, involving the relocation of households and two businesses.
- In Paraparaumu, in the vicinity of the Kāpiti Road interchange, five properties are required in full (two houses and three commercial buildings), and nine further properties in part.
- Disruption of the residential area north of the Waikanae River in the vicinity of Puriri Avenue and Te Moana Road with 16 properties required in full, and eight in part. This involves relocation of households and businesses where the proposed Expressway deviates from the existing designation alignment.
- In Peka Peka, five properties are required in full and two in part.

[240] The term "properties' refers to an individual landowner, noting that a landowner may own more than one parcel of land.

The social effects of the requirement for relocation of households and businesses are, to a degree, hard to quantify, as it is not certain that these households or business can or want to shift within the community. However, it is recognised that the requirement for these properties will result in disruption to and potential loss for the local communities, particularly if the people or businesses move out of the community.

To provide certainty to property owners, the Crown has initiated the process of offering to purchase directly affected land along the alignment, based on 'willing buyer / willing seller' negotiation. As noted above, at the time of lodgement, purchase agreements are in place for 21 property owners.

Current neighbourhood social dynamics have been, and will continue to be, disrupted while these property acquisition processes continue. The incidence of effects on households displaced and those who remain has been strongly felt and this has been unsettling for those involved. This has elicited a range of responses from reluctant acceptance to ongoing opposition to the Project.

30.4.3 Disruption of businesses

Project requirements necessitate displacement of two businesses at Raumati, three businesses at Kāpiti Road and three businesses at Te Moana Road, as well as operational changes for affected rural-based businesses.

The Crown is progressing acquisition agreements with all of the businesses that would be displaced. Social effects of these businesses moving to new locations are assessed to be low and the community is expected to readily adjust to their relocation.

In addition to those directly affected, businesses at other locations within Kāpiti will likely relocate in response to the proposed Expressway, either to take advantage of new traffic flows or to respond to the potential for decreased patronage at their current location. Businesses heavily dependent on passing vehicular traffic will be most affected. These effects are discussed in Chapter 29 of this AEE on economic effects. This assessment includes recognition that some businesses will benefit from construction and / or operation of the proposed Expressway, and that on balance there are net benefits to the Kāpiti District, in addition to national and regional level benefits.

In terms of RMA considerations, the nature and scale of the effects on businesses is such that it is unlikely to have a significant effect on the ability of the District's residents to provide for their social well-being.

30.4.4 Social effects of construction work

All people in the local communities will be affected in some way by construction in that it will disrupt people's patterns of movement, creating a level of disturbance, nuisance and stress. Such effects are common to all road construction, maintenance and upgrading.

The Project also would have the potential to affect daily patterns of living especially for those near construction works. Noise, dust and vibration from construction activities have the potential to effect people in and near social sites where people gather, and at residences that are near construction

activities. Several people's wellbeing and way of life will be affected, especially those who live or work near construction sites or where their property access is affected. There is likely to be disruption and periods of inconvenience for those travelling by road or bus, and for cyclists, pedestrians and horse riders.

Over the expected course of the construction phase, the social effects on the local community are expected to range widely. However, the potential adverse social effects of Project construction are generally experienced more by those living in proximity to the construction works. It is therefore important that these people are included in the communication and liaison processes over the construction period.

Management and mitigation of construction effects will be particularly important for maintaining the local communities' wellbeing and quality of life during construction. The proposed mitigation includes proactive community engagement and liaison, communication management, construction management and systems to seek to ensure that the NZTA is responsive to community concerns over the construction period, particularly vulnerable groups in the community such as elderly and the disabled.

Day time construction noise will be elevated from the current noise environment in most locations, and residents will experience some nuisance / disturbance particularly at times of noisy works. People who stay at home during the day (including people who work from home, are sick, or who work night shifts) are likely to be disproportionally affected by long periods of noisy works. As Kāpiti has an older population than the New Zealand average age profile and higher than average proportion of persons working at home, this issue is given specific attention under the CEMP in Volume 4.

The largest proportion of the construction works will be in the vicinity of the interchanges, bridges and other structures. Residents in close proximity to these areas are likely to be subjected to long periods of noisy works, and where piling works are occurring intermittent vibration effects. Effective noise and vibration management is therefore essential to reducing these noise effects as far as practicable.

Dust and sand can affect human health and be a nuisance to the surrounding public by causing deposits on and in houses, cars and washing. Dust and sand may also impact on people's enjoyment of outdoor areas and cause perceived or actual health impacts. The air quality assessment, described in Chapter 20 of this AEE and in Technical Reports 13 and 14, assesses the potential effects associated with construction (dust and vehicle emissions) along key routes – and focuses on sensitive receptors in the community, such as residential areas, schools, preschools and healthcare facilities. Management measures via the CEMP in Volume 4 are designed to seek to ensure that the adverse effects of dust will be acceptable at these locations.

During the construction phase, some suburban and rural roads will be used for construction-related traffic. Most construction related traffic movements will be directed via the current SH1 into Otaihanga Road and onto the alignment which will be used as a haul route, or via SH1 from the Peka Peka Road and Poplar Avenue intersections. Use of Kāpiti Road and Te Moana Roads will also be required.

Temporary disruption to access to and from community facilities, schools, health centres and parks (regional and district), and on cycleways and pedestrian linkages will therefore occur on an intermittent basis. There are a number of community facilities in close proximity to the Project, and there may be

some inconvenience to users of these facilities during construction, particularly in relation to access for these facilities. In particular:

- At Kāpiti Road, access to the Paraparaumu Library and community centre, Paraparaumu Airport, Paraparaumu Town Centre
- At Waikanae, access to the El Rancho Christian Holiday Camp, access to the Takamore urupā, and Waikanae River Trails
- Other key recreational facilities, including Otaihanga Bike Park and QE Park.

Requirements to comply with a Construction Traffic Management Plan in Appendix O of the CEMP (Volume 4) and the availability of alternative public access points elsewhere will seek to ensure that impacts on peoples' way of life will be acceptable and appropriately managed. Traffic effects are discussed in Chapter 12 of this AEE and in Technical Reports 32 and 33 in Volume 3.

30.4.5 Temporary Effects on Community Well- being

Construction works, especially those with long timeframes, can be socially disruptive and have the potential to represent an annoyance to surrounding residents and road users. Good management of these construction works will influence the community's acceptance of these works and the degree to which their quality of life is affected.

Until the works begin, some residents are likely to remain unsure and may be anxious as to what they will be facing. Provision of quality information to enable people to understand the nature and duration of effects facing them is important to help lessen this source of anxiety.

For some residents, there will be a sense of relief once construction of the Project finally starts, given the long duration of previous designations and the speculation and uncertainty about various project proposals that have spanned many years. This relief, however, may be tempered by the extent to which they are directly affected by the length of construction period.

As described above, it will be important to have an effective communications process over the construction period of the Project to minimise the degree of uncertainty.

30.4.6 Temporary benefits of construction to the community

Around 500 construction workers are likely to be engaged over the peak construction periods. There will be an influx of construction workers at the major construction sites, predominantly around bridges and structures. This may bring significant benefits, particularly in terms of increased spending at local businesses (especially food outlets).

30.5 Social effects from the operation of the proposed Expressway

There are a number of operational consequences of the Project, outlined in the SIA, which may impact on people's wellbeing and way of life. The following sections outline the long-term social impacts, and cross reference to the relevant Chapter and technical report for more information on specific effects.

30.5.1 Overview

By the time the Project is constructed, most residents can be expected to have factored the Project into their own expectations and aspirations about the future of their lives and communities. This is particularly the case given the relatively long construction period associated with the Project (four years). Based on the feedback received during consultation, the proposed Expressway coming into operation is an experience that some people have not been looking forward to, particularly those living in close proximity to the Project. Conversely, a significant proportion of the feedback received indicates that many in the community will welcome the proposed Expressway coming into operation.

The proposed Expressway will be a new transport option for local communities. It will offer greater access and shorter travel times to educational and social services, and reserves and recreation. It is expected that there will be improved travel experiences for vehicle users, public transport users, and cyclists and pedestrians. Economic benefits are anticipated from these including increased attractiveness of the local area to businesses, employment opportunities, and reductions in unemployment and underemployment.

However, the proposed Expressway is likely to have a severance effect to some extent, especially in Paraparaumu and Waikanae. While the proposed Expressway will reduce traffic volumes on many local roads and maintain all east-west local road connections, it will create some physical severance: in particular, Leinster Avenue will become a cul-de-sac, and some existing informal walkways across the designation corridor will be severed. In addition, the changing nature of traffic in some neighbourhoods may affect the ease of connectivity across some routes (for example, because of anticipated future traffic volumes on Park Avenue). These changes, as well as the presence of a long hard linear section of infrastructure will also present a psychological severance for some residents.

Noise effects of the operational proposed Expressway have perhaps the greatest potential effect on the wellbeing and quality of life of residents in the local communities. Given the existing moderate to low-noise environment where the Expressway is proposed, the Project will increase ambient noise levels, especially for residents close to the proposed Expressway in areas where there is little existing traffic noise. The noise mitigation measures proposed have been identified as the 'best practicable option' by those specialists involved in that design process. These options have taken into account the need to mitigate effects beyond the physical effects of noise; for example, the visual and amenity effects of noise barriers. Overall, the proposed noise mitigation will ensure residents will retain an appropriate quality for their living environment, although it is acknowledged that this change will not necessarily be acceptable to all affected residents as it still reflects a change from their current situation. For some others, the quality of life is anticipated to be improved by greater access to and improved travel times on the proposed Expressway.

Overall, the range of social effects of operation of the Project for the local communities is anticipated to range from significantly adverse (particularly in regard to some people's attitudes and expectations) through to significantly positive (particularly in regard to the Project's economic and travel benefits).

The following section assesses some of the long-term effects on the communities' social well-being in greater detail:

- Severance Effects

- Effects on Community Health
- Effects on Living Environments
- Effects on Recreational Values
- Effects on Community Well-being

30.5.2 Severance effects

There are two aspects to considering what is known as the 'severance effect' of constructing a new road such as an expressway:

- the physical disruption to connectivity and movement (both vehicular and non-vehicular), and
- the perception of severance from establishing a long linear hard section of infrastructure.

30.5.2.1 Connectivity and movement

Generally, the Project will reduce vehicular travel distances and maintain or enhance accessibility and connectivity within and between the communities within the Project Area. This is achieved through:

- Provision of a new walking / cycling path alongside the proposed Expressway and connections to the local KCDC Cycling / Walking / Bridleway network,
- Maintenance of all major east to west local road connections,
- Retention of urban local road crossings at grade below the proposed Expressway to support walking, cycling, and recognising the needs of the mobility impaired;
- The reduction of traffic volumes on many local roads, as well as the existing State Highway;
- Provision of new pedestrian footbridges to offset loss of current informal tracks across the existing designation alignment;
- Enabling easier access to rail and bus stations as traffic on the existing SH1 will be reduced once the Project is operational; and
- Enabling consideration of options for new bus 'loop' services via the proposed Expressway.

These outcomes are considered to result in positive social impacts on people's patterns of daily living, and there will be an overall net benefit to people's access to and use of the State highway network and local roads.

Improved accessibility along the proposed Expressway will result from the provision of an additional bridge crossing at Waikanae. Full interchanges at Kāpiti and Te Moana Roads will benefit people's patterns of daily living by improving connectivity and reducing travel times. This includes improving connectivity to local places of work, leisure, and community facilities, as well as to other areas in the Wellington region and facilities of regional importance, such as the Wellington Regional Hospital and Wellington International Airport.

The Project is identified as having the potential to enhance the overall level of business investment and development[241]. While any adverse business displacement effects at Waikanae, Paraparaumu and other Kāpiti locations are likely to be business-specific and localised, the broader impacts of the proposed Expressway on business activity is considered to be positive.

While there has been comment from some residents and businesses at Peka Peka who feel disadvantaged by the proposed partial interchange in that location, which would not provide either for local traffic to travel south on the proposed Expressway, or for northbound traffic coming off the proposed Expressway to Peka Peka. However, given the small population in the vicinity and the alternative routes for local traffic to travel south and north (via either the existing State highway and via the coastal road), this effect would be a relatively confined impact.

A significant beneficial impact for the residential communities along current SH1 is the overall reduction in traffic, as well as the reduced severance from facilities such as train and bus stations at Paraparaumu and Waikanae. In this instance, 'severance' is used to describe the effects of roads and traffic that physically separate a community from other communities or community services and facilities. Roads and traffic can affect social interaction and accessibility, particularly when the roads are wide and/or there is a high volume of traffic as is presently the case with current SH1. The current SH1 also presents difficulties for local traffic entering the State highway network. The safety record of the current SH1 within the Project area is poor. Community perceptions are that there is danger associated with living near the current SH1 due to access concerns and safety concerns regarding walking alongside it in higher speed limit sections.

The improved ease of access across the existing SH1 to public transport facilities, and community and residential areas in eastern Waikanae, will reduce severance perceptions for private residences that are accessed off SH1. The redevelopment of the existing SH1 will, enhancing opportunities for amenity improvements at town centre frontages to current SH1 at Paraparaumu and Waikanae.

Potential enhancement of the urban environment along the existing SH1 once the proposed Expressway is in operation is being jointly investigated by KCDC and NZTA, and received overwhelmingly favourable responses from the community during consultation.

Public transport commuters and residents have stated that crossing current SH1 presents a number of safety and mobility issues for residents and is an existing community severance issue, posing both a real and perceived barrier.

30.5.2.2 Severance perception

The proposed Expressway would introduce a significant new infrastructure element into what is a perceived as an open and relatively undeveloped and natural environment, compared with adjacent developed areas. The introduction of the Project is therefore likely to alter the sense of connection

[241] *Kāpiti Employment Areas Study*, October 2011, produced by Property Economics Limited for Kāpiti Coast District Council.

across the designation, notwithstanding that all main east-west road and pedestrian linkages will remain intact and at grade after the proposed Express way is constructed.

The proposed Expressway design utilises a range of design solutions seeking to lessen 'barrier' perceptions such as:

- Choice of alignment to set the proposed Expressway into the landscape and make it less prominent through shielding by land contours, use of landscape planting, provision of bunding, and structural design choices;
- Where, practicably, the proposed Expressway has to be elevated, design attention has been given to the experience of passing under the proposed Expressway bridges, and for those living or moving alongside the proposed Expressway, including through proposed planting and screening; and
- Provision of cycleway / walkway / bridleway facilities along the proposed Expressway and linking to the Kāpiti Coast District Council paths network; this would assist the sense of connection through clear means of accessing neighbourhoods along and across the proposed Expressway.

The Project, particularly in those sections of the alignment that deviate from the WLR road and previous motorway designations, will cause some physical disruption of the existing urban fabric and may give rise to perceptions of severance in some locations. In particular, the Project would create the perception of a 'barrier' between neighbourhoods on either side of the proposed Expressway due to the scale and operational characteristics of the proposed Expressway.

The significant reduction in traffic on the existing SH 1, particularly heavy vehicles, will reduce the severance effects that such traffic have on the existing communities in Waikanae and Paraparaumu. It would also provide an opportunity to further reduce this perception by enhancements that could be made to the road environment.

Users of informal walking tracks across the existing designated land face physical disruption of these links during the construction and into the operation of the proposed Expressway. The proposed Expressway would cut off some informal walking tracks across the existing designation, particularly in Raumati South and between Kāpiti and Mazengarb Roads. Project analysis of walking movement 'desire lines' has identified what are considered to be optimal locations for reinstating connections via two pedestrian over bridges. Once the proposed Expressway has been constructed, this connectivity will be largely reinstated through two new pedestrian bridges across the proposed Expressway at Raumati South and Paraparaumu, in conjunction with the proposed Expressway long walkway/cycleway. Nonetheless, perceptions of severance are likely to arise for some users of informal tracks.

30.5.3 Effects on community health

The proposed Expressway design and associated improvements to the overall transportation network will bring about significant improvements to road safety.

This will have a positive impact in relation to the health / wellbeing of local residents (as well as road users from elsewhere in the Region). The existing SH1 along the length of the Project has a poor crash rate history, including three fatalities in 2011.

The Project is expected to significantly improve road safety performance by providing a road built to improved modern design standards. The Project will feature safety measures, such as a continuous median barrier separation for northbound and southbound traffic and grade separated intersections. The overall effect will be improved road safety for road users. There will also be benefits for the communities along the existing SH1 where traffic will reduce.

At Kāpiti Road and Te Moana Road in particular, as well as at Poplar Avenue and Peka Peka Road, the interchanges will introduce increased traffic volumes. This has the potential to decrease road safety for people within these areas. However, the proposed design of the Project, including some proposed works on the sections of local roads which tie in to the Interchanges will mitigate the potential adverse effects of increased traffic for road users and for pedestrians and other users such as cyclists in these areas.

The incidence of crime is often reduced when areas are lit at night time and have increased traffic volumes. As such, this is a positive effect resulting from the operational phase of the Project, especially in areas that previously had low traffic numbers, such as in Peka Peka. Offsetting this will be some people's desire for quietness and not having lighting in rural areas.

In terms of route security and resilience, the existing SH1 between MacKays Crossing and Peka Peka is vulnerable to several threats which collectively reduce the security of the route. Primary risk events are large earthquakes, high rainfall events which cause flooding, and road traffic crashes. The Project will improve the security of the State highway network and the security of the Regional and District road network by providing an alternative route to the current SH1. The modern design standards will also provide increased resilience to natural hazards.

The result of this is the likelihood of a reduced network closure period in the event that the Main Alignment is affected by any of these threats, providing a positive effect for people's wellbeing. Reduced road closure periods allow for more rapid response by emergency services and improved access to regional hospital facilities and recovery logistics hubs following a major natural disaster.

The Project will also provide additional access options to key electricity transmission, gas and water infrastructure following an event. The availability of alternative routes will also allow traffic to be diverted, rather than stopped, in the event of a road closure on one of the routes. These measures positively impact on people's confidence in the transport network and on their health and safety.

30.5.4 Effects on living environments

In terms of the effects of the proposed Expressway on the sense of place and neighbourhood character, the potential impacts in relation to people's expectations of local character vary between community areas, and according to people's individual expectations.

For example, the 400-plus residences alongside the current SH1 will experience the operational 'reality' of the proposed Expressway as a decrease in traffic locally which is highly likely to be perceived to be an

improvement to the existing environment. In other areas, impacts on people's local living environment will be significant and permanent, such as adjacent to the proposed Expressway in the vicinity of Te Moana Road. The physical presence of the proposed Expressway will be a psychological barrier for some people affecting their sense of local character.

For the rural section of the Project (i.e., between Ngarara Road and Peka Peka) there will be a significant change to the local character and landscape caused by the new road structure and associated traffic. Given the general absence of community infrastructure in the area, services and facilities are not affected.

Varying in extent between community areas, the Project will result in a permanent alteration to the local character of areas along the alignment, including:

- For the MacKays to Poplar Avenue segment of the Project, the change in character will generally be caused by the effects experienced by QE Park users who are already in an environment affected by the existing SH1.
- From Poplar Avenue to south of Raumati Road, the proposed Expressway and structures are located within new designation boundaries, creating exposure to new noise and activity levels.
- From Raumati Road to Kāpiti Road, the proposed Expressway and structures will generally be located consistent with existing designation boundaries as they affect the communities and will form an edge effect.
- The interchange at Kāpiti will introduce a change of character to the business and community areas particularly in terms of new structures, including noise barriers, and increased volumes of traffic and the consequential increased sense of activity.
- Residential areas north to Mazengarb Road and the Waikanae River will experience a change in local character because of modification of the current rolling dune landscape, and some properties will have views of the new road.
- At Waikanae River to north of Te Moana Road, residents and recreational users will experience exposure to new noise and activity levels as well as an edge effect to adjacent properties.
- North of Te Moana Road to Peka Peka, the semi-rural and rural experience will significantly alter with exposure to new noise and activity levels, as well as an edge effect to adjacent properties.

As previously discussed in relation to connectivity and movement, there will be a corresponding reduction in severance caused by the volume and nature of traffic on the existing SH1, which increases accessibility and safety. Reduced severance can also improve the amenity and local character of these locations and communities.

Given the level of attention that has been given to the design of the proposed Expressway alignment, intersections, pedestrian facilities, walkways and cycle-way connections, and landscape and ecological planting, while it will alter the character of communities along the route, it is anticipated that the actual effect of the Project on the living environment and people's sense of place will not be significant.

The main visual effects during the construction phase will arise from earthworks modifying existing landforms including the dunescape through ground improvement activity, cut and fill works, and the building of structures.

In addition, other visual effects will arise from construction yards, partially completed road elements, and concentrations of vehicles and machinery at the construction sites.

These elements will represent a significant change in the amenity and the 'look and feel' of neighbourhoods adjacent the Project, in rural areas, and in recreation areas such as at the Waikanae River Trails, and QE Park.

For those who will have a view over construction sites as it is likely that construction will span a four to five year period means these effects are of a moderately long duration. This may affect people's pride in their neighbourhood. However, as the visual effects of construction are temporary, it is not considered to have a significant impact on wellbeing or way of life. Some people will have a genuine interest in the construction work and activity in their neighbourhood and may consider that the visual impact of construction is not an adverse effect.

Landscape and visual effects are discussed further in Chapter 17 and in Technical Report 7.

30.5.4.1 Noise and vibration

All properties near the main alignment of the proposed Expressway and those which are considered to be sensitive receptors – including schools and residential properties, care centres and churches – have been assessed against the New Zealand Standard 6806:2010 Acoustics: Road Traffic Noise.

Without any mitigation and management measures it is likely that there will be adverse effects to surrounding communities at numerous residential sites, and facilities arising from noise. Project design has therefore included:

- noise reducing road surfacing,
- a wide designation footprint (generally around 100m) to enable greater separation from properties and to enable mitigation measures such as bunds to be 'designed in', and
- noise barriers where typography or other considerations mean the above responses are not practical.

These measures will ensure received noise is within New Zealand standards. Noise effects are discussed in Chapter 19 of this AEE and the Technical Reports 15 to 19.

Heavy vehicles on roads can generate vibration that travels through the ground to nearby houses. Typically, this vibration will be well below limits set to avoid structural damage to houses or cosmetic damage such as cracking plaster and paintwork. Vibration levels reduce as vibration travels further away from a road. A detailed assessment of road-traffic vibration has been conducted (refer to Chapter 19 of this AEE and Technical Report 18 in Volume 3), which includes measurements of vibration from test sites in Kāpiti.

The noise effects of the proposed Expressway once it is in operation have perhaps the greatest potential effect on the wellbeing and quality of life of residents in the local communities. Overall, the proposed noise mitigation is considered to enable residents to retain an appropriate quality of living environment. However, it is acknowledged that this change will not necessarily be acceptable to all affected residents as it still reflects a change from their current situation.

30.5.4.2 Air quality

Vehicle emissions and the potential adverse health impacts associated with these emissions are a potential impact relating to the operational phase of the Project. Air Quality effects are outlined in Chapter 20 of this AEE and in Technical Reports 13 and 14 (Volume 3), and should be read in conjunction with the Traffic and Transport Chapter 12 and associated Technical Reports.

Traffic volumes are predicted to increase at locations near proposed Expressway interchanges, particularly Kāpiti Road and Te Moana Road, once the Project is operational. Traffic volumes are predicted to decrease along the length of current SH1 through the established residential communities and business areas north of Poplar Avenue, through the Paraparaumu and Waikanae town centres, and north to Peka Peka Road. Traffic volumes on many other local roads are also expected to reduce once the proposed Expressway is in operation.

30.5.4.3 Amenity values

The completed Project will represent a significant change in the amenity values[242] of the area for local residents, with potential adverse noise and visual effects, particularly for those with a view of the Main Alignment, bridges and structures. Effects on amenity values are further discussed in the Urban Form Chapter 16 and in Technical Report 6.

There will be an adverse effect on amenity values arising from the removal of the contribution that the undeveloped designation corridor currently provides to the neighbourhoods along its alignment. At present, the designated land has a natural and, in many locations, quiet character. This will be fundamentally changed by the proposed Expressway in some locations, for example in the vicinity of Puriri Road, Waikanae.

There will be an effect on the amenity values of QE Park as the proposed Expressway alignment cuts through at its northeastern corner, a part of the Park that is generally unused by the public.

[242] 'Amenity values' under the RMA mean those natural or physical qualities or characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes.

30.5.5 Effects on recreational values

The proposed Expressway will have some effects on the community's ability to access and enjoy the recreational opportunities in the District. Some of these effects will be beneficial, particularly in terms of providing increased connectivity and access and the enhancement of the area's cycling and walkway network.

At the southern end of the Project, while the route will permanently remove approximately 4 hectares of QE Park, pedestrian and cycle linkages will be maintained and enhanced across the Project, and the NZTA is working with GWRC and DOC on measures to improve cycling facilities within QE Park that can link with the proposed walkway/cycleway along the proposed Expressway corridor. NZTA is also working towards offsetting the QE Park land required for the proposed Expressway with an equivalent area of land in a location adjacent to the Park. This process is occurring outside the NoR process, as it involves other statutory processes and agreements.

During construction there will be disruption and changes to the northeastern corner of the Park (currently used for farming purposes) to build the north bound off-ramp at Poplar Avenue, and to establish set down areas and temporary yards for construction activities. Approximately 10.85 hectares are required on a temporary basis. The effects of these works include the need to limit public access in the vicinity of Poplar Avenue for the construction set down and yard area, and traffic management arrangements to ensure safety of those walking and cycling in the Poplar Avenue vicinity.

The Waikanae River Trails and Wharemauku Stream walkway are moderately to heavily used by the community. Bridge construction at these locations will temporarily affect the use and enjoyment of these specific locations. Pedestrian and cycle activity on local roads crossed by the proposed Expressway will also experience localised effects. Requirements to comply with a CEMP and the availability of alternative public access points will seek to ensure that the impacts on peoples' way of life will be acceptable and that safety will be appropriately managed.

At the Waikanae River Trails, physical access will be maintained during construction by using diversions and keeping at least one trail open at all times. On completion, the proposed Expressway design incorporates measures to seek to ensure that the pedestrian environment under the proposed Expressway bridge continues to invite use of these routes.

There will be longer-term effects on the amenity values of the Waikanae River Trails once the Project is operational. However, the design of the proposed Expressway includes a number of mitigation measures beyond those achieved through choice of Project alignment and designation width:

- Quality of design for bridges and structures,
- Provision of bunds and planting for many affected visual outlooks,
- Noise bunds and barriers for increased noise effects.

It is considered that implementation of these will reduce the potential amenity related adverse effects to acceptable levels.

Horse-riding in the vicinity of Raumati Road and through the northern portions of the Project area is identified in the SIA as an important recreational activity, both on private land and on local roads. There may be some disruption to this activity during construction of the Project resulting from additional construction traffic on roads causing safety concerns, and from occupation of publicly owned land (i.e., in the vicinity of the Waikanae River). Similarly, construction of the Project has the potential to affect the regional cycle route via SH1 at MacKays Crossing through the Raumati Straight and to the north.

There will be other effects on recreation as a result of the construction of the Project. Water based recreation may be affected, as people are less likely to swim, fish or participate in water sports if the water quality of Waikanae River and other streams and / or the Waikanae Estuary is perceived to be affected; for example, by any temporary sedimentation resulting from the Project.

Management measures are to be put in place to seek to ensure that the adverse effects on water quality will not be significant during the construction of the Project, to reduce the risk of recreational opportunities being affected.

Construction of a north / south cycle and walking path as part of the Project, linking to KCDC networks and regional routes (via QE Park) to the south offers significant recreational value to the community.

30.6 Conclusions of the social effects assessment

From a regional perspective, it is anticipated that there will be significant social benefits resulting from the Project, particularly economic and transport/accessibility benefits. The Project is also expected to yield economic and accessibility benefits to the District and local communities, with consequential social benefits. However, there are negative social effects of the Project, which are borne predominantly by those in close proximity to the Project, particularly those neighbourhoods immediately adjoining the proposed Expressway. It is also recognised that the presence of the proposed Expressway in the local communities will result in a change to the character of those communities.

Given the alignment and design of the proposed Expressway has sought to either maintain the existing level of connectivity, particularly in regard to east-west links, or to enhance such connectivity (such as by providing a second crossing of the Waikanae River and by developing a cycleway/walkway the length of the Project), the actual physical extent of severance would be minor. However, it is acknowledged that, for some residents, the physical presence of the road will be perceived as a psychological severance.

Many of the negative social effects would occur during construction. It is important that these effects are monitored and mitigated through effective construction management, communication and community liaison.

The Project design has mitigated a number of potentially negative social effects (including the reduction of reducing the acoustic and visual effects of the proposed Expressway, and maintaining local accessibility in the local communities).

30.7 Measures to avoid, remedy or mitigate actual or potential adverse effects on the social environment

The SIA identifies a range of significant benefits arising from the construction and operation of the Project. There will also be adverse social effects associated with the Project, primarily of a temporary nature arising from transitional effects on residential, business and rural environments adjusting to the presence of the proposed Expressway.

30.7.1 Mitigation of social effects on the region

To address the potential effects of construction in particular, it is proposed to continue to engage and communicate with people in the Region over this phase of the Project. In particular, the importance of keeping the community informed on construction activities and potential accessibility / travel time impacts of construction will provide opportunity for reducing the social disruption due to construction effects; for example, by allowing people to plan for travel time delays.

With mitigation measures in place, the overall effects of the Project on the Region are anticipated to range from moderately negative on occasions during construction to significantly positive when the proposed Expressway is in operation.

30.7.2 Mitigation of social effects on the community

From the SIA, the following primary potential adverse social effects from construction and operation were identified:

- community anxiety (construction phase)
- noise and vibration (construction and operational phases);
- air quality (construction phase);
- traffic and access (construction and operation phase);
- amenity (operational phase);
- recreation (construction and operational phase);).
- local character changes (construction and operational phase).)

For the construction phase of the Project, the CEMP in Volume 4 and its subsidiary plans for noise / vibration, air quality and traffic are used and will form part of the suite of consent and designation conditions. The NZTA will require its contractors to perform to a high level in relation to managing stakeholder and community expectations.

Communication will be the key tool to manage effects, allowing the NZTA and the contractors to understand how the community feels and ascertain the most appropriate way to manage community concerns. The NZTA would commit to:

- Being proactive and providing clear information on the Project in a timely manner,
- Engaging in dialogue on Project timing and options as they affect specific properties, and

- Providing an avenue for certainty and closure by purchasing affected properties, offering to purchase property ahead of the proposed designation being confirmed.

As described above, the NZTA is proposing to undertake a number of other measures that would occur under other statutory processes outside the framework of the RMA. These measures also require the agreement of key stakeholders, and are therefore not appropriate to regard as potential conditions of the designation/resource consents.

A table summarising the principal mitigation measures that are proposed to be undertaken by the NZTA to address the actual or potential social effects is presented below. Many these measures have been proposed in regard to other specific effects of the Project, and therefore duplicate other measures proposed by the NZTA. These measures are in addition to the mitigation proposed as part of the overall design of the proposed Expressway.

Table 30.1: Mitigation measures for Social Effects

Identified actual or potential effect	Method to avoid, remedy or mitigate potential effect
Adverse construction effects	▪ Implementation of a Stakeholder Communication Management Plan ▪ Implementation of a CEMP (in Volume 4), including communications strategy and processes to respond to queries and complaints ▪ Establishment of a local liaison group(s) with representatives of affected communities ▪ Provision of updates on construction to local and wider communities, with contact details and processes for engaging with the NZTA ▪ Post-construction return of land not required for Project operation as soon as is practicable
Community Anxiety	▪ Regular communications and project information on timelines, sources of information, and advice ▪ Continuation of active property purchase programme by the Crown ▪ Liaison person to answer queries and concerns
Adverse effects on living environment	▪ Mitigation of construction noise and vibration as recommended in Chapter 19 (Noise and Vibration) of this AEE, and to be set out in the CEMP (Volume 4) ▪ Noise bunds and planting incorporated as set out in Chapter 17 (Landscape and Visual) of this AEE ▪ Quality design of structures to mitigate adverse visual effects as set out in Chapter 16 (Urban Form & function) of this AEE ▪ Opportunities to include the community in the implementation of the landscaping design (for example, community planting days) ▪ The design of urban area bridges and structures applies CPTED principles to encourage safe and useable facilities
Adverse potential adverse effects on recreation:	▪ The Construction Traffic Management Plan (Appendix O of the CEMP, Volume 4) recognises and provides for recreational activities which use many local roads ▪ Maintain provision for walking and cycling along the Waikanae River and Wharemauku Stream corridors during construction ▪ Effects on water quality are managed through methods for erosion and sediment control
Severance	▪ Liaison with KCDC to determine appropriate locations for proposed pedestrian crossings of the proposed Expressway at Raumati and Paraparaumu

PART H: MANAGEMENT OF ENVIRONMENTAL EFFECTS

31 Environmental management and monitoring

Overview

The Project design process has sought to reconcile a diverse range of environmental, social, cultural and economic values. The starting position for this has been to try and avoid or reduce potential adverse effects, while maximising positive effects.

Potential adverse effects that are not able to either fully avoided or adequately mitigated through design measures incorporated into the Project will require careful management throughout the construction and operation of the Project.

The Project delivery framework described in this section sets out how the Project will be delivered through to commissioning. This identifies where, in addition to the design detail contained in the plans and application documentation filed for this application, there is a role for management plans and other key processes (such as community liaison).

The overall management plan framework is set out, with two tiers of management plan being proposed:

- an overarching Construction Environmental Management Plan (CEMP); and
- a series of topic specific management plans (such as for noise and air quality)

A CEMP and topic specific management plans have been prepared and are contained in Volume 4. Some of the management plans or their components necessarily have to remain in draft form until statutory approvals are in place and further detailed design work is undertaken. The detailed design work will inform Management Plan finalisation via a certification process with either the Regional or District Council depending on who has statutory responsibility for the matter.

These Management Plans provide detail about how potential environmental effects will be dealt with. The management plans also cover proposed environmental monitoring which will be undertaken prior to, during and following construction to monitor potential effects, and provide a mechanism through which additional measures can be implemented during construction and operation if necessary.

31.1 Introduction

The assessment of environmental effects in Volume 2 identifies a wide range of positive and adverse actual and potential environmental effects predicted to result from the construction and operation of the Project.

Many potential adverse effects have been avoided completely or at least significantly reduced through design measures that have been incorporated into the Project.

There remain a range of adverse effects that will require remediation and/or mitigation. This includes monitoring and management of specified matters prior to, during and post construction.

This Chapter provides a discussion of these proposed environmental management.

The remainder of this Chapter provides the following:

- the Project delivery framework, which identifies how conditions and management plans will be implemented through the detailed design and construction phases of the Project (Section 33.2)
- the proposed management plan framework (Section 33.3); and
- a summary of the measures proposed to adequately manage potential adverse effects (Section 33.4).

It is proposed that the suite of proposed mitigation, remediation and monitoring measures summarised in Section 33.4 are formalised through the placement of conditions on the designation and resource consents. The summary of measures provides a reference to the relevant proposed conditions.

Proposed conditions are set out subsequently:

- proposed conditions of the designations (Chapter 34); and
- proposed conditions of the resource consents (Chapter 35).

31.2 Project delivery framework

The description provided of the Project and its component project elements, supported by information in the Technical Reports (Volume 3) and the accompanying plans (Volumes 4 and 5), enable the scale and nature of the Project to be understood.

Many measures to avoid, remedy or mitigate the potential adverse effects on the environment have been designed into the Project and thus have also been described.

The key to the future management of effects is the additional development and implementation of a suite of measures that include conditions, management plans and monitoring and maintenance. This is referred to as the Project delivery framework. This includes the need to:

- manage areas of environmental sensitivity,
- to recognise environmental risk issues; and,
- to identify the mechanisms to avoid, remedy or mitigate these actual and potential effects.

This overall process for delivery of the Project is shown in Figure 31.1.

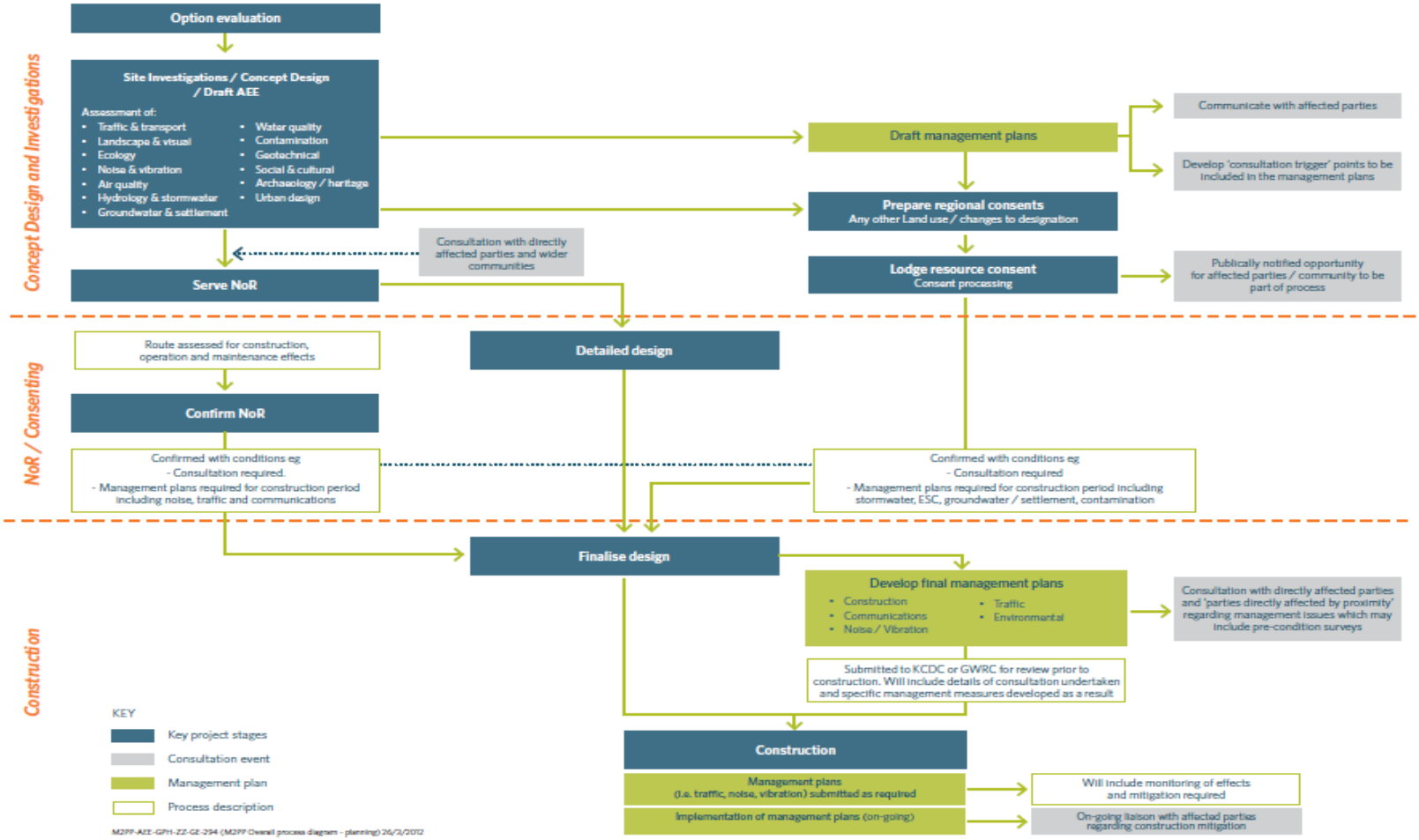

Figure 31.1: Overall Project delivery process

31.2.1 Principles for Project delivery

The following principles form the basis for the development of the application documents and additional plans and conditions that will dictate the delivery of the Project, its operation and maintenance:

- All works are to be undertaken in compliance with current New Zealand standards and legislation;
- The construction and operation of the Project will use the best practicable option[243] to avoid, remedy or mitigate adverse effects;
- An integrated team approach to development of the design and the methods to avoid, remedy or mitigate actual and potential effects means that no one particular discipline is more important than another;
- Each technical specialist, consultant, or contractor involved in the Project has equal responsibility to strive to avoid, remedy or mitigate adverse effects.

In addition to these principles, the methods used will seek to:

- Maintain on-going communication with the Greater Wellington Regional Council and Kāpiti Coast District Council who will be responsible for monitoring and enforcing conditions placed on the designation and resource consents sought;
- Maintain strong communication links with the directly affected landowners, tangata whenua, key stakeholders and the community;
- Mitigate adverse effects during design and construction of the Project through which the above environmental principles will be implemented.

31.2.2 Methods to avoid, remedy or mitigate

The following methods to avoid, remedy and mitigate actual and potential adverse effects are proposed:

- designation conditions
- consent conditions
- management plans

This section sets out actual and potential adverse environmental effects, and methods that would be used to manage them. Following that, management plans and conditions are discussed and described.

[243] 'Best Practicable Option' is defined in the Resource Management Act in relation to the effects from the discharge of contaminants or emission of noise, and guided by established case law. However, the principles of BPO are widely understood and applied in other areas of environmental management to develop measures to prevent or minimise many other types of effects.

31.3 Management plan framework

This section sets out the framework of management plans required to avoid, remedy and mitigate effects. The proposed framework is shown in Figure 31.2.

GWRC	KCDC	Department of Conservation	Historic Places Trust	Road Controlling Authorities
Resource consents	Designation	(for information)	Authority (HPA)	Other (LGA etc)
Construction Environmental Management Plan				
Accidental Discovery Protocol				
			Archaeological Management Plan	
Construction Air Quality Management Plan				
Ecological and Landscape Management Plans				
Erosion and Sediment Control Plan				
Contaminated Soils and Groundwater Management Plan				
Hazardous Substances Management Plan				
Resource Efficiency and Waste Management Plan				
Groundwater (level) Management Plan				
Settlement Effects Management Plan				
	Construction Noise and Vibration Management Plan			
	Construction Traffic Management Plan			
				Road Opening Notice
	Stakeholder Communications Management Plan			
Design and Construction Method				
	Network Utilities Management Plan			
As built plans - all streamworks	As builts (KCDC and GWRC) - note also Building Act Requirements			

M2PP-AEE-GPH-ZZ-GE-295 (M2PP Management Plans Framework - planning) 26/3/2012

KEY

Provided as draft

Proposed conditions (but not provided at this stage)

Figure 31.2: Proposed management plan framework

31.3.1 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) has been prepared for the Project (Refer Volume 4). The CEMP documents set out in detail how effects are to be managed. Some sections do however require finalisation by the Project contractor prior to construction once all detailed design is complete.

This will be required to be generally in accordance with the CEMP in Volume 4, and the final CEMP will be provided to GWRC and KCDC for certification prior to construction commencing.

The CEMP is an overarching strategy document. Most other management plans fall under this main plan. The CEMP provides the strategy for how the Project is going to be physically constructed. It sets out the methods and tools to be implemented by the construction contractors to avoid, remedy and mitigate potential adverse environmental effects in order to meet the proposed resource consents and designation conditions, relevant legislation and the NZTA's environmental objectives.

The CEMP includes the principles and general approach to managing the environmental effects, along with setting out a methodology and detail for delivering construction. The delivery of detailed management plans is a critical part of the Project Delivery Framework during construction.

The CEMP covers all anticipated construction elements and presents a framework of principles, environmental policy, objectives and performance standards, plus detail for most matters. It establishes the relationship with the related environmental management plans that address specific topic areas, for example construction noise, traffic, and air quality, which are included as appendices to the CEMP.

Implementing the CEMP (including its second tier management plan appendices) will serve to appropriately avoid, remedy or mitigate any potential adverse environmental effects of the Project's construction. A range of proactive and reactive communication tools will be employed that require a constructor to clearly demonstrate that the community is engaged and informed.

The proposed designation and consent conditions for the CEMP also provide flexibility to review and modify practices according to construction specific circumstances. Making sure the CEMP is current and relevant is critical to its successful implementation. The CEMP details the tools for the implementation of good environmental management including monitoring and review requirements of the CEMP, auditing procedures, corrective actions and management reviews of the CEMP.

The contractor will be required to undertake all construction activities on site in accordance with the provisions of the relevant management plans as part of their contractual arrangements.

31.3.2 Topic specific environmental management plans

The CEMP and environmental sub-plans may require review and amendment during the life of the Project to reflect changes to activities, risks, mitigation measures, responsibilities and management processes. The ability to make changes to the CEMP is an important aspect of continually improving the effectiveness of the CEMP.

Changes to further develop and finalise necessary matters of detail for the CEMP will be required once the consents and designations are obtained. The contractors will undertake this as part of the process of finalising detailed design and those elements of construction not able to be provided until later in the Project. The process for modifications is set out in the CEMP and includes a process involving inputs from Councils and key stakeholders.

The CEMP and its second tier plans are to be consistent with and complement the Project's AEE. The technical assessment reports contained in the AEE inform the specific environmental management, monitoring and mitigation measures described within the sub-plans. The contractor will implement these to manage actual and potential environmental effects during construction.

31.3.3 Summary of environmental effects and corresponding management plans

The following table provides a summary matrix relating relevant actual and potential effects on the environment to the relevant construction management plans.

Table 31.1: Proposed management of environmental effects via management plans

Environmental effect (Construction)		Management of effect	Relevant management plan	Reference within Volume 4 of the AEE
Designation				
Noise	Noise	▪ Implementation of construction in accordance with the Construction Noise and Vibration Management Plan. ▪ Maintenance of an issues & complaint register.	CEMP CNVMP	CEMP CNVMP, Appendix F
Vibration	Vibration effects	▪ Implementation of construction in accordance with the Construction Noise and Vibration Management Plan. ▪ Maintenance of an issues and complaint register.	CEMP CNVMP	CEMP CNVMP, Appendix F
Air	Air Quality effects	▪ Implementation of construction in accordance with the Construction Air Quality Management Plan. ▪ Maintenance of an issues and complaint register.	CEMP CAQMP	CEMP CAQMP, Appendix G
Social responsibility	Social effects	▪ Minimise disturbance with appropriate timing / sequencing of construction. ▪ Careful management of construction, including selection of techniques. ▪ Accurate and regular communications with potentially affected parties to manage understanding and expectations.	CEMP SCMP CNVMP CTMP CAQMP	CEMP SCMP, Appendix S CNVMP Appendix F CTMP, Appendix O

Environmental effect (Construction)		Management of effect	Relevant management plan	Reference within Volume 4 of the AEE
Culture and heritage	Archaeological, built heritage, tangata whenua	■ Archaeologist part of the construction team. ■ Works to be in accordance with the NoR and any HPT approvals. ■ Iwi liaison protocols followed	CEMP CNVMP ELMP Accidental Discovery Protocols for wetland areas	CEMP CNVMP Appendix F EMP Appendix M Appendix 4 of Technical Report 9, Volume 3
Site operation	Site facilities	■ To be managed in accordance with the CEMP. ■ Landscape and visual effects management applies.	CEMP ELMP	CEMP ELMP, Appendix M
Traffic	Construction traffic	■ Construction traffic to be managed as per the CTMP.	CEMP CTMP	CEMP CTMP Appendix O
Visual and Landscape	Construction site facilities, yard and buildings	■ Landscape mitigation planting applies where practicable.	CEMP LMP	CEMP LMP Appendix T
	Visual mitigation	■ Landscape mitigation plan sets out staged planting plans for management of effects during construction, as well as mitigation for permanent works.	CEMP LMP	CEMP LMP Appendix T
Resource Consents				
Land *Water resources*	Erosion and Sediment Control and Stormwater Management	■ Implementation of erosion and sediment control procedures. ■ Sediment ponds. ■ Stabilisation of inactive work areas. ■ Diversion of clean water. ■ Proactive weather forecasting, monitoring and risk management.	CEMP ESCP	CEMP ESCP Appendix H
Ecology	Planting and habitat management/ replacement	■ Species/habitat translocation. ■ Enrichment planting. ■ Freshwater & wetland habitat restoration. ■ Pest management ■ Landscaping.	CEMP EMP	CEMP EMP, Appendix M

Environmental effect (Construction)		Management of effect	Relevant management plan	Reference within Volume 4 of the AEE
Groundwater Levels and Settlement	Temporary and long term changes to groundwater levels and ground settlement effect	■ Implementing the management and design of construction activities in accordance with the Groundwater (Level) Management Plan. ■ Implementation of construction in accordance with the Settlement Effects Management Plan. In particular: ■ Monitoring of consolidation and mechanical settlements; and ■ Monitoring and management of buildings, services and infrastructure that have the potential to be impacted by settlement.	CEMP GWMP SEMP	CEMP GWMP, Appendix I SEMP, Appendix J
Spill response, waste and contamination	Contamination	■ Implementation of CSGMP.	CEMP CSGMP HSMP REWMP	CEMP CSGMP, Appendix K HSMP Appendix L REWMP, Appendix N
	Hazardous Substances	■ Storage and use in accordance with the Dangerous Good regulations; relevant licences and approvals obtained in CEMP; incident form to be filled in and recorded if hazardous spill occurs.		
	Refuelling/ maintenance areas	■ Spill management procedure as part of the CEMP and implemented by the construction team; use and maintenance of spill kit; spills to be cleaned up and recorded in accordance with the CEMP. ■ Waste to be removed from site back to main bins at Otaihanga Yard. Waste to be sorted according to type as detailed in the Resource Efficiency & Waste Management Plan.		
	Management of construction waste	■ Construction waste to be removed from site back to the main bins at Otaihanga Yard. Waste to be sorted according to type as detailed in the Resource Efficiency & Waste Management Plan.		
Site operation	Site facilities	■ To be managed in accordance with the CEMP. ■ Contingency measures.	CEMP	CEMP

31.4 Summary of mitigation, monitoring and other measures to manage adverse effects

A range of mitigation, remediation, management and monitoring measures has been developed for the Project, in order to avoid, remedy or mitigate potential adverse effects. These measures are summarised in Table 31.2. Where relevant, a reference is provided to proposed condition(s).

Table 31.2: Proposed mitigation and monitoring

Construction effects
Operational effects

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Traffic and transport				
Project induced traffic increases occurring on some local roads may require specific management or design changes after proposed Expressway opening. Locations identified are: ■ Kāpiti Road in the vicinity of the Kāpiti Road Interchange ■ Poplar Avenue, east of Matai Road ■ Park Avenue, north of Te Moana Road ■ Paetawa Road	An agreed traffic monitoring and review regime agreed with Kāpiti Coast District Council to ensure effects are within the expected range.	Traffic monitoring on a quarterly basis for a one year period to inform a post-construction review.	A post-construction review of functioning of specified roads one year after project commissioning for: ■ Kāpiti Road in the vicinity of the Kāpiti Road Interchange ■ Poplar Avenue, east of Matai Road ■ Park Avenue, north of Te Moana Road ■ Paetawa Road	■ Technical Report 32, Volume 3 ■ Technical Report 34, Volume 3
Land Use and property				
Temporary occupation of private properties for construction	A condition of consent is recommended to review the	N/A	■ Designation – uplift of parts of the new	■ Technical Report 3, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
purposes.	designation areas once construction is completed. Note: Temporary occupation for construction is managed through the Public Works Act.		designation not required for the operation of the Expressway once construction completed.	■ Technical Report 20, Volume 3
Access to water supply will be severed for some private properties.	Alternative water supply will be provided for all those with lawfully established water rights.	N/A	■ CEMP ■ Designation – Arrangements for alternative water supply determined prior to construction commencement.	■ NZTA requirements
Access to some private properties will be severed temporarily as a result of the Expressway alignment and new local road configuration.	Provision for permanent alternative access arrangements are part of the project. Temporary measures for are needed to ensure provision and management	N/A	■ CTMP for temporary works	■ Assessment of Environmental Effects, Volume 2
Services/Network Utilities				
Dust from construction activities could potentially interfere with Transpower infrastructure.	Dust suppressant is proposed to limit potential spread of dust. If necessary some of the Transpower infrastructure may need to be cleaned of dust.	Dust effects on assets will be monitored in liaison with Transpower during construction.	■ Designation – NUMP	■ Agreement between NZTA and Transpower
Project alignment is close to two Transpower towers.	Detailed design will confirm works adjacent to the towers. Communication is ongoing with Transpower to confirm whether any mitigation measures are needed.	N/A	■ Designation – NUMP	■ CEMP, Volume 4
Potential for construction to cause physical damage to Network Utility infrastructure.	Clearly identifying the location of infrastructure and how these will be protected. Carefully coordinated onsite	Ongoing monitoring throughout the construction period.	■ Designation – CEMP – NUMP ■ Rectification of any damage	■ CEMP, Volume 4 ■ Consultation Summary Report

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	management set out within the CEMP.			
Urban Form and Function				
Waikanae town centre and nearby businesses will experience reduced volumes of through traffic. Some businesses draw on this passing trade which may have an effect on their turnover.	Signage from Expressway to town centre.	N/A	▪ Provision of signage to town centres from Expressway interchanges.	▪ Technical Report 5, Volume 3 ▪ Technical Report 6, Volume 3
Significant impact on the existing character of urban, rural and open space areas. New Expressway structures, vehicle movements and associated traffic noise are some of the potential adverse effects that will be introduced into the environment.	Location specific combinations of mitigation measures will be used to maintain, as best as practicable, the character of urban, rural and open space areas. Methods include: ▪ Earthworks sympathetic to the natural landscape for example contouring around existing topographical features where practicable. ▪ Site specific landscape treatment. ▪ Visual barriers for noise attenuation. ▪ Sculptural design of bridge structures. ▪ Treatment of underbridge areas to maintain safe and attractive pedestrian and cyclist areas.	As specified for individual project monitoring elements.	Designation Condition 1 sets our requirement for Project development in general accordance with design elements detailed in application (Plan Set and proposed conditions)	▪ Technical Report 5, Volume 3 ▪ Technical Report 6, Volume 3
The interchange at Peka Peka may encourage unplanned urban development pressures.	No mitigation is proposed based on Project design solution (i.e., partial interchange). The provisions of	KCDC District Plan assessments and monitoring to addresses this. Therefore, no	N/A	▪ Technical Report 5, Volume 3 ▪ Technical Report 6, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	the existing District Plan are considered appropriate to control any development that is not in accordance with the District Plan rules.	additional monitoring proposed.		
Visual and Landscape				
Temporary visual effects of earthworks (particularly those associated with preloading) and associated vegetation removal. The residential areas immediately adjacent to the proposed preloading sections of the Expressway, and potentially the most affected by earthworks are the communities at Leinster Avenue, Raumati Road/Rata Road, and Midlands.	■ The extent of earthworks will be confined to the area within the construction designation boundary and are temporary. ■ During the site establishment phase of construction, the Project team shall minimise permanent loss and damage to vegetation to the minimum required to undertake the works. ■ Progressively, upon completion, the earthworks will be hydroseeded to minimise soil erosion and scouring; in places artificial materials such as coconut or brush may be required to replace or to complement the hydroseeding. ■ Tree and shrub planting of the earthworks will be carried out in optimal environmental conditions to maximise plant survival and establishment. The hydroseeded areas will be spot or blanket sprayed prior to planting and all planted areas will be mulched.	Monitoring will occur as outlined within the LMP. With respect to landscape values there will be qualitative monitoring during the construction and transition phase, focused on earthwork activities especially within the dune landforms, retention of valued vegetation in the construction footprint and implementing the planting plans throughout the alignment	Requirements set out in CEMP (including ESCP) and LMP to address	■ CEMP, Volume 4 ■ LMP (being CEMP Appendix T, Volume 4) ■ Technical Report 7, Volume 3 ■ Technical Report 5, Volume 3 ■ Technical Report 20, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	▪ For short-term pre-load areas (i.e., less than 6 months) a top layer of clean granular material, sub base course or mulch (straw, hay or wood) will be applied over sand to minimise wind disturbance of the surface and to minimize dust. For the pre-load areas that will remain in place longer than 6 months, a layer of topsoil will be applied and then grassed. ▪ Any complaints will be managed through the process outlined in the CEMP and ESCP.			
The Expressway and all associated structures (noise bunds and walls, embankments, bridges, overbridges, interchanges) are designed to minimise the impact on the notable remnant dunes along the alignment. However, large areas of dunes will be modified or in places removed.	Re-shaping the dunes and mass planting on the embankments (along with other techniques described in Landscape and Visual Chapter 17 of this report) will assist to integrate the road into the landscape.	Monitoring of the dune reshaping construction activities as outlined within the LMP. ▪ Monitoring of the dune reshaping construction activities shall require the Project Landscape Architect and Civil Engineer to be on site at critical phases during the final shaping of the earthworks through and on the edge of dune landscapes. ▪ The inception meetings will arrange timely site visits for the Project Landscape Architect, Civil	Specify requirements for monitoring in LMP	▪ CEMP, Volume 4 ▪ LMP (being CEMP Appendix T Volume 4) ▪ Technical Report 7, Volume 3 ▪ Technical Report 5, Volume 3 ▪ Technical Report 20, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
		Engineer and Project team (specifically the machine operators) to discuss the daily, weekly, monthly approach to the works. It is likely that regular site visits during the most critical stages will be required and 'hold points' allow key experts to meet, assess, and report on progress, before the machinery and Project teams move on to another site or activity. ■ Critical phases shall be photographed and appropriately reported on by the Project team and the Project Environmental Manager and representatives from KCDC will inspect the finished earthworks and post-mitigation planting phase.		
The Expressway alignment will remove areas of native and exotic vegetation, and wetlands which are valued as part of the character of the landscape. It is noted, however, that through appropriate planting plans, devised from an ecological and landscape amenity perspective,	■ Through recognised techniques particularly at the 'site establishment' phase of construction, groups of trees, stand alone mature trees, residual amenity plantings from residential properties can be retained and protected. ■ The mitigation package for each Landscape Character	Monitoring and maintenance of retained and newly planted vegetation as outlined in the EMP and LMP. ■ Prior to construction works, there will be an on-site inception meeting with Project Landscape Architect, Project Ecologist and Project team to	Replacement or restoration to at least original extent of areas lost. Specify matters for EMP and LMP to address	■ CEMP, Volume 4 ■ EMP (being CEMP Appendix M, Volume 4) ■ LMP (being CEMP Appendix T, Volume 4) ■ Technical Report 7, Volume 3 ■ Technical Report 5, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
the stormwater network proposed can be an opportunity to create visual and ecologically important areas.	Area also includes substantial planting to bolster remnant areas of native vegetation protected along the alignment. This is detailed in the EMP. ■ The areas of vegetation to be retained are identified in the Vegetation Map Series (details are provided in Appendix 3 of the EMP). ■ The contractor shall minimise activities that have the potential to result in the permanent loss or damage of wetlands outside of the Project footprint (as outlined within Table 8 of the ELMP). ■ Maintenance of the planted areas is to follow a maintenance schedule drafted by the Project Landscape Architect and Project Ecologist.	discuss planting plan detail and best way of implementation. Agreement will be made on 'hold points', site visits and regularity of monitoring and reporting. For quality assurance purposes, reporting will comprise of written documentation detailing progress against anticipated outcomes (the Planting Specifications), and include photos to illustrate these outcomes. ■ Following the practical completion of planting (pending defects liability requirements) a two-year maintenance period is proposed for planting on embankments, batter slopes, wet and dry swales, and for riparian planting. A four year maintenance period is proposed for the ecological, stormwater treatment and planted flood storage wetlands.		■ Technical Report 20, Volume 3
The cuts to the dunes will expose the earth to colonisation of pest plants and weeds.	Immediate hydroseeding will be necessary.	Monitoring of pest plant species is essential to trigger the planning and implementation of pest plant management. Monitoring methods are	Specify matters for EMP and LMP to address	■ CEMP, Volume 4 ■ EMP (being CEMP Appendix M, Volume 4) ■ LMP (being CEMP Appendix T, Volume 4)

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
		outlined within the ELMP. Inspections will be required during and post construction, particularly for newly planted and established landscaped areas and areas to be restored and revegetated.		■ Technical Report 7, Volume 3 ■ Technical Report 5, Volume 3 ■ Technical Report 20, Volume 3
Amenity value effects and change in landscape character from the large scale of the Expressway, overbridges and interchanges, traffic movements and increased ambient noise. The magnitude of these effects increases where they are visible to both resident and transient viewing audiences, and when the visual change detracts from existing views and outlooks. Positive effects accrue where traffic reduces on current SH1 and the local network.	For large sections of the Expressway the proposed earth bunds, noise walls and planting will screen views of the moving traffic. Mitigation planting is proposed throughout the Expressway Alignment. There are several types of mitigation planting, depending on the landscape and ecological features, and the works and structures of the Expressway. All proposed planting areas are identified on the Planting Plan Map Series (and corresponding key) and details are provided in Appendix 3 of the LMP.	Monitoring of the areas to be restored and revegetated as discussed above and in the ELMP. The monitoring effort will be tapered off once the planted areas become well established, with a 3 year limit on the extent of maintenance.	■ Specify matters for LMP to address	■ CEMP, Volume 4 ■ EMP (being CEMP Appendix M, Volume 4) ■ LMP (being CEMP Appendix T, Volume 4) ■ Technical Report 7, Volume 3 ■ Technical Report 5, Volume 3 ■ Technical Report 20, Volume 3
Lighting				
Construction yard and activity lighting, while temporary, has the potential to cause light spill effects to nearby residents and glare effects to drivers of vehicles. Construction yard lighting has not yet been designed.	The Construction Environmental Management Plan (CEMP, Volume 4) will manage the potential impacts of temporary lighting during construction. Lighting design plans for construction yards will be	It is recommended that the contractor monitor lighting during construction every 2 months or response to any complaint. Monitoring should include visual tests to check that luminaires have not been	■ Specify matters for CEMP to address	■ Technical Report 8, Volume 3 ■ CEMP, Volume 4

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	submitted by an accredited Illumination Engineer as part of the CEMP. The contractor will be required under the CEMP to use luminaires that do not produce environmental spill light above that required by relevant Kāpiti Coast District Plan standards.	re-aimed inappropriately		
There are two specific areas where lighting (from the cycleway/walkway) could intrude into residential properties and be a source of irritation. Along the southern approach to the Kāpiti Road interchange (refer to drawings CV-MF-730 and CV-MF-740, Volume 5); and Along the northern section, immediately before the Mazengarb Road connection (refer to drawing CV-MF-741, Volume 5).	Mitigation (to achieve 3 lux or less in these locations) is proposed and will be achieved through a selection or combination of: ■ detailed design features; and/or ■ installing the lighting onto the acoustic fence; and/or ■ reducing the height of the cycleway light poles within these sections.	Monitoring of lighting in response to complaints.	■ Specify standards and/or outcomes to be achieved in the design of lighting ■ CEMP	■ Technical Report 8, Volume 3
Noise and Vibration				
Construction noise and vibration has the potential to cause disturbance to residents in close proximity to the alignment.	Compliance with the construction noise standard and vibration standards. Where the CNVMP determines that adverse noise or vibration effects are significant residents in close proximity will be consulted and depending on the circumstances a variety of options will be considered to	As required by the CNVMP, including monitoring: ■ noise limits ■ At locations considered to be sensitive receivers, or otherwise in response to complaints.	■ Specify matters for CNVMP to address	■ CNVMP ■ Technical Report 16, Volume 3 ■ Technical Report 17, Volume 3 ■ Technical Report 18, Volume 3 ■ Technical Report 19, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	avoid or mitigate noise as far as practicable.			▪ Technical Report 20, Volume 3
Operational traffic noise has the potential to cause disturbance to residents in close proximity to the alignment.	Project design includes site specific mitigationto mitigate noise where necessary. Methods employed to mitigate operational noise include: low noise road surfacing (OGPA), designation width, contoured earth bunds and noise walls/barriers.	No monitoring required except as set out in the CNVMP.	Specify matters for CNVMP to address	▪ Technical Report 15, Volume 3 ▪ Technical Report 17, Volume 3 ▪ Technical Report 18 ▪ Technical Report 19 ▪ Technical Report 20, Volume 3
Air Quality				
Dust generated by earthworks and road construction activities can be a nuisance to the public, has the potential to affect plant life and can contribute to sediment loads in waterways.	Dust from construction activities will be managed through the CAQMP. The primary management approach will be the suppression of dust at its source, allowing potential adverse effects on air quality to be appropriately managed.	A dust monitoring programme is proposed, based on regular visual monitoring in all areas, continuous monitoring of total suspended particulate matter (TSP) at one or two of locations, continuous monitoring of meteorological monitoring at one or more locations and prompt responses to complaints from the public and regulatory authorities.	Specify matters for CAQMP to address	▪ CAQMP ▪ Technical Report 14, Volume 3 ▪ Technical Report 20, Volume 3
Construction vehicles have the potential to cause adverse air quality effects under certain meteorological conditions, generating excessive smoke and odour from diesel-fuelled heavy vehicles, generators and other machinery.	The CAQMP includes requirements to maintain vehicles and equipment in accordance with manufacturer specifications and immediately service units discharges excessive exhaust smoke. Adherence to the CAQMP practices for construction	The CAQMP describes measures to be undertaken to control and monitor construction vehicle emissions (section 3.1.4), including requirements to maintain vehicles and equipment in accordance with manufacturer	Specify matters for CAQMP to address	▪ CAQMP ▪ Technical Report 14, Volume 3 ▪ Technical Report 20, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	vehicles will ensure that all potential adverse effects associated with emissions will be adequately managed.	specifications and immediately service units discharges excessive exhaust smoke.		
When pre-cast concrete units are removed from the mould, hand-held grinders are often used to remove surface flaws, and occasionally water-blasting is required to obtain a suitable surface finish. Both of these activities have the potential to generate dust emissions.	Dust generation will be minimised by using diamond-tooth grinders for hand-held grinding wherever possible. Water blasting is usually not necessary and it is estimated that this may need to be carried out approximately 10 times during the construction phase of the Project. The concrete pre-casting site is located 250m from the nearest sensitive activities.	A dust monitoring programme is proposed, based on regular visual monitoring in all areas, continuous monitoring of total suspended particulate matter (TSP) at one or two of locations, continuous monitoring of meteorological monitoring at one or more locations and prompt responses to complaints from the public and regulatory authorities.	Specify matters for CAQMP to address	▪ CAQMP ▪ Technical Report 14, Volume 3 ▪ Technical Report 20, Volume 3
Excavation may disturb land contaminated with organic wastes (such as closed landfills) or waterlogged soils that may be anaerobic, such as peat.	It is not considered that excavation works along the alignment will release any odour.	In the instance of an unexpected disturbance, monitor in response to complaints made. The specific requirements for managing complaints associated with dust/odour/vehicle exhaust nuisance effects are detailed within the CAQMP	Specify matters for CAQMP to address	▪ CAQMP (CEMP, Appendix G) ▪ Technical Report 14, Volume 3 ▪ Technical Report 20, Volume 3
Cumulative PM_{10}, NO_2, CO and benzene concentrations have the potential to increase in the vicinity of the Expressway when it is commissioned. Concentrations adjacent current SH1 and on parts of the local	The result of the dispersion modelling indicates that the operation of the Project is unlikely to cause exceedances of any relevant air discharge assessment criterion of air pollutants caused by vehicles	In the instance of an unexpected disturbance, monitor in response to complaints made. The specific requirements	Specify matters for CAQMP to address	▪ Technical Report 13, Volume 3 ▪ Technical Report 20, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
network may reduce due to traffic now using the Expressway.	using the Expressway. No mitigation or monitoring is considered necessary.	for managing complaints associated with dust/odour/vehicle exhaust nuisance effects are detailed within the CAQMP.		
Traffic modelling indicates that there will be some changes to traffic on local roads, including increases in vehicle numbers on Kāpiti Road, Poplar Ave, Mazengarb Road and Park Road. Positive effects will accrue on existing SH1 and parts of the local network due to traffic decreases due to diversion to using the Expressway.	These increases are unlikely to have a significant impact on concentrations of air pollutants at nearby receptors.	In the instance of an unexpected disturbance, monitor in response to complaints made. The specific requirements for managing complaints associated with dust/odour/vehicle exhaust nuisance effects are detailed within the CAQMP	Specify matters for CAQMP to address	■ Technical Report 13, Volume 3 ■ Technical Report 20, Volume 3
Terrestrial Ecology				
The indirect effects of construction on terrestrial ecology are limited to those related to dust, fire and weed invasion.	Any potential for these effects has been sufficiently mitigated through their inclusion in the Construction Environmental Management Plan and its associated management plans.	Refer to monitoring of fire within the CEMP. Refer to monitoring of weeds and pest plants within the ELMP. Refer to monitoring of dust within the CAQMP.	Specify matters for LMP and EMP and CEMP and CAQMP to address.	■ LMP (CEMP, Appendix T) ■ EMP (CEMP, Appendix M) ■ CAQMP (CEMP, Appendix G, Volume 4) ■ CEMP, Volume 4 ■ Technical Report 26, Volume 3 ■ Technical Report 27, Volume 3 ■ Technical Report 28, Volume 3 ■ Technical Report 29, Volume 3
Loss of terrestrial vegetation (including wetlands), in particular kanuka and mahoe forest.	Mitigation proposed is detailed within Chapter 21 of this report).	Specialist ecological advice	Specify requirements for CEMP and EMP to address	■ EMP (CEMP, Appendix M) ■ LMP (CEMP, Appendix T)

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
It is noted that stormwater treatment wetlands and flood storage areas that will be formed along the route and will subsequently provide additional ecological benefits.	▪ Use BPO to avoid identified sites within designation during detailed design. ▪ 5.4ha of wetland restoration be created as mitigation for the loss of 1.8 ha of wetland. ▪ It is recommended that a minimum of 7.6ha of mass planting along the Expressway alignment (refer to Chapter 17 for a description of mass planting) be provided as mitigation for the loss of terrestrial vegetation (kanuka forest, regenerating mahoe and mature indigenous forest) within the Project footprint. This approach has been taken to maintain and overall improve the wider ecological corridor benefits along the length of the Expressway. ▪ Adaptive management	during detailed design. Monitoring and maintenance of retained and newly planted vegetation as outlined in the ELMP. ▪ Prior to construction works, there will be an on-site inception meeting with Project Landscape Architect, Project Ecologist and Project team to discuss planting plan detail and best way of implementation. Agreement will be made on 'hold points', site visits and regularity of monitoring and reporting. For quality assurance purposes, reporting will comprise of written documentation detailing progress against anticipated outcomes (the Planting Specifications), and include photos to illustrate these outcomes. ▪ Following the practical completion of planting (pending defects liability requirements) a two-year maintenance period is proposed for planting on embankments, batter		▪ CEMP, Volume 4 ▪ Technical Report 26, Volume 3 ▪ Technical Report 27, Volume 3 ▪ Technical Report 28, Volume 3 ▪ Technical Report 29, Volume 3 ▪ Technical Report 7, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
		slopes, wet and dry swales, and for riparian planting. A four year maintenance period is proposed for the ecological, stormwater treatment and planted flood storage wetlands.		
Lizard mortality resulting from vegetation clearance	■ Artificial refuges should be set at the key locations outlined within the herpetofauna survey (Technical Report 28, Volume 3) as part of pre-construction site inspection (prior to any vegetation clearance). Any lizards captured should be released in other suitable habitat of sufficient distance from the Expressway alignment. ■ Prior to any construction in the vicinity of the El Rancho Wetland (Weggery), a series of tracks should be cut through the scrub within the Project footprint to allow the area to be searched for arboreal lizards.	Baseline and post construction monitoring	Specify requirements for CEMP and EMP to address	■ EMP (CEMP, Appendix M) ■ CEMP, Volume 4 ■ Technical Report 26, Volume 3 ■ Technical Report 27, Volume 3 ■ Technical Report 28, Volume 3 ■ Technical Report 29, Volume 3
Displacement or mortality of fernbird during construction and operation. Loss of fernbird habitat during construction.	■ Mapping of territories (fernbird habitat surveys) within the Te Harakeke/Kawakahia Wetland - Nga Manu Nature Reserve area prior to any construction-related	A scheduled and ongoing programme of maintenance and monitoring of the habitat buffering in the fernbird habitat areas.	Specify requirements for CEMP and EMP to address	■ EMP (CEMP, Appendix M) ■ CEMP, Volume 4 ■ Technical Report 26, Volume 3 ■ Technical Report 27, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	activities; ■ Wetland habitat creation away from the Expressway (ideally a minimum of one year prior to any vegetation clearance). This could include the new flood storage wetlands proposed north of the Kakariki Stream and the proposed riparian planting in the Kakariki Stream, both areas of which are likely to be within the fernbird territories; ■ A bridge structure across the Kakariki Stream that provides riparian vegetation and sufficient clearance underneath that a corridor can be created to facilitate movement under the Expressway rather than across; ■ Maintenance of a mown grass buffer along the Expressway (so as to not encourage birds to the road edge); and ■ Any clearance of vegetation within identified fernbird territories should only occur outside of the breeding season.			■ Technical Report 28, Volume 3 ■ Technical Report 29, Volume 3
Freshwater Ecology				
Construction will result in freshwater habitat loss and	■ Use BPO to avoid streams not directly affected by stream works.	■ Adaptive management to establish a baseline of pre-construction	Specify requirements for CEMP and EMP to address	■ CEMP, Volume 4 ■ EMP (CEMP, Appendix M) ■ Technical Report 26,

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
modification. A total of 1,119m of perennial and intermittent stream habitat will be lost as a result of culvert and bridge construction, and 1,525m of stream habitat lost due to stream diversions and modifications. It is noted that new sections of stream (seven) connecting the Expressway works to stormwater ponds outlets to existing watercourses will result in new stream habitat.	▪ Stream restoration on the watercourses affected upstream and downstream of the Project. This involves retiring and riparian planting a minimum of 4,973m of stream habitat. ▪ Provision of an additional 257m of restoration by mass planting of wetland plant species within the approximately 13ha of flood storage areas where these areas provide for fish passage. ▪ Best practice erosion and sediment control mechanisms during construction will also assist in reducing potential sediment-laden run-off reaching the ecologically sensitive downstream receiving environments.	ecological conditions against which changes are measured. ▪ Monitoring and maintaining ESC devises during construction (as discussed in "Water Quality" above).		Volume 3 ▪ Technical Report 30, Volume 3
Construction activities may result in freshwater fauna species loss as a result of stream diversions, culverting and bridge construction. Due to the quantity of stream length that will be lost or modified during construction there is potential for significant loss of native freshwater fish.	▪ A suitably qualified ecologist will be involved in the design and the key construction phase of all instream works in perennial and intermittent streams, including temporary and permanent culvert installations, temporary and permanent fords, diversions and weirs. ▪ Fish relocation will be carried out during the construction of culverts and stream	Fish community monitoring: ▪ The test of an absence of adverse effect will be the comparison of sites that during baseline had repeated taxa presence, again having those taxa post construction. It is therefore not suggested to monitor fish during the construction period but to set a good baseline (at least 4 detailed study	Specify requirements for CEMP and EMP to address	▪ CEMP, Volume 4 ▪ EMP (CEMP, Appendix M) ▪ Technical Report 26, Volume 3 ▪ Technical Report 30, Volume 3 ▪ Technical Report 22, Volume 3 ▪ Technical Report 24, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	diversions. ■ Works in stream beds will be minimised during periods of fish migration (Spring 1 Oct – 30 Dec; Autumn 1 April – 30 May) to ensure work is only undertaken in short, prescribed periods during this time with appropriate ecological supervision. ■ Works will be phased in the drier months of the year to minimise potential effects on freshwater fauna.	periods), and then to resample with the same effort 6 months or 1 year (after a migration period) post construction. Macro-invertebrate monitoring: ■ Monitoring of macro-invertebrate populations in the Wharemauku Stream, Mazengarb Stream, Muaupoko Stream, Waikanae River, Waimeha Stream, Ngarara Drain, Kakariki Stream, Paetawa Drain and Hadfield/Kowhai Stream will be undertaken on two occasions each year, one in summer and one in winter at sites upstream and downstream (beyond the mixing zone) of the works. This is followed by the biannual routine monitoring programme commencing during the construction period and continuing until the Regional Council is satisfied that no adverse effects have or are likely to occur, but up to a maximum time of 3 years following the opening of the Expressway. Trigger Event Monitoring		

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
		▪ As with the devices monitoring, there may be additional sampling required within the freshwater habitats in response to events.		
Potential for increased levels of sediment or contaminants entering freshwater from earthworks.	▪ The primary opportunity for management of risk of sediment discharge to valued streams and the marine environment rests with monitoring and adaptive management of the site, systems for erosion control, the capture and treatment of sediment laden water, and its discharge. ▪ The Erosion and Sediment Control Plan recommends a range of mitigation measures to minimise sediment discharge levels, particularly where there are sensitive downstream receiving environments. ▪ The potential for hazardous substances to be released into waterways following a spill will be prevented by implementation of methods outlined in the Hazardous Substances Management Plan (CEMP Appendix L, Volume 4)	The freshwater monitoring programme has two primary components, being "devices" monitoring and habitat monitoring. Habitat monitoring is discussed in the EMP and "Devices" monitoring is covered in the ESCP. Section 4.5 of the EMP provides an indicative freshwater aquatic monitoring plan, which uses baseline data to establish triggers for changes to turbidity, sediment deposition and aquatic health and guidance for how the results of this monitoring will feed into an adaptive management processes. This plan is to be implemented consistent with the early warning storm plan as outlined in the Erosion and Sediment Control Plan.	Specify requirements for CEMP (ESCP) and EMP to address	▪ CEMP, Volume 4 ▪ EMP (CEMP, Appendix M) ▪ ESCP (CEMP, Appendix H) ▪ HSMP (CEMP, Appendix L, Volume 4) ▪ Technical Report 26, Volume 3 ▪ Technical Report 30, Volume 3 ▪ Technical Report 22, Volume 3 ▪ Technical Report 24, Volume 3
Potential to adversely affect fish	▪ Culverts to have fish friendly	Immediately following	Specify requirements for	▪ CEMP, Volume 4

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
passage. It is expected that fish passage can be provided (and maintained) to all streams traversed by the Expressway where indigenous freshwater fish may be present.	design features.	formation of diversions and prior to livening of the new channel an appropriately qualified ecologist will inspect and confirm that any structures within the diversion will provide fish passage for all native species currently known to occur or are reasonably likely to occur within this stream. On-going monitoring and maintenance of culverts will occur during the operation of the Project.	CEMP and EMP to address	■ EMP (CEMP, Appendix M) ■ Technical Report 26, Volume 3 ■ Technical Report 30, Volume 3 ■ Technical Report 22, Volume 3
Project design includes measures to manage drawdown or dam effects on groundwater immediately surrounding the Expressway. Potential remains however for some adverse effects on wetland hydrology adjacent to the Expressway.	Adaptive management to measure water levels in the Raumati/Manuka Wetland, Otaihanga Southern and Northern Wetlands and El Rancho Wetland (Weggery): ■ In addition to the baseline wetland condition monitoring undertaken as part of the ecological investigations, baseline hydrological monitoring will be undertaken in these wetlands prior to construction to determine existing water levels and the range of seasonal variation. ■ Through the construction phase, ongoing monitoring of water levels and the ecological condition of	Monitoring of water levels and the ecological condition of wetlands will be undertaken as part of an adaptive management approach. Details are provided within the EMP and GWMP.	Specify requirements for CEMP, GWMP and EMP to address	■ EMP (CEMP Appendix M, Volume 4) ■ GWMP (CEMP Appendix I, Volume 4) ■ Technical Report 26, Volume 3 ■ Technical Report 30, Volume 3 ■ Technical Report 24, Volume 3 ■ Technical Report 21, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	wetlands will be undertaken as part of the adaptive management approach. ■ As part of the adaptive management approach, a range of options have been developed to manage construction-related effects associated with drawdown or damming, including consultation with statutory authorities.			
The discharge of contaminated stormwater from the Expressway to local streams and estuaries has the potential to impact on water and habitat quality.	■ Stormwater attenuation, off-set storage areas, treatment and conveyance. ■ Culvert inlets and outlets and structures protected from scour and erosion through rock rip rap armour and planting or using similar means of protection	A water quality treatment plan will monitor the stormwater treatment ponds and proprietary devices during the initial 2 of operation to ensure these devices are operating effectively to meet the target removal rates.		■ Technical Report 26, Volume 3 ■ Technical Report 30, Volume 3 ■ Technical Report 24, Volume 3 ■ Technical Report 22, Volume 3
Marine Ecology				
Assessment of Project Design and construction concludes there is no effect on Marine Ecology beyond that occurring through natural processes. Potential for sediment discharge from construction activities to adversely affect the marine environment is recognised as requiring monitoring for assurance purposes.	Management of risk of sediment discharge to the marine environment is best achieved through monitoring and adaptive management of the site and systems for erosion control, the capture and treatment of sediment laden water and its discharge. For construction sedimentation discharge it is recommended that the following management	Section 4.6 of the EMP provides an indicative marine monitoring plan which uses baseline data to establish triggers for changes to sediment deposition and the health of the marine environment and guidance for how the results of this monitoring will feed into an adaptive management processes. This plan is to be	Specify requirements for CEMP (ESCP) and EMP to address	■ CEMP, Volume 4 ■ EMP (CEMP, Appendix M, Volume 4) ■ Technical Report 26, Volume 3 ■ Technical Report 31, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	and monitoring occurs: ■ Staging of construction works and establishment of maximum open earth worked area to reduce risk. ■ Erosion management and sediment control to exceed regional guidance. ■ Risk management plan, including earthworks stabilisation procedures, for significant storm event monitoring and response.	implemented consistent with the early warning storm plan as outlined in the Erosion and Sediment Control Plan. The structure of the monitoring will involve three levels of monitoring, being Baseline, Scheduled Annual Monitoring and Triggered Monitoring. The Baseline data will provide a bench-mark against which to measure the construction phase data sets. The Scheduled Monitoring will involve routine twice yearly studies of prescribed ecological parameters. The Triggered Monitoring will be in response to potential adverse effects having happened, as identified by pre-determined “triggers” having occurred.		
Potential for stormwater discharge to adversely affect marine ecology.	Stormwater attenuation, off-set storage areas, treatment and conveyance.	■ A water quality treatment plan will monitor the stormwater treatment ponds and proprietary devices during the initial 2 years of operation to ensure these devices are operating effectively to meet the target removal		■ Technical Report 26, Volume 3 ■ Technical Report 31, Volume 3 ■ Technical Report 22, Volume 3 ■ Technical Report 24, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
		rates.		
Hydrology and Stormwater				
Temporary changes to watercourse environment(s) as part of construction works, including bridging and culverting	▪ Correct installation and on-going maintenance of ESC measures and devices ▪ Construction staging	▪ Erosion and sediment control measures ▪ Visual assessments of receiving watercourses ▪ Weather forecasts	Specify requirements for CEMP and ESCP to address	▪ CEMP, Volume 4 ▪ ESCP (CEMP, Appendix H, Volume 4) ▪ Technical Reports 22, Volume 3 ▪ Specify requirements for CEMP and ESCP to address Technical Report 24, Volume 3 ▪ Technical Report 25, Volume 3
Replacement of existing pervious surfaces with impervious surfaces resulting in a greater peak flow rate and volume of runoff, and increased potential for flooding downstream	▪ Attenuation of peak flows from the Expressway through the use of swales and/or wetlands. ▪ Refinement of the outlet design will see the swales meet the target attenuation for all events.	▪ Monitoring of swale / wetland attenuation functioning	Monitoring of stormwater treatment devices and water quality	▪ Technical Reports 22, Volume 3 ▪ Technical Report 24, Volume 3
Infilling of floodplains and/or from constraints resulting from culverts and bridges could potentially lead to flooding in areas that do not currently flood.	▪ Provision of large areas of offset storage to lower flood levels across the Project area ▪ Attenuate of flood flows (swales and wetlands) to reduce the need for offset storage ▪ Bridges designed to span width of watercourse and floodplains where appropriate to span watercourses and their floodplains			▪ Technical Reports 22, Volume 3 ▪ Technical Report 24, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	▪ Reduced skew (shorter) culvert alignments will be investigated during later design stages			
Groundwater				
The following activities have potential to affect groundwater. ▪ construction of the embankments; ▪ stormwater devices and cuts associated with the Expressway; ▪ during construction the groundwater contribution to rivers and streams may reduce by up to 1.5% (peak) as a result of the water take. ▪ any related drawdown will be transient in nature and unlikely to extend beyond the Project designation excavation in the peat may require dewatering	▪ Lining and other refinements to the design of large storm water devices where they involve excavations below the water table; ▪ Optimising construction activities, including: -Drilling a larger number of construction water take wells spread out along the alignment, with each taking a small volume at different times depending on the construction programme rather than relying on fewer wells pumping continuously at a higher rate; -Limiting the open length of excavation to that which can be backfilled in the same day to reduce the area and period of any dewatering; and -Using the starter layer in embankment construction as a drainage blanket to minimise damming effects up-gradient of surcharged peat.	Monitoring groundwater elevation, flow and quality and respond appropriately. Groundwater monitoring bores will be monitored for at least twelve (12) months prior to commencement of the construction works (where permissible), during construction, and for twelve (12) months, but up to three (3) years, after construction is complete. In cases where post-construction mitigation is implemented, monitoring specific to such mitigation may be continued for a longer period if the collected data do not indicate a return to pre-construction groundwater levels or establishment of a new equilibrium. The frequency and type of monitoring will vary depending on the stage of construction.	Specify requirements for CEMP and GWMP to address	▪ CEMP, Volume 4 ▪ GWMP (CEMP, Appendix I, Volume 4) ▪ Technical Report 21, Volume 3
The level of drawdown	Mitigation measures to reduce	Groundwater monitoring as	Specify requirements for	▪ CEMP, Volume 4

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
anticipated is unlikely to have an adverse impact on existing users, but if these are very shallow low volume wells the yield could be affected and a temporary replacement supply or longer term solution may be required.	the amount of drawdown and associated effects (should maximum consented drawdowns be exceeded) include: ■ Monitoring groundwater elevation, flow and quality and responding appropriately; ■ Altering the excavation methodology to reduce the period of time that excavations are drained; ■ Altering the peat treatment methodology to balance drawdown / damming effects; ■ Using active drainage measures beneath embankments (e.g. pipe) to facilitate flow through the embankment; ■ Redirecting treated surface water to wetlands or surface water bodies; ■ Where private water supply wells are affected, tankering water from construction wells to users or deepening wells to increase the available drawdown; and ■ Controlling the recharge of groundwater to limit the amount of drawdown. Appropriate mitigation method(s) would be selected by the Project Team at the time	above.	CEMP and GWMP to address	■ GWMP (CEMP, Appendix I, Volume 4) ■ Technical Report 21, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	that the need for mitigation is identified, with the method selected dependent on the nature, extent and location of the exceedance.			
Settlement				
Settlement effects on road embankments	If this effect does occur: ■ Change the ground improvement approach where the Expressway is constructed over peat deposits by treatment methods of: -Excavate and Replace; or -Preload and Surcharge. ■ Modify the ground improvement approaches such as a load transfer platform combined with foundations, to avoid excavating or loading the underlying peat. ■ Reduce the embankment footprint over localised areas. This may be achieved by using geogrid reinforcement to allow steepening of embankment slopes, to	Settlement monitoring regime and methodology is outlined within the SEMP. It is expected that settlement monitoring will occur: ■ 12 months preconstruction ■ Quarterly during construction ■ Monthly during active[244] construction. If the monitoring results indicate the movements are outside the expected range, or if there are other reasons for concern, then the monitoring frequency and / or extent can be increased to cover those areas of concern. The settlement monitoring	Specify requirements for CEMP and SEMP to address Note: The SEMP relies on other management plans within the wider CEMP, Volume 4, in particular the Groundwater (Level) Management Plan (CEMP Appendix I, Volume 4).	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ GWMP ■ CNVMP ■ Technical Report 35, Volume 3

[244] Active construction' can be defined as: starting when earthworks commence within 500m of a particular location and ending when pavement construction is complete at that location, and starting when excavation in front of a retaining wall comes within 50m of a section and ending when the permanent wall supports are in place beyond a distance of 50m.

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	increase the distance between the construction activity and the sensitive items.	outlined in this section is proposed to extend beyond the earthworks extent and the expected area of resulting effects, as described in Chapter 26 of this report.		
Lowering of the groundwater level and associated settlement level during construction may be of a greater magnitude than has been modelled.	If this effect does occur: ■ Change the construction methodology, including: ■ Alternative peat treatment; ■ Lining (temporary and/ or permanent) of cuts below the groundwater level; ■ Limit the length and drained duration of temporary excavations; ■ Local cut off (clay bund or slurry wall); ■ Recharge trenches/ walls.	Ground water monitoring as specified above.	Specify requirements for CEMP and SEMP to address	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ Technical Report 35, Volume 3 ■ Technical Report 21, Volume 3
Lateral movement of embedded retaining walls (as the ground is excavated in front of them) may exceed the anticipated limits.	If required, the following actions may be taken: ■ Remove surcharge close to the wall; ■ Place a berm in front of the wall; ■ Reduce the extent of temporary over excavation in front of the wall; ■ Install additional or stiffer piles; ■ Install props or ground anchors.	Settlement and groundwater monitoring as described above.	Specify requirements for CEMP and SEMP to address	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ Technical Report 35, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Settlement effects may result in minor damage to buildings.	If this effect does occur: ■ General repairs required. These repairs may include repointing of brickwork, repainting and redecorating. ■ In a severe case, repairs may require some partial re-building work, although this is considered highly unlikely. The timing of such repairs would depend on the stage of construction, the building owner's preference and the degree of damage.	Settlement and groundwater monitoring as described above.	Specify requirements for CEMP and SEMP to address	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ Technical Report 35, Volume 3
Settlement effects may result in structural damage to buildings.	If this effect does occur: ■ A detailed evaluation undertaken by a Structural Engineer and recommendations for repair and an increased level of monitoring arising from this evaluation will then be implemented. ■ If an extreme case arose where local repair or re-construction is not sufficient, then additional measures such as underpinning or strengthening may be required. ■ In the event of a "substantial injurious affection" to a person's land resulting from the construction of the MacKays to Peka Peka	Settlement and groundwater monitoring as described above.	Specify requirements for CEMP and SEMP to address	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ Technical Report 35, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	Expressway, section 63 of the Public Works Act would entitle that person to compensation.			
Services located below the footprint and founded above the base of the peat deposits can potentially be damaged by a change in grade.	If this effect does occur: ■ Relocation or active protection due to either the settlements effects or physical construction works. ■ These works agreed with the service providers prior to Project works commencing.	In addition to the settlement and groundwater monitoring described above, monitoring will be undertaken using CCTV inspections of some stormwater and wastewater services will be carried out to assess the effects of the settlement.	Specify requirements for CEMP and SEMP to address	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ Technical Report 35, Volume 3
Services located outside the earthworks extent may be subject to a change in grade as a result of works within the earthworks footprint.	If this effect does occur: ■ Undertake detailed investigation of the area and affected services promptly. Include detailed examination of the site, and coordination with the relevant service providers to ascertain what effects their network is experiencing, and assess what remedial action is required. Any remedial works will be carried out as soon as possible. If the investigation reveals no immediate damage, the services will continue to be monitored closely until all parties are satisfied no damage has occurred. ■ Permanently divert the service through another nearby service and abandon the	In addition to the settlement and groundwater monitoring described above, monitoring will be undertaken using CCTV inspections of some stormwater and wastewater services will be carried out to assess the effects of the settlement.	Specify requirements for CEMP and SEMP to address	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ Technical Report 35, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	original service line (the capacity of the nearby service would need to be checked). ■ Temporarily divert the service and repair the original service. ■ Expose the service and undertake a repair. Replace the service. In cases of severe damage, a length of the service may be replaced.			
Settlement may result in grade changes and differential movements on nearby local roads.	If this effect does occur: ■ Overlay the road surface to raise to the previous level and re-shape any differential movements. ■ Reconstruct the kerb and channels, and footpaths to mitigate changes in grade and/ or differential settlements. ■ Install additional drainage if new areas of ponding are identified.	Settlement and groundwater monitoring as described above.	Specify requirements for CEMP and SEMP to address	■ CEMP, Volume 4 ■ SEMP (CEMP, Appendix J, Volume 4) ■ Technical Report 35, Volume 3
Settlement may continue to occur post-construction.	N/A	Monitoring of settlement and groundwater levels will take place Quarterly for 6 months, reducing to half yearly and results reported to GWRC.	Specify requirements for CEMP and SEMP to address	■ Technical Report 35, Volume 3
Contamination				
Contaminant risk to human health and/or ecological values during land disturbance activity	These potential effects can be avoided through various mitigation measures including	A Contaminated Land Specialist will be engaged by the Project team to	Specify requirements for CEMP and CLGMP to address	■ CEMP, Volume 4 ■ CSGMP (CEMP Appendix K, Volume 4)

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
And Potential for hazardous materials to be discovered during construction resulting in human health risk (largely for workers).	by: ■ adherence to the procedures within the Contaminated Soils and Groundwater Management Plan; ■ adherence to the procedures within Construction Air Quality Management Plan; ■ adherence to the procedures within the Erosion and Sediment Control Plan; ■ resource consent conditions; ■ containment of contaminants on–site; and, ■ disposal of contaminated soil to licensed landfills.	monitor, supervise and report on all works that may disturb contaminated land. Tasks include the following: ■ Coordinate contaminated land assessments and testing; ■ Advise on classification of excavated material for reuse and disposal; ■ Coordinate contaminated groundwater management and disposal; and ■ Train staff in contaminated land identification and control procedures. Monitoring as required within the CAQMP and ESCP will be undertaken.		■ CAQMP (CEMP Appendix G, Volume 4) ■ ESCP (CEMP, Appendix H, Volume 4) ■ Technical Report 23
Water Quality				
Discharge of sediment in watercourses during: ■ land disturbance; ■ temporary stockpiling; ■ pumping of water from excavation areas; and, ■ while working at watercourses.	■ Correct installation and on-going maintenance of ESC measures and devices and review of measures and devices where required. ■ Construction staging. ■ Storm warnings.	■ Erosion and sediment control device monitoring to ensure they remain effective. ■ Visual assessments of receiving watercourses. ■ Weather forecast monitoring.	Specify requirements for CEMP and ESCP to address.	■ CEMP, Volume 4 ■ ESCP (CEMP, Appendix H, Volume 4) ■ Technical Reports 22, Volume 3 ■ Technical Report 24, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
		This monitoring will be carried out by suitably trained members of the ESC team.		▪ Technical Report 25, Volume 3
Contaminants entering stormwater from vehicles on Expressway road surface	Treatment of road run-off prior to discharge	A water quality treatment plan will monitor the stormwater treatment ponds and proprietary devices during the initial 2 of operation to ensure these devices are operating effectively to meet the target removal rates.	Monitoring of stormwater treatment devices and water quality	▪ Technical Reports 22, Volume 3 ▪ Technical Report 24, Volume 3 ▪ Technical Report 25, Volume 3 ▪ Technical Report 26, Volume 3
Economic				
Net positive benefits will arise from the project. Construction activity and traffic will cause temporary negative economic effects in localised areas.	The specific routes and locations that will be affected have been identified and assessed and measures to address these detailed in the Construction Environmental Management Plan (CEMP) and Construction Traffic Management Plan (CTMP).	N/A	Specify requirements for CEMP and CTMP to address.	▪ CEMP, Volume 4 ▪ CTMP (CEMP, Appendix O, Volume 4) ▪ Chapter 29 of the AEE, Volume 2
Disruption of current dynamics for passing traffic to be aware of business offerings at Paraparaumu and Waikanae, and to know how to navigate to these offerings.	Provide interchange signage to clearly identify the presence of Paraparaumu and Waikanae town centres and the routes to these.	Existing KCDC District Plan assessments and monitoring already address this. No further monitoring required.	Refer to conditions as outlined within Chapter 29 of this report.	▪ Chapter 29 of the AEE, Volume 2
Business relocation of activities reliant on current SH1 passing trade at Waikanae and	Current State Highway 1 revocation achieved as soon as practicable after Expressway	Existing KCDC District Plan assessments and monitoring already	N/A.	▪ Chapter 29 of the AEE, Volume 2

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Paraparaumu.	opening to enable identified 'revitalisation' opportunities to be pursued by KCDC.	addresses this. Therefore, no additional monitoring proposed.		
Social				
Daytime disturbance produced by construction noise in sensitive areas.	Refer to "Noise and Vibration" above. Mitigation as recommended in the Noise and Vibration Chapter 19, and as set out in CEMP (Volume 4) and the CNVMP (being Appendix S of the CEMP, Volume 4).			■ CEMP, Volume 4 ■ SCMP (CEMP, Appendix S, Volume 4) ■ CNVMP (CEMP, Appendix F, Volume 4) ■ Technical Report 20, Volume 3
Disturbance to human health and nuisance caused by dust produced by construction.	Refer to "Air Quality" above. Mitigation as recommended in the Air Quality Chapter 20, and as set out in CEMP (Volume 4) and the CAQMP (being Appendix G of the CEMP, Volume 4).			■ CEMP, Volume 4 ■ CAQMP (CEMP Appendix G, Volume 4) ■ SCMP (CEMP, Appendix S, Volume 4) ■ Technical Report 20, Volume 3
Visual effects of construction activities taking place throughout the district over four years.	Refer to "Landscape and Visual" above. Mitigation as recommended in the Landscape and Visual Chapter 17, and as set out in CEMP (Volume 4) and the ELMP (being Appendix M of the CEMP, Volume 4).			■ CEMP, Volume 4 ■ ELMP, (CEMP, Appendix M, Volume 4) ■ SCMP (CEMP, Appendix S, Volume 4) ■ Technical Report 20, Volume 3
Recreational opportunities along streams, in streams, in QE Park may be temporarily disrupted.	■ A cycleway / walkway constructed parallel to the Expressway for it length from Poplar Avenue to Peka Peka. Northern sections will include provision for a bridleway. ■ A cycleway / walkway	In regard to water quality, refer to monitoring above.	■ Condition relating to the provision of cycleway/walkway and bridleway. ■ Work with GWRC on potential for re-established QE Park land	■ CEMP, Volume 4 ■ CTMP (CEMP, Appendix O, Volume 4) ■ ESCP (CEMP, Appendix H, Volume 4) ■ SCMP (CEMP, Appendix S,

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	constructed through Queen Elizabeth Park in conjunction with DOC / GWRC. ■ Equivalent area of land in QE Park permanently taken for Project re-established in alternative location. ■ The Construction Traffic Management Plan recognises horse riders are present on local roads, and includes a focus on making linkages clear. ■ Effects on water quality are managed through methods for erosion and sediment control.		in alternative location. ■ Specify requirements for CEMP, CTMP, ESCP and SCMP to address.	Volume 4) ■ Technical Report 20, Volume 3
Possible anxiety effects caused by lack of certainty of construction effects.	■ Implementation of Stakeholder and Communication Plan. ■ Implementation of the Construction Environmental Management Plan (CEMP). ■ Implementation of Project monitoring and response processes, including social impact specific monitoring. ■ Establishment of local liaison groups with representatives of affected communities. ■ Provision of updates on construction to local and wider communities, with contact details and processes for engaging.	Feedback from local liaison groups and other sources	Specify requirements for CEMP and SCMP to address	■ CEMP, Volume 4 ■ SCMP (CEMP, Appendix S, Volume 4) ■ Technical Report 20, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	▪ Post construction return of land that is not required for Project operation as soon as is practicable.			
Disruption to local traffic and temporary lack of access to various local facilities caused by construction traffic.	The Construction Traffic Management Plan (CTMP) and the availability of alternative public access points elsewhere will ensure impacts on people's way of life will remain acceptable and be appropriately managed.	On-going assessment of Key Performance Indicators as outlined in the CTMP. The three KPIs which are proposed for the Project are Traffic Management Auditing, SH1 Travel Times and Stakeholder Surveys.	Specify requirements for CEMP and CTMP to address	▪ CEMP, Volume 4 ▪ SCMP (CEMP, Appendix S, Volume 4) ▪ CTMP (CEMP, Appendix O, Volume 4) ▪ Technical Report 20, Volume 3
Physical disruption of communities– disruption of residential and business areas, perceptions of severance between communities	Setting Expressway into surrounding environment and design elements for structures, landscaping and maintaining local connections. Provision of new pedestrian/cycle/bridle access across and along the Expressway. Provision of clear information, discussion and clarity. Collaborative negotiation with business owners.	A post construction assessment and monitoring for three years to evaluate severance effects related to the Project.	Specify requirements for CEMP and SCMP to address	▪ Technical Report 20, Volume 3
Operational noise and vibration can negatively affect sensitive areas near to the Expressway.	Refer to "Noise and Vibration" above.			▪ Technical Report 20, Volume 3 ▪ Technical Report 15, Volume 3 ▪ Technical Report 18, Volume 3
Impacts on air quality will increase around interchanges.	Refer to "Air Quality" above.			▪ Technical Report 20, Volume 3 ▪ Technical Report 13,

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
				Volume 3
Visual and amenity effects caused by having an Expressway where before there was an undeveloped designated corridor.	■ Noise bunds and planting incorporated as set out in Landscape and Visual Chapter 17. ■ Quality design of structures to mitigate adverse visual effects as set out in Urban Form & Design Chapter 16. ■ In the vicinity of Takamore Wāhi Tapu the mitigation for effects on amenity are set out in Chapter 31 ■ Community engagement and liaison over construction on detailed landscaping design elements and opportunities to include the community in the implementation of these (e.g. community planting days)	Monitoring of planting as per landscape	■ Project developed as specified in Volume 5 Plan Set.	■ Technical Report 20, Volume 3 ■ Technical Report 7, Volume 3 ■ Technical Report 5 and 6, Volume 3
Local character will be impacted to varying degrees along the alignment, in both urban and rural areas.	■ The design of urban area bridges and structures applies CPTED principles to encourage safe and useable facilities. ■ Community engagement and liaison on design details for significant features in the local environment to maintain a sense of involvement and engagement in the Project		■ Project developed as specified in Volume 5 Plan Set.	■ Technical Report 20, Volume 3 ■ Technical Report 7, Volume 3
Tangata Whenua and Cultural Heritage				
Impacts on the cultural landscape	Assistance provided to Te Āti Awa ki Whakarongotai to map and identify significant cultural	Active supervision by iwi representative during earthworks in sensitive	■ Iwi liaison protocols followed	■ CEMP, Volume 4 ■ Technical Report 11,

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Includes: archaeology, sites of significance, landscape features	sites and places within their tribal jurisdiction – database. Historic reserve designation under the Reserves Act 1977 – lands surrounding the Takamore urupā. Refer below for archaeological monitoring protocols.	areas and cultural training for contractors.	▪ Accidental Discovery Protocol to be followed ▪ Refer to other conditions as outlined within Chapter 31 of this report.	Volume 3 ▪ Technical Report 12, Volume 3 ▪ Technical Report 9, Volume 3 ▪ Technical Report 10, Volume 3 ▪ Technical Report 7, Volume 3
Environment and Biodiversity	Iwi engagement in the preparation of management plans for ecology, water etc.	Active supervision by iwi representative during earthworks in sensitive areas and cultural training for contractors.	▪ Iwi liaison protocols followed ▪ Refer to conditions as outlined within Chapter 31 of this report.	▪ CEMP, Volume 4 ▪ Technical Report 11, Volume 3 ▪ Technical Report 12, Volume 3 ▪ Technical Report 26, Volume 3
Impacts on Water Quality	Iwi engagement in the preparation of management plans for ecology, water etc. Creation of habitat storm water ponds.	Active supervision by iwi representative during earthworks in sensitive areas and cultural training for contractors.	▪ Iwi liaison protocols followed ▪ Refer to conditions as outlined within Chapter 31 of this report.	▪ CEMP, Volume 4 ▪ Technical Report 11, Volume 3 ▪ Technical Report 12, Volume 3 ▪ Technical Report 26, Volume 3 ▪ Technical Report 25, Volume 3
Wāhi Tapu/Wāhi Taonga	Acknowledgement of wāhi tapu site. Historic reserve designation under the Reserves Act 1977 – lands adjacent to the Takamore urupā. Interpretation promoting the cultural importance of identified areas.	Active supervision by iwi representative during earthworks in sensitive areas and cultural training for contractors.	▪ Iwi liaison protocols followed ▪ Accidental Discovery Protocol to be followed for wetland areas ▪ Refer to conditions as outlined within Chapter 31	▪ Technical Report 11, Volume 3 ▪ Technical Report 12, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
	▪ [Advisory note: HPA authorisation conditions to be followed]		of this report.	
Archaeology and Built Heritage				
The destruction or damage of 14 archaeological sites arising from construction of the Expressway.	Archaeological investigations under Historic Places Act authorisations will take place. A series of interpretation panels are also proposed at significant or strategic locations along the proposed pedestrian/cycle way to enhance the experience and reflect on the area's cultural significance and history of occupation in the area. Surveying and recording of burials of tūpuna are to be marked out.	▪ Systematic investigations of discrete sections of the proposed Expressway that have a high archaeological probability. The investigative work would be undertaken by a team of archaeologists and take place prior to construction. ▪ Monitoring during the course of constructing sections of the proposed Expressway that have a low to moderate archaeological probability, and where site density is not anticipated to be high.	Accidental discovery protocols. Nominated archaeologist.	▪ CEMP, Volume 4 ▪ Technical Report 9, Volume 3
Construction is likely to result in the damage or destruction of unknown or yet to be identified archaeological sites e.g. the area between Te Moana Road and Ngarara Road.	Archaeological investigations are proposed in conjunction with monitoring during the course of construction. Areas where there is a very low archaeological probability will be covered under the accidental discovery protocol.	Monitoring as described above.	Accidental discovery protocols for wetland areas of Project. [Advisory note: separate Historic Places Act management and conditions will apply to other parts of the alignment.]	▪ CEMP, Volume 4 ▪ Technical Report 9, Volume 3
Noise, visual, vibration and amenity effects on the Stringer	The relocation of the house from its current site to a	Given that the house will be relocated, monitoring is not	N/A	▪ Technical Report 9, Volume 3

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
'Wind Rain' House arising from the construction and operation of the Expressway.	suitable alternative location on the Kāpiti Coast to ensure the association between the house and the area is maintained.	required.		

31.5 Proposed conditions

Based on the mitigation and monitoring measures summarised in Table 31.2, a suite of conditions is proposed to manage the effects of construction. These can be broken up into two broad categories:

- conditions dealing with human health and nuisance effects; and
- conditions dealing with other environmental, ecological, and water effects.

For the most part the human health and nuisance effects are dealt with under the designation conditions, and the other environmental, ecological, and water effects are dealt with in the regional consent conditions.

A suite of conditions is also proposed to manage the effects of operation. These mainly relate to maintenance, including maintenance of the road and associated structures, surface runoff and maintenance of vegetation planting. The NZTA has an existing network maintenance contract and has a number of measures in place for the ongoing operation and maintenance of its assets. Maintenance measures include, for example:

- landscape maintenance;
- road surface maintenance;
- stormwater management; and
- graffiti removal.

32 Proposed designation conditions

32.1 Guide to reading the conditions

The proposed suite of conditions to manage effects of the Project has been numbered in order to eliminate confusion, specifically to avoid multiple 'Condition 1' and so forth. The numbering format is as follows:

Set of proposed conditions	Numbering format
NZTA designation conditions	**DC.1, DC.2.** and so on

The table below provides explanation to a number of the acronyms and terms used in the conditions.

Definitions	
AEE	Means the MacKays to Peka Peka Expressway Assessment of Effects on the Environment Volumes 1 to 5 dated April 2012
CEMP	Means the Construction Environmental Management Plan
Commencement of Works	Means the time when the works that are the subject of these designations commence
Council	Means the Kāpiti Coast District Council
District	Means the Kāpiti Coast District
District Plan	Means the Kāpiti Coast District Plan
Existing network utilities	Means all network utilities existing at 15 August 2011 (the date of lodgement of this Notice of Requirement). Network utility has the same meaning as in section 166 of the RMA
GWRC	Means the Wellington Regional Council
KCDC	Means the Kāpiti Coast District Council
Manager	Means the Regulatory Manager of the Kāpiti Coast District Council
Outline Plan (OP)	Means an Outline Plan prepared in accordance with section 176A of the RMA
Project	Means the construction, maintenance and operation of the MacKays to Peka Peka Expressway
Requiring Authority	Means the New Zealand Transport Agency
RMA or 'the Act'	Means the Resource Management Act 1991
Road Asset Manager	Means the Kāpiti Coast District Council's road asset manager
Stage	Means a stage of the Project as nominated by the Requiring Authority
Work	Means any activity or activities undertaken in relation to the Project

32.2 Proposed NZTA designation conditions

Ref	Draft conditions
	General Conditions and Administration
DC.1	a) Except as modified by the conditions below, and subject to final design, the Project shall be undertaken in general accordance with the information provided by the Requiring Authority in the Notice of Requirement dated [insert date] and supporting documents being: i) Assessment of Environmental Effects report, dated [insert date] ii) Plan sets: 1. CV-SP -100 – 160: Scheme plans;

Ref	Draft conditions
	2. CV-GP-101-136: Geometric plans; 3. CV-SC-001-004: Cross sections; 4. CV-EW-100-232: Earthworks; 5. CV-BR-100-970: Bridges; 6. CV-GE-100-140: Structural - General; 7. GI-PR-01-18: Land Requirement Plans; 8. CV-MF-100-132: Lighting, Marking and Signage; 9. CV-CM-101-412: Construction Methodology; 10. Urban & Landscape Design Framework (Technical Report 5); 11. Landscape & Visual (Technical Report 7)- Appendix A & B; 12. Stormwater & Hydrology (Technical Report 22) – Appendix 22.A; 13. Erosion & Sediment Control (CEMP Appendix H) – Appendix H.B, H.C, H.D, H.E, H.F, H.H, H.I, H.R. b) For the avoidance of doubt, none of these conditions prevent or apply to works required for the ongoing operation or maintenance of the Project following construction such as changes to street furniture or signage over time. Depending upon the nature of such works, outline plans or outline plan waivers may be required. c) Where there is conflict between the documents listed above and these conditions, these conditions shall prevail.
DC.2	As soon as practicable following completion of construction of the Project, the Requiring Authority shall: a) Review the width of the area designated for the Project; b) Identify any areas of designated land that are no longer necessary for the on-going operation or maintenance of the State Highway or for on-going mitigation measures; and c) Give notice to the Council in accordance with Section 182 of the RMA seeking the removal of those parts of the designation identified in D.2 (b) above.
DC.3	The designation shall lapse if not given effect to within 15 years from the date on which it is included in the District Plan under Section 175 of the RMA.
DC.4	The Requiring Authority shall reimburse the Council for its actual and reasonable costs incurred in carrying out its functions pursuant to Section 36(1)(d) of the Act.
	Outline Plans
DC.5	a) An Outline Plan of Works shall be prepared for the pedestrian cycleway and footbridge (and the associated connections) between: • Between Leinster Ave and Raumati Road (in the general location as shown in the Scheme Plan SV-SP-106); and • Between Kāpiti Road and Mazengarb Road (in the general location as shown in the Scheme Plan SV-SP-113). b) The OP shall be prepared in accordance with Section 176A of the RMA and submitted to the Manager. ***Advice Note**: An Outline Plan may be prepared and submitted for any works not covered by Condition DC.1 in accordance with the requirements of s176A of the RMA.*
	Pedestrian /Cycle bridges
DC.6	The two pedestrian/cycle bridges and associated accesses referred to in condition DC.5 shall be constructed and completed by the time the Expressway is fully operational.
	Management Plans - General
DC.7	All works shall be carried out in general accordance with any of the management plans required by these conditions. The draft management plans lodged with the Notice of Requirement that are listed below in this condition shall be updated and finalised by the contractor and submitted to the Manager for certification at least 15 working days prior to the commencement of construction of the relevant stage or stages: a) Construction Noise and Vibration Management Plan b) Construction Air Quality Management Plan

Ref	Draft conditions
	c) Construction Traffic Management Plan d) Hazardous Substances Management Plan e) Landscape Management Plan. ***Advice Note: Relationship of Management Plans with the Construction Environmental Management Plan*** *These management plans are part of a suite of plans that are required to manage the effects of construction of the Project on the environment, and that come under an overarching Construction Environmental Management Plan (CEMP). The CEMP will confirm final Project details, staging of Work, and detailed engineering design to ensure that the Project remains within the limits and standards approved under this designation and that the construction and operation activities avoid, remedy or mitigate adverse effects on the environment in accordance with the conditions of this designation, and any resource consents granted to assist the Requiring Authority in constructing the Project.* *The CEMP will also provide details of the responsibilities, reporting frameworks, coordination and management required for Project quality assurance; final detailed design; construction methodologies; timeframes and monitoring processes and procedures.* *The CEMP is required to be certified by the Greater Wellington Regional Council only, in accordance with the conditions of regional resource consents. Under those conditions, the CEMP is to be supplied to the Kāpiti Coast District Council for an initial consultation process, and then the final document is required to be supplied for information, and displayed in any site office.*
DC.8	Where a management plan is required to be prepared in consultation with any third party, the Management Plan shall demonstrate how the views of that party (or parties) have been incorporated, and, where they have not, the reasons why.
DC.9	a) In the event of any dispute, disagreement of inaction arising as to any certification / approvals required by the designation conditions, or as to the implementation of, or monitoring required by the conditions, matters shall be referred in the first instance to the Manager and to the NZTA Regional State Highway Manager to determine a process of resolution. b) If a resolution cannot be agreed within 6 months of lodging the particular management plan, the matter may be referred to an independent appropriately qualified expert, agreeable to both parties, setting out the details of the matter to be referred for determination and the reasons the parties do not agree. c) The qualified expert shall be appointed within 10 working days of the NZTA or Kāpiti Coast District Council giving notice of their intention to seek expert determination. The expert shall, as soon as possible, issue a decision on the matter. ***Advice note****: the dispute resolution process above does not prejudice any party's right to take enforcement action in relation to the implementation of the designation conditions. However, the dispute resolution process will be applied before any formal enforcement action is taken by the Council, except in urgent situations.*
DC.10	The Requiring Authority may request amendments to any of the management plans required by these conditions by submitting the amendments in writing to the Manager for certification at least 10 working days prior to any changes taking effect. Any changes to management plans shall remain consistent with the overall intent of the relevant management plan.
DC.11	a) The management plans shall be made available for public viewing at one or more of the Project site offices. b) Where practicable, electronic copies of the management plans shall be made available upon request.
	Communications and Public Liaison – Construction
DC.12	A liaison person shall be appointed by the Requiring Authority for the duration of the construction phase of the Project to be the main and readily accessible point of contact at all times for persons affected by the construction work. The Requiring Authority shall take appropriate steps to seek to advise all affected parties of the liaison person's name and contact details. If the liaison person will not be available for any reason, an alternative contact person shall be nominated, to seek to ensure that a project contact person is reasonably available by telephone during the construction phase of the Project.

Ref	Draft conditions
DC.13	a) Prior to the commencement of construction and/or enabling works, the Requiring Authority shall prepare and implement, a Stakeholder and Communications Management Plan (SCMP) that sets out procedures detailing how the public and stakeholders will be communicated with throughout the construction period. As a minimum, the SCMP shall include: i) Details of a contact person available on site at all times during works. Contact details shall be prominently displayed at the entrance to the site(s) so that they are clearly visible to the public at all times. ii) Methods to consult on and to communicate the proposed hours of construction activities outside of normal working hours and on weekends and public holidays, to surrounding residential communities, and methods to deal with concerns raised about such hours. iii) Methods to record concerns raised about hours of construction activities and, where practicable, methods to so far as is practicable avoid particular times of day which have been identified as being particularly sensitive for neighbours. iv) Any stakeholder specific communication plans required v) Monitoring and review procedures for the Communication Plan vi) Details of communications activities proposed including: 1. Publication of a newsletter, or similar, and its proposed delivery area. 2. Newspaper advertising 3. Notification and consultation with individual property owners and occupiers with dwellings within 20 metres of construction activities. b) The SCMP shall include linkages and cross-references to methods set out in other management plans where relevant. The SCMP shall be provided at least 15 working days prior to construction commencing, to the Manager and Community Liaison Group.
DC.14	a) The NZTA shall establish a Community Liaison Group(s) at least 30 working days prior to construction commencing in each of the following key construction areas: – Northern Project area – Southern Project Area b) The purpose of the Community Liaison Group(s) shall be to provide a regular forum through which information about the Project can be provided to the community, and an opportunity for concerns and issues to be raided with the Requiring Authority. c) The Community Liaison Group shall be open to all interested organisations within the Project area including, but not limited to the following groups: – Kāpiti Coast District Council – Educational facilities within the project area (including schools, kindergartens, childcare facilities) – Community / environmental groups – Business groups – Community Boards d) The Community Liaison Group(s) hold meetings at least once every three months throughout the construction period so that ongoing information can continue to be disseminated.
DC.15	The Requiring Authority shall provide the Manager with an updated schedule of construction activities at monthly intervals during the construction of the Project.
	Complaints
DC.16	a) At all times during construction work, the Requiring Authority shall maintain a permanent record of any complaints received alleging adverse effects from, or related to, the exercise of this designation. The record shall include: i) the name and address (as far as practicable) of the complainant; ii) identification of the nature of the complaint; iii) location, date and time of the complaint and of the alleged event; iv) weather conditions at the time of the complaint (as far as practicable), and including wind direction and approximate wind speed if the complaint relates to air

Ref	Draft conditions
	quality. v) the outcome of the Requiring Authority's investigation into the complaint; vi) measures taken to respond to the complaint; and vii) Any other activities in the area, unrelated to the Project that may have contributed to the compliant, such as non-Project construction, fires, traffic accidents or unusually dusty conditions generally. b) The Requiring Authority shall also keep a record of any remedial actions undertaken. c) This record shall be maintained on site and shall be made available to the Manager and Greater Wellington Regional Council, upon request. The Requiring Authority shall notify the Manager and Greater Wellington Regional Council in writing of any such complaint within 5 working days of the complaint being brought to the attention of the Requiring Authority.
	Construction Traffic Management Plan
DC.17	a) The draft Construction Traffic Management Plan (CTMP) submitted with the application (dated XXX 2012) shall be updated, finalised and submitted to the Manager for certification, at least 15 working days prior to commencement of construction of the Project. b) The certified CTMP shall confirm the procedures, requirements and standards necessary for managing the traffic effects during construction of the Project.
DC.18	a) Site Specific Traffic Management Plans (SSTMP) shall be prepared in consultation with the Kāpiti Coast District Council and provided to the Kāpiti Coast District Council nominated person at least 5 working days for a "minor" SSTMP and at least 10 working days for a "major" SSTMP prior to the commencement of work in that area, and shall describe the measures that will be taken to manage the traffic effects associated with the construction of specific parts of the Project prior to construction of the relevant part(s) of the Project commencing. In particular, SSTMPs shall describe, where appropriate: i) Temporary traffic management measures required to manage impacts on road users during proposed working hours; ii) Assessment of delays associated with the proposed closure/s and detour routes; iii) The capacity of any proposed detour route(s) and their ability to carry the additional traffic volumes likely to be generated as a result of the construction of the Project and any known safety issues associated with the detour route, including any mitigation measures the Requiring Authority proposes to put in place to address any identified safety issues; iv) Measures to maintain existing vehicle access to adjacent properties and businesses; v) Measures to maintain safe and clearly identified pedestrian and cyclist access on roads and footpaths adjacent to the construction works. Where detours are necessary to provide such access the Requiring Authority shall provide for the shortest and most convenient detours which it is reasonably practicable to provide, having regard to safety; vi) Measures to maintain passenger transport services and facilities; vii) Any proposed temporary changes in speed limit; viii) Provision for safe and efficient access of construction vehicles to and from construction site(s); ix) The measures that will be undertaken by the Requiring Authority to communicate traffic management measures to affected road users and stakeholders. b) For the purposes of this condition, a "minor" SSTMP shall be defined as involving works of 5 or fewer days in duration, and a "major" SSTMP shall be defined as involving works of more than 5 days in duration.
DC.19	a) SSTMP(s) shall be prepared following consultation with the following key stakeholders: i) Emergency services (police, fire and ambulance). ii) Public health services iii) Schools, childcare centres and other educational activities with frontage or access to roads which works in relation to the Project will take place.

Ref	Draft conditions
	b) Results of this consultation and responses from key stakeholders to any matters should be specified in the relevant SSTMP.
DC.20	The CTMP and SSTMP(s) shall be consistent with the version of the NZ Transport Agency Code of Practice for Temporary Traffic Management (COPTTM) which applies at the time the CTMP or the relevant SSTMP is prepared. Where it is not possible to adhere to this standard, the COPTTM's prescribed Engineering Exception Decision (EED) process will be followed, which will include appropriate mitigation measures agreed with the Road Asset Manager.
DC.21	The CTMP and SSTMP(s) shall be reviewed, by a suitably qualified independent person, prior to being submitted to the Council for certification. Any comments and inputs received from the independent reviewer shall be clearly documented, along with clear explanation of where any comments have not been incorporated and the reasons why.
DC.22	The Requiring Authority shall appoint an independent party to carry out random auditing of temporary road closure/s in accordance with COPTTM at regular intervals throughout the construction of the Project. The intervals shall be stated in the CTMP. A copy of the findings of each audit shall be provided to the Manager.
DC.23	Prior to the commencement of the Project, or any enabling works, the Requiring Authority shall undertake a pre-construction condition survey of the carriageway/s along those local roads affected by the Project for which the Council is the road controlling authority and submit it to the Manager and the Roading Asset Manager. The condition survey shall consist of a photographic or video record of the carriageway, and shall include roughness, rutting defects and surface condition.
DC.24	The Requiring Authority shall contribute fair and reasonable costs toward the maintenance of Otaihanga Road caused by the increased heavy vehicle movements related to the construction of the Project. The Requiring Authority shall carry out regular inspections of the road networks affected by the Project during construction to ensure that all potholes and other damage resulting from the construction of the Project are identified as soon as practicable.
DC.25	As soon as practicable following completion of construction of the Project the Requiring Authority shall, at its expense, conduct a post-construction condition survey of the road network affected by the Project. The results of the pre and post construction surveys will be compared and where necessary, the Requiring Authority shall at its expense arrange for repair of any damage to the carriageways and footpaths (and associated road components), for which the Council is the road controlling authority, where that damage has resulted from the impacts of construction of the Project.
	Construction Dust Management
DC.26	a) The NZTA shall finalise and implement, through the CEMP, the Construction Air Quality Management Plan (CAQMP) submitted with the application. The purpose of the CAQMP shall be to establish procedures for monitoring the discharge of particulates into the air during construction, methods to be used to limit dust and odour nuisance, and procedures for responding to any complaints and events. b) The CAQMP shall be provided to the Manager, at least 15 working days prior to bulk earthworks being undertaken for review and certification that the CAQMP includes the following details: i) Visual monitoring of dust emissions; ii) Methods to be used to limit dust and odour nuisance iii) Procedures for responding to process malfunctions and accidental dust discharges; iv) Criteria, including consideration of weather conditions and procedures for use of water sprays on stockpiles and operational areas of the site; v) Continuous Monitoring of Total Suspended Particulate (TSP) concentrations and meteorology; vi) Monitoring of the times of offensive odour emissions from the ground; vii) Procedures for responding to discharges of odour (including in the event of excavation of contaminated sites); viii) Monitoring of construction vehicle maintenance;

<table>
<tr><th>Ref</th><th>Draft conditions</th></tr>
<tr><td></td><td>ix) Process equipment inspection, maintenance, monitoring and recording;
x) Complaints investigation, monitoring and reporting; and
xi) The identification of staff and contractors' responsibilities.</td></tr>
<tr><td>DC.27</td><td>The NZTA shall review the CAQMP at least annually and as a result of any material change to the Project. Any consequential changes will be undertaken in accordance with Condition DC.10.</td></tr>
<tr><td>DC.28</td><td>Unless expressly provided for by conditions of this designation, there shall be no odour, dust or fumes beyond the site boundary caused by discharges from the site which, in the opinion of an enforcement officer, is noxious, offensive or objectionable.</td></tr>
<tr><td>DC.29</td><td>Beyond the site boundary there shall be no hazardous air pollutant caused by discharges from the site that causes, or is likely to cause, adverse effects on human health, environment or property.</td></tr>
<tr><td></td><td>Noise and Vibration Management – Construction</td></tr>
<tr><td>DC.30</td><td>The Requiring Authority shall implement the noise management and mitigation measures identified in the certified CVNMP. Construction noise shall, as far as practicable, be made to comply with the following criteria in accordance with NZS6803:1999:
Residential receivers
<table>
<tr><th>Time of week</th><th>Time period</th><th>dB $L_{Aeq(T)}$</th><th>dB L_{Amax}</th></tr>
<tr><td>Weekdays</td><td>0630-0730</td><td>55</td><td>75</td></tr>
<tr><td></td><td>0730-1800</td><td>70</td><td>85</td></tr>
<tr><td></td><td>1800-2000</td><td>65</td><td>80</td></tr>
<tr><td></td><td>2000-0630</td><td>45</td><td>75</td></tr>
<tr><td>Saturdays</td><td>0630-0730</td><td>45</td><td>75</td></tr>
<tr><td></td><td>0730-1800</td><td>70</td><td>85</td></tr>
<tr><td></td><td>1800-2000</td><td>45</td><td>75</td></tr>
<tr><td></td><td>2000-0630</td><td>45</td><td>75</td></tr>
<tr><td>Sundays and public holidays</td><td>0630-0730</td><td>45</td><td>75</td></tr>
<tr><td></td><td>0730-1800</td><td>55</td><td>85</td></tr>
<tr><td></td><td>1800-2000</td><td>45</td><td>75</td></tr>
<tr><td></td><td>2000-0630</td><td>45</td><td>75</td></tr>
</table>
Industrial and commercial receivers
<table>
<tr><th>Time period</th><th>dB $L_{Aeq(T)}$</th></tr>
<tr><td>0730-1800</td><td>70</td></tr>
<tr><td>1800-0730</td><td>75</td></tr>
</table>
(T) means a duration between 15 minutes and 60 minutes, in accordance with NZS6803:1999.
Where the criteria set out above cannot be met, the process of Condition DC.32 shall be followed.</td></tr>
</table>

<table>
<tr><th>Ref</th><th>Draft conditions</th></tr>
<tr><td>DC.31</td><td>The Requiring Authority shall implement the vibration management and mitigation measures identified in the certified CVNMP. Construction vibration shall, as far as practicable, be made to comply with the following criteria in accordance with the draft NZTA vibration guide:

<table>
<tr><th>Receiver</th><th>Details</th><th>Category A</th><th>Category B</th></tr>
<tr><td rowspan="2">Occupied dwellings</td><td>Night-time 2000h - 0630h</td><td>0.3 mm/s PPV</td><td>1 mm/s PPV</td></tr>
<tr><td>Daytime 0630h - 2000h</td><td>1 mm/s PPV</td><td>5 mm/s PPV</td></tr>
<tr><td>Other occupied buildings*</td><td>Daytime 0630h - 2000h</td><td>2 mm/s PPV</td><td>5 mm/s PPV</td></tr>
<tr><td>All other buildings</td><td>Vibration – continuous**</td><td>5 mm/s PPV</td><td>50% of Line 2 values in Table B.2 of BS 5228-2:2009</td></tr>
</table>

* ‘Other occupied buildings’ is intended to include daytime workplaces such as offices, community centres etc., and not industrial buildings. Schools, hospitals, rest homes etc. would fall under the occupied dwellings category.

** This line addresses ‘continuous’ or ‘long-term’ vibration as there are no construction machinery proposed which produces transient vibration.

a) Measurements of construction vibration shall be undertaken in accordance with German Standard DIN 4150-3:1999 “Structural Vibration Part 3: Effects of vibration on structures”.
b) If measured or predicted vibration levels exceed the Category A criteria then a suitably qualified expert shall be engaged to assess and manage construction vibration and to comply with the Category A criteria. If the Category A criteria cannot be practicably achieved, the Category B criteria shall be applied.
c) If measured or predicted vibration levels exceed Category B criteria, then construction activity shall only proceed if there is continuous monitoring of vibration levels and effects on buildings at risk of exceeding the Category B criteria, by suitably qualified experts.
d) Where the Category B criteria set out above cannot be met, the process of Condition DC.33 shall be followed.</td></tr>
<tr><td>DC.32</td><td>a) Where the criteria of Condition DC.30 cannot practicably be met, the Requiring Authority shall prepare Site Specific Construction Noise Management Plans (SSCNMPs) in accordance with the CVNMP. The SSCNMP shall describe site specific noise management and mitigation measures required, which shall be in addition to the general mitigation measures noted in the CVNMP.
b) Each SSCNMP shall be submitted to the Manager for certification at least 5 working days prior to the relevant construction activity commencing.</td></tr>
<tr><td>DC.33</td><td>a) Where the Category B criteria of Condition DC.31 cannot practicably be met, the Requiring Authority shall prepare Site Specific Vibration Management Plans (SSVMPs) in accordance with the certified CNVMP. The SSVMP shall describe site specific vibration risks and mitigation measures required, which shall be in addition to the general mitigation measures noted in the certified CVNMP.</td></tr>
</table>

Ref	Draft conditions
	b) Each SSCVMP shall be submitted to the Manager for certification at least 5 working days prior to the relevant construction activity commencing.
DC.34	Prior to the commencement of Project construction operations, a detailed pre-construction building condition survey of at-risk buildings, services and structures (as identified in the certified CNVMP) shall be conducted by a suitably qualified engineer. A report of each survey shall be forwarded to the Manager within one week of the assessment.
DC.35	a) At least 2 working days prior to commencement of works within any construction area the Requiring Authority shall seek to ensure that: i) If night works (works between the hours of 2000h and 0630h) are proposed to be undertaken, the occupiers of properties within 100m of the construction area (are provided with written notification of the scheduled works, including any advice for reducing internal noise levels); ii) the occupiers of properties within 100m of the construction area are provided written notification of the scheduled works; iii) the occupiers of properties within 50m of the construction area are provided individual written notification of the schedule works with the opportunity offered for discussions on a case by case basis, if requested. b) Reasonable attempts are to be made to directly engage with the occupiers of properties within 20m of the construction area to discuss the proposed construction works.
DC.36	The detailed design of any structural construction noise or vibration mitigation measures (e.g. temporary construction noise barriers) as identified in the certified CVNMP shall be undertaken by a suitably qualified acoustics specialist, and shall be implemented prior to commencement of construction in within 100m of such mitigation.
DC.37	Where practicable, permanent (traffic) noise barriers, required as Detailed Mitigation Options for operational noise following completion of the Project (in accordance with Conditions DC.39 - DC.40 shall be erected prior to noise generating construction works commencing within 100 metres of the relevant PPFs. Where this is not practicable, temporary noise mitigation measures shall be implemented in accordance with the CNVMP as set out in Condition DC.36 above.
	Noise and Vibration Management – Operation
DC.38	For the purposes of Conditions DC.39 – DC.48, the following terms will have the following meanings: ■ BPO – means Best Practicable Option ■ Building-modification Mitigation – has the same meaning as in NZS6806:2010 ■ Habitable space – has the same meaning as in NZS6806:2010 ■ Noise Criteria Categories – means groups of preference for time-averaged sound levels established in accordance with NZS6806:2010 when determining the selected mitigation option considered to be the BPO; i.e. Category A – primary noise criterion, Category B – secondary noise criterion, Category C – internal noise criterion. ■ NZS6806:2020 – means NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads. ■ PPFs – has the same meaning as in NZS6806:2010, and are generally identified in green, yellow or red in Appendix B of Technical Report 15. ■ Sector – means Sectors 1 to 4 of the Project as set out in the AEE. ■ Structural Mitigation – has the same meaning as in NZS6806:2010, which includes bunds and low noise road surfaces; ■ Traffic Noise Assessment – means Technical Report 15 submitted as part of the AEE for this Designation.
DC.39	The detailed design of any structural mitigation measures shall be undertaken by a suitably qualified acoustics specialist prior to construction of the Project, and, subject to Condition DC.40, shall include, as a minimum, the following: a) The location, length and height of noise barriers in general accordance with Appendix B of the traffic noise assessment; and b) A requirement that Open Graded Porous Asphalt ("OGPA") or equivalent low-noise

Ref	Draft conditions
	generating road surface be used in general accordance with Appendix B of the traffic noise assessment.
DC.40	a) Where the design of the Detailed Mitigation Measures identifies a need to revise the noise mitigation measures as identified in Technical Report 15, EN-NV-020 to EV-NV-094 (for example, because it is not practicable to implement a particular mitigation in the same location, length, or height), the Requiring Authority shall submit the revised Detailed Mitigation Measures to the Council to certify either: i) If the design of the Structural Mitigation could be changed and the measure would still achieve the same Identified Category at all relevant PPFs, that the changed Structural Mitigation would be consistent with adopting the BPO in accordance with NZS6806:2010, the Detailed Mitigation Options may include the changed Structural Mitigation measures, or ii) If the changed design of the Structural mitigation would change the Noise Criteria Category at any PPF to a less stringent Noise Criteria Category, that the changed Structural Mitigation measure would be consistent with adopting the BPO in accordance with NZS6806:2010. b) The information submitted with the Detailed Mitigation Measures shall include information to demonstrate that: i) The Best Practicable Option process was followed, involving acoustic, landscape, urban design, and other relevant expertise; and ii) The principles of the Landscape and Urban Design Framework (Technical Report 5) were applied.
DC.41	a) The Requiring Authority shall implement the traffic noise mitigation measures identified as the "Selected Mitigation Options" in Appendix B of the Traffic Noise Assessment as part of the Project, in order to achieve the Noise Criteria Categories indicated in Appendix B ("Identified Categories"), where practicable and subject to Conditions DC.39 - DC.40 above. b) The Detailed Mitigation options shall be implemented prior to completion of construction of the Project.
DC.42	Prior to construction of the Project, a suitably qualified acoustics specialist shall identify those PPFs which, following implementation of all the structural mitigation measures included in the Detailed Mitigation Options, are not in Noise Criteria Categories A or B and where Building-modification Mitigation may be required to achieve 40 dB $L_{Aeq(24h)}$ inside habitable spaces ("Category C Buildings").
DC.43	a) Prior to commencement of construction of the Project in the vicinity of a Category C Building, the Requiring Authority shall write to the owner of each Category C Building seeking access to such building for the purpose of measuring internal noise levels and assessing the existing building envelope in relation to noise reduction performance. b) If the owner(s) of the Category C Building approve the Requiring Authority's access to the property within 12 months of the date of the Requiring Authority's letter (sent pursuant to Condition DC.43a), then no more than six months prior to commencement of construction of the Project in any Sector, the Requiring Authority shall instruct a suitably qualified acoustics specialist to visit the building to measure internal noise levels and assess the existing building envelope in relation to noise reduction performance.
DC.44	a) Where a Category C Building is identified, the Requiring Authority shall be deemed to have complied with Condition DC.43 above where: i) The Requiring Authority (through its acoustics specialist) has visited the building; or ii) The owner of the Category C Building consented to the Requirement Authority's request for access, but the Requiring Authority could not gain entry for some reason (such as entry being denied by a tenant); or iii) The owner of the Category C Building did not approve the Requiring Authority's access to the property within the time period set out in Conditions DC.43b) (including where the owner(s) did not respond to the Requiring Authority's letter (sent pursuant to Condition DC.43a) within that period)); or iv) The owner of the Category C Building cannot, after reasonable enquiry, be found

Ref	Draft conditions
	prior to completion of construction of the Project. b) If any of (ii) to (iv) above apply to a particular Category C Building, the Requiring Authority shall not be required to implement any Building-modification Mitigation at that Category C Building.
DC.45	Subject to Condition DC.44, within six months of the assessment required under Condition DC.43b), the Requiring Authority shall give notice to the owner of each PPF identified under Condition DC.42: a) Advising of the options available for Building-modification Mitigation to the building; and b) Advising that the owner has three months within which to decide and advise the Requiring Authority whether to accept Building- modification Mitigation for the building, and if the Requiring Authority has advised the owner that more than one option for Building-modification Mitigation is available, to advise the Requiring Authority which of those options the owner prefers.
DC.46	Once an agreement on Building-Requiring Authority and the owner of an affected building, the mitigation shall be implemented in a reasonable and practical timeframe agreed between the Requiring Authority and the owner.
DC.47	Subject to Condition DC.46, where Building-modification Mitigation is required, the Requiring Authority DC.43(b) above where: a) The Requiring Authority has completed Building-modification Mitigation to the Category C Building; or b) The owner(s) of the Category C Building did not accept the Requiring Authority's offer to implement Building-modification Mitigation prior to the expiry of the timeframe stated in Condition DC.43b) above (including where the owner(s) did not respond to the Requiring Authority within that period); or c) The owner of the Category C Building cannot, after reasonable enquiry, be found prior to completion of construction of the Project.
DC.48	The Requiring Authority shall manage and maintain the Detailed Mitigation Options to ensure that, to the extent practicable, those mitigation measures retain their noise reduction performance.
DC.49	The NZTA policy for road roughness shall be applied in order to minimise the risk of operation vibration issues
DC.50	a) Prior to construction, the Requiring Authority shall arrange for a suitably qualified and experienced acoustics specialist approved by the Manager to undertake a minimum of 8 (eight) representative measurements of ambient noise levels. Measurements shall be undertaken in accordance with the requirements of section 5.2 of NZS6806:2010. b) Following completion of the work, the NZTA shall arrange for a suitably qualified and experienced acoustics specialist approved by the Manager to undertake traffic noise monitoring at the same sites surveyed in Condition DC.50a) above, within 2 to 3 years following completion of construction of the Project. Measurements shall be undertaken in accordance with the requirements of section 5.2 of NZS6806:2010. c) The results of the noise level monitoring undertaken in accordance with Conditions DC.50a) and b) above shall be used to verify the computer noise model of the Detailed Mitigation Options. A report describing the findings of the verification shall be provided to the Manager within one month of it being completed.
	Hazardous Substances Management Plan
DC.51	a) The Requiring Authority shall finalise, submit and implement through the CEMP, the Hazardous Substances Management Plan (HSMP) to be submitted to the Manager for certification at least 15 working days prior to works commencing. b) The purpose of HSMP is: i) to provide information to the contractor in regard to acceptable management methodologies to incorporate during construction; and ii) to provide information to the Regional Council and Kāpiti Coast District Council to demonstrate that the risks of storing and using hazardous substances within the Project area will be appropriately managed by the Requiring Authority. c) The HSMP shall include information relating to:

Ref	Draft conditions
	i) implementation and operating procedures including the keeping of a hazardous substances register and preparation of a spill response plan; ii) monitoring requirements; and iii) review procedures
	Network Utilities Management Plan
DC.52	The Requiring Authority shall prepare and implement a **Network Utilities Management Plan** (NUMP) so that enabling works, design and construction of the Project adequately take account of, and include measures to address, the safety, integrity, protection or, where necessary, relocation of, existing network utilities.
DC.53	The NUMP shall be prepared in consultation with the relevant infrastructure providers who have existing network utilities that are directly affected by the Project and shall include: a) Measures to be used to accurately identify the location of existing network utilities, b) Measures for the protection, relocation and/or reinstatement of existing network utilities; c) Measures to seek to ensure the continued operation and supply of infrastructure services which may include, but not be limited to, any new or relocated gas pipes being made operational prior to the termination of existing gas lines; d) Measures to provide for the safe operation of plant and equipment, and the safety of workers, in proximity to live existing network utilities; e) Measures to manage potential induction hazards to existing network utilities; f) Earthworks management (including depth and extent of earthworks), for earthworks in close proximity to existing network utility; g) Vibration management for works in close proximity to existing network utility; and h) Emergency management procedures in the event of any emergency involving existing network utilities.
	Landscape Management Plan
DC.54	a) The Requiring Authority shall revise and finalise the Landscape Management Plan (LMP) for the Project. b) The purpose of the LMP is to outline the methods and measures to be implemented during the construction phase and for a defined period thereafter to avoid, remedy and mitigate adverse effects of the permanent works on landscape amenity. The LMP shall document the permanent mitigation measures, as well as the the necessary monitoring and management required to successfully implement those measures during the construction phase and the transition to the operational phase of the Expressway. c) The LMP shall be prepared in consultation with: • Te Ati Awa ki Whakarongotai and Takamore Trust; • Te Rūnanga O Toa Rangātira Inc, where the works are within or directly affect Queen Elizabeth Park; • the Greater Wellington Regional Council where works are within or directly adjacent to Queen Elizabeth Park or Waikanae River corridor; • As relevant, Friends of Queen Elizabeth Park, Friends of Wharemauku Stream, Friends of Waikanae River; and • the Council. This consultation shall commence at least 30 working days prior to submission of the finalised LMP to the Council. Any comments and inputs received from the parties listed above shall be clearly documented, along with clear explanation of where any comments have not been incorporated and the reasons why. d) The LMP shall provide information how the following outcomes will be achieved: i) The integration of the Project's permanent works, including earthworked areas, structures and noise attenuation measures, into the surrounding landscape and topography; ii) The mitigation of the visual effects of the Expressway on properties in the immediate vicinity through landscape works within land acquired for the Project; iii) The retention or relocation of significant existing trees, or their replacement of their retention or relocation is not practicable;

Ref	Draft conditions
	iv) The retention of areas of regenerating indigenous vegetation; v) The proposed maintenance of plantings, including the re placement of unsuccessful plantings; and vi) Coordination of landscape works with ecology works, including those required for stream diversion and permanent stormwater control ponds.
DC.55	a) The LMP shall be prepared by suitably qualified and experienced landscape architect, and shall implement: i) the principles and outcome sought by the Landscape and Urban Design Framework (Technical Report 5); and ii) the landscape plans submitted as part of the Visual And Landscape Assessment (Technical Report 7). and shall be prepared in accordance with: iii) Transit New Zealand's Guidelines for Highway Landscaping (dated September 2002) – or any subsequent updated version; iv) Transit New Zealand's "Urban Design Implementation Principles (2006)" – or any subsequent updated version; and v) AUSTROADS standards where these are relevant to pedestrian and cycle paths. b) The LMP shall be consistent with the Ecological Management Plan (EMP) that is required to be certified under the regional consent conditions.
DC.56	The Requiring Authority shall submit a copy of the draft Landscape Management Plan required by Condition DC.54 to the Regional Council for comment at least 15 working days before it is submitted to the Manager for certification. Any comments received shall be supplied to the Manager when the Landscape Management Plan is submitted, along with a clear explanation of where any comments have not been incorporated and the reasons why.
DC.57	The LMP shall include details of landscape design, including the following matters: a) Identification of vegetation to be retained, including retention of as many as practicable significant trees and areas of regenerating indigenous vegetation; b) Protection measures for vegetation to be retained, and make good planting along cleared edges; c) Proposed planting including plant species, plant/grass mixes, spacing/densities, sizes (at the time of planting) and layout and planting methods including trials; d) Planting programme – the staging of planting in relation to the construction programme which shall, as far as practicable, include provision for planting within each planting season following completion of works in each stage of the Project; e) Detailed specifications relating to (but not limited to) the following: i. Vegetation protection (for desirable vegetation to be retained); ii. Weed control and clearance; iii. Pest animal management; iv. Ground preparation; v. Mulching; and vi. Plant supply and planting, including hydroseeding and grassing - which shall require: 1. Any planting to reflect the natural plant associations of the area; 2. Where practicable, the use of mixes of plant which are of a suitable richness and diversity to encourage self-sustainability once established; and 3. Any native plants to, so far as practicable, be genetically sourced from the relevant Ecological District; f) A maintenance regime including monitoring and reporting requirements, which is to apply for the three years following that planting being undertaken; g) Landscape treatment for noise barriers; h) Landscape treatment for pedestrian and cycle facilities; i) Consideration of: • The landscape character of the area; • The integration of the works into the natural environment, including streams;

Ref	Draft conditions
	and • *Crime Prevention Through Environmental Design* (CPTED) principles in urban areas.
DC.58	In order to confirm that the LMP is consistent with the ecological management measures in the EMP, the certified EMP required under the regional resource consents shall be submitted to the Council for information at the same time.
DC.59	The Requiring Authority shall submit the Landscape Management Plan to the Manager for certification in respect of Conditions DC.54 and DC.58 at least 15 working days before the commencement of construction.
	Archaeology and Heritage
DC.60	The Requiring Authority, in consultation with, Te Rūnanga o Ati Awa ki Whakarongotai Inc, Takamore Trust, the New Zealand Historic Places Trust, and, in respect of Queen Elizabeth Park, Te Rūnanga O Toa Rangātira, shall prepare an Accidental Discovery Protocol to be implemented in the event of accidental discovery of cultural or archaeological artefacts or features during the construction of the Project in areas of swamp or wetland not covered by archaeological authorities obtained under Part 1 of the Historic Places Act 1993. This protocol shall be submitted to the Manager at least 15 working days prior to any construction or enabling Work commencing on the Project. The protocol shall include, but need not be limited to: a) Training procedures for all contractors regarding the possible presence of cultural or archaeological sites or material, what these sites or material may look like, and the relevant provisions of the Historic Places Act 1993 if any sites or material are discovered; b) Parties to be notified in the event of an accidental discovery shall include, but need not be limited to Te Rūnanga o Ati Awa ki Whakarongotai Inc, Takamore Trust, Te Rūnanga O Toa Rangātira (in respect of Queen Elizabeth Park), the New Zealand Historic Places Trust, GWRC, KCDC and, if koiwi are discovered, the New Zealand Police; c) Procedures to be undertaken in the event of an accidental discovery (these shall include immediate ceasing of all physical works in the vicinity of the discovery); and d) Procedures to be undertaken before work under this designation may recommence in the vicinity of the discovery. These shall include allowance for appropriate tikanga (protocols), recording of sites and material, recovery of any artefacts, and consulting with Te Rūnanga o Ati Awa ki Whakarongotai Inc, Takamore Trust, Te Rūnanga O Toa Rangātira (in respect of Queen Elizabeth Park) and the New Zealand Historic Places Trust prior to recommencing works in the vicinity of the discovery. ***Advice Note:*** *The Requiring Authority will be seeking separate archaeological authorities from the New Zealand Historic Places Trust under section 12 of the Historic Places Act 1993, prior to the commencement of construction. The authorities are likely to include requirements for detailed investigations and monitoring effects and are also likely to require the preparation of an HMP (or an Archaeological Management Plan).*
DC.61	Following completion of construction works the Requiring Authority shall, in consultation with Te Rūnanga o Ati Awa ki Whakarongotai Inc, the Takamore Trust, the Kāpiti Coast District Council and the New Zealand Historic Places Trust and where any investigations have been undertaken in accordance with any archaeological authorities granted under Part 1 of the Historic Places Act based on the information obtained as part of those investigations, undertake for public information and educational purposes; a) The preparation of a series of fixed interpretive signs and the placement of those signs at culturally and/or archaeologically significant or strategic locations adjacent to the combined pedestrian footpath/cycleway; b) The preparation of a complimentary set of portable interpretive panels to be supplied to the Kāpiti Coast District Council for use and distribution; c) The preparation of a booklet that provides an overview of the history of occupation on the Kāpiti Coast; d) A series of open days associated with any archaeological field investigations.
	Cultural Heritage
DC.62	Prior to the Expressway becoming operational, the Requiring Authority shall write to the

Ref	Draft conditions
	Takamore Trust offering to commission a detailed geophysical survey of the extent of the Takamore urupa. If the Takamore Trust confirms to the Requiring Authority that it agrees to them undertaking the survey within 1 year of the Requiring Authority making the written offer to the Trust, the Requiring Authority shall undertake the survey and supply the Takamore Trust with a copy of the information derived from the survey as soon as reasonably practicable following completion of the survey.
	Lighting
DC.63	Lighting shall be designed and screened to minimise the amount of lighting overspill and illumination of residential areas, and shall demonstrate that: a) All motorway lighting shall be designed in accordance with "Road lighting Standard AS/NZS1158"; and b) All other lighting shall be designed in accordance with the relevant rules of the District Plan.

33 Proposed resource consent conditions

33.1 Guide to reading the conditions

The proposed suite of conditions to manage effects of the Project has been numbered in order to eliminate confusion, specifically to avoid multiple 'Condition 1' and so forth. The numbering format is as follows:

NZTA regional resource consent condition s	
G	General conditions applying to all relevant consents and permits
WS	Conditions applying to consents and permits for works in watercourses
E	Conditions applying to consents and permits for earthworks and erosion and sediment control activities
BC	Conditions applying to consents and permits for the construction of boreholes
GT	Conditions applying to consents and permits for the taking of groundwater

The table below provides explanation to a number of the acronyms and terms used in the conditions.

Definitions	
AEE	Means the MacKays to Peka Peka Expressway Assessment of Effects on the Environment Volumes 1 to 5 dated April 2012
CEMP	Means the Construction Environmental Management Plan
Commencement of Works	Means the time when the works that are the subject of these designations commence
Existing network utilities	Means all network utilities existing at 15 August 2011 (the date of lodgement of this Notice of Requirement). Network utility has the same meaning as in section 166 of the RMA.
GWRC	Means the Greater Wellington Regional Council
KCDC	Means the Kāpiti Coast District Council
Manager	Means the Consents Manager of the Greater Wellington Regional Council
Project	Means the construction, maintenance and operation of the MacKays to Peka Peka Expressway
Project Environmental Manager	Means the person responsible for environmental management during construction, as nominated in the Construction Environmental Management Plan
Work	Means any activity or activities undertaken in relation to the Project

33.2 Proposed NZTA resource consent conditions

33.2.1 Proposed application of conditions

Except as specified otherwise, the General Conditions shall apply to all resource consents as relevant. In addition, a number of resource consents are proposed to have specific conditions apply.

Reference	Wording of Draft Conditions
	General
G.1	The Project shall be undertaken in general accordance with the plans and information submitted with the application as documented as consent numbers [INSERT GWRC REFERENCE NUMBERS HERE], subject to such amendments as may be required by the following conditions of consent. The plans and information include: a) Assessment of Environmental Effects report, dated [XXXX] April 2012 b) Plan sets: i. CV-SP -100 – 160: Scheme plans; ii. CV-GP-101-136: Geometric plans; iii. CV-SC-001-004: Cross sections; iv. CV-EW-100-232: Earthworks; v. CV-BR-100-970: Bridges; vi. CV-GE-100-140: Structural - General; vii. GI-PR-01-18: Land Requirement Plans; viii. CV-MF-100-132: Lighting, Marking and Signage; ix. CV-CM-101-412: Construction Methodology; x. Urban & Landscape Design Framework (Technical Report 5); xi. Landscape & Visual (Technical Report 7)- Appendix A & B; xii. Stormwater & Hydrology (Technical Report 22) – Appendix 22.A; xiii. Erosion & Sediment Control (CEMP Appendix H) – Appendix H.B, H.C, H.D, H.E, H.F, H.H, H.I, H.R. Where there is conflict between the documents lodged and the conditions, the conditions shall prevail.
G.2	Subject to the consent holder holding or obtaining appropriate property rights to enable it to do so, the consent holder shall permit the servants or agents of the GWRC to have access to relevant parts of the respective properties at all reasonable times for the purpose of carrying out inspections, surveys, investigations, tests, measurements and/or to take samples.
	Pre-construction Administration
G.3	The consent holder shall seek to arrange a pre-construction site meeting between the GWRC and any other relevant party nominated by the GWRC, including the primary contractor, at least 10 working days prior to commencement of any stage (as identified in the staging plan submitted under condition G.1. In the case that any of the invited parties, other than the representative of the consent holder, does not attend this meeting, the consent holder will have been deemed to have complied with this condition, provided the invitation requirement is met. The consent holder shall ensure that additional site meetings are held between the consent holder, the Manager and any other relevant party nominated by the Manager, at appropriate internals, and not less than annually.
G.4	The consent holder shall ensure that a copy of this consent and all documents and plans referred to in this consent, are kept on site at all times and presented to any GWRC officer on request.
	Consent Lapse and Expiry
G.5	Pursuant to section 125(1) of the Act, this consent referenced [INSERT GWRC REFERENCE NUMBERS HERE] shall lapse 15 years from the date of its commencement (pursuant to Section 116(5) of the Act) unless it has been given effect, surrendered or been cancelled at an earlier date.
G.6	Pursuant to section 123(c) of the Act, this consent referenced [INSERT GWRC REFERENCE DISCHARGE PERMIT AND WATER PERMIT NUMBERS HERE] shall expire 35 years from the date of its commencement (pursuant to Section 116(5) of the Act).
	Review Condition

Reference	Wording of Draft Conditions
G.7	The Manager may review any or all conditions of this consent by giving notice of their intention to do so pursuant to Section 128 of the Resource Management Act 1991, at any time within six months of the first, third and fifth anniversaries of the date of commencement of the works authorised by this consent for any of the following purposes: a) To deal with any adverse effects on the environment, which may arise from the exercise of this consent, and which it is appropriate to deal with at a later stage; and b) To review the adequacy of any monitoring plans proposed and/or monitoring requirements so as to incorporate into the consent any monitoring or other requirements which may become necessary to deal with any adverse effects on the environment arising from the exercise of this consent.
	Complaints
G.8	During construction Work, the consent holder shall maintain a permanent record of any complaints received alleging adverse effects from, or related to, the exercise of this consent. The record shall include: a) the name and address (as far as practicable) of the complainant; b) identification of the nature of the complaint; c) location, date and time of the complaint and of the alleged event; d) weather conditions at the time of the complaint (as far as practicable), including wind direction and approximate wind speed if the complaint relates to air discharges; e) the outcome of the consent holders investigation into the complaint; f) measures taken to respond to the complaint; and g) any other activities in the area, unrelated to the project that may have contributed to the compliant, such as non-project construction, fires, or unusually dusty conditions generally. The consent holder shall also keep a record of any remedial actions undertaken. This record shall be maintained on site and shall be made available to the Manager and the Territorial Authority, upon request. The consent holder shall notify the Manager and the Territorial Authority of any such complaints as soon as practicable after the complaint is received by the consent holder, or any representatives. This notification shall be either by telephone or email, or via an alternative electronic method as agreed with the Manager.
	Incidents
G.9	a) The consent holder shall immediately notify the Manager and the Territorial Authority if any contaminants (including sediment) or material are released in the undertaking of the Work and enters any watercourse due to any of the following: i) discharges from non-stabilised areas that are not treated by erosion and sediment control measures required under this consent; and/or ii) failure of any erosion and sediment control measures; and/or iii) any other incident which either directly or indirectly causes, or is likely to cause, adverse ecological effects in any watercourse that is not authorised by a resource consent held by the consent holder. b) If any of these incidents occur, the consent holder shall notify the Manager as soon as practicable after the incident being identified, and shall: i) establish control measures where these have failed or have not been implemented in accordance with the CEMP as soon as practicable; ii) liaise with the Manager to establish what remediation or rehabilitation is required and whether such remediation or rehabilitation is practical to implement; iii) carry out any remedial action as required by and to the satisfaction of the Manager; and iv) maintain a permanent record of the incident at the site, which shall include the date and time of the incident, the nature, manner and cause of the release of the contaminants, weather conditions at the time of the incident and the steps taken to contain any further release and to remedy any adverse ecological effects on the watercourse. c) This notification shall be either by telephone or email, or via an alternative electronic method as agreed with the Manager. d) For the purpose of this condition, 'incident' shall refer to any discharge of

Reference	Wording of Draft Conditions
	contaminants that either directly or indirectly causes, or is likely to cause, adverse ecological effects in any watercourse that is not authorised by a resource consent held by the consent holder.
G.10	The consent holder shall, if requested by the Manager in response to a complaint, incident or other reasonable request that relates to managing an adverse effect that is directly related to the construction of the project, carry out a review of any management plan required by these conditions. The consent holder shall submit the reviewed management plan to the Manager for certification that: a) The reason(s) for requiring the review have been appropriately addressed; and b) Appropriate actions and a programme for implementation are provided for if required.
	Staff Training
G.11	The consent holder shall ensure that earthworks contractors responsible for supervising site staff shall undergo environmental awareness training, required by the CEMP. This training shall occur at least five working days week prior to the commencement of any earthworks or earthworks stage and shall be given by a suitably qualified and experienced person certified by the Manager to deliver a practical on-site training session. Specifically, contractors shall be briefed as follows: a) Contractors likely to be involved in the construction and maintenance of erosion and sediment control devices shall receive training on the performance standards to be achieved by the erosion and sediment control devices; and b) Contractors likely to be involved in the construction of any stream diversions or other in-stream works shall be briefed on the values of the stream, the objectives of stream design, the requirements of native fish for fish passage, and the sensitivity of the receiving environment to sediment discharge. c) Contractors likely to be involved in any works involving vegetation clearance shall be briefed on the values of any significant areas of vegetation that are to be retained, and the methods that shall be used to identify and protect them during construction.
	Staging and Programme Conditions
G.12	The consent holder shall prepare an overall staging plan for the whole project for certification by the Manager at least 15 working days prior to the commencement of any Work authorised by this consent. The staging plan shall set out the proposed total construction period and demonstrate how the project will be staged. Certification of the overall staging plan required under this above is necessary prior to the submission of the CEMP) required under Condition G.20. ***Advice Note:*** *Condition G.17 below provides for the updating and certification of any Management Plan for which details of various stages of works may not be known at the time the Management Plan is submitted for original certification. In particular, more detailed area specific staging plans are to be prepared and submitted for certification as part of the CEMP under condition G.20. In addition, Construction Erosion and Sediment Control Plans for specific sites along the route are provided under Condition G.28.*
G.13	The consent holder shall provide the Manager with an updated schedule of construction activities for the Project at monthly intervals throughout the construction phase of the entire Project. Each monthly update schedule shall demonstrate how it fits into the overall staging plan required by Condition G.12.
	Annual Report
G.14	The consent holder shall provide to the Manager by the [XXth of XXXX] each year (or on an alternative date as otherwise agreed), an annual monitoring report. The purpose of this report is to provide an overview of the monitoring and reporting work undertaken, and any environmental issues that have arisen during the construction of the Project. As a minimum, this report shall include: a) all monitoring data required in accordance with the conditions of this consent; b) any reasons for non-compliance or difficulties in achieving compliance with the conditions of these resource consents; c) any works that have been undertaken to improve the environmental performance of the site or that are proposed to be undertaken in the up-coming year;

Reference	Wording of Draft Conditions
	d) recommendations on alterations to the monitoring required; and e) any other issues considered important by the consent holder.
	Management Plans - General
G.15	All works shall be carried out in general accordance with the management plans required by these conditions.
G.16	Any changes to management plans specified in Condition G.15 that may be sought by the consent holder shall remain consistent with the overall intent of the relevant management plan and shall be submitted to the Manager for certification at least 10 working days prior to any changes taking effect.
G.17	The management plans may not include all details for every stage of works at the time the plan is submitted for certification to the Manager. If further details are to be provided for later stages of construction, the management plan shall specify which stages require further certification at a later date. Further details shall be submitted to the Manager at least 10 working days prior to works commencing in the relevant construction stage. Any changes to the relevant Management Plan that may be required as a result of further design details shall be submitted to be certified by the Manager at least 10 working days prior to works commencing in the relevant construction stage in accordance with the relevant condition(s). The further details submitted shall be consistent with the original purpose and objectives as outlined in the relevant conditions below.
G.18	Where a management plan is required to be prepared in consultation with any third party, the management plan shall demonstrate how the views of that party (or parties) have been incorporated, and where they have not, the reasons why.
G.19	The management of key environmental effects associated with the construction phase of the Project shall be detailed within environmental management plans that are included in the appendices to the CEMP (draft Plans were submitted with the applications). The finalised management plans shall be submitted to the Manager for certification at least 15 working days before the commencement of construction. Works shall not commence until the consent holder has received the Manager's written certification for the management plan(s). This suite of management plans consist of: a) Erosion and Sediment Control Plan b) Groundwater (Level) Management Plan c) Settlement Effects Management Plan d) Contaminated Soils and Groundwater Management Plan e) Ecological Management Plan
	Construction Environmental Management Plan
G.20	The consent holder shall update and finalise the draft CEMP submitted with the application (dated XX 2012), which shall include the suite of Management Plans listed under condition G.19. The finalised CEMP shall be submitted to the Manager for certification at least 15 working days before the commencement of construction. Works shall not commence until the consent holder has received the Manager's written certification of the CEMP.
G.21	The certification) shall confirm that the CEMP (and its appendices) shall confirm that the CEMP gives effect to the relevant conditions and that includes details of: a) Staff and contractors' responsibilities b) Training requirements for employees, sub-contractors and visitors; c) Environmental incident and emergency management (including the procedures required under condition G.9); d) Communication and interface procedures; e) Environmental complaints management (required under Condition G.8); f) Compliance monitoring; g) Environmental reporting; h) Corrective action;

Reference	Wording of Draft Conditions
	i) Environmental auditing; and j) CEMP review. The CEMP shall also confirm construction methodologies and construction timeframes, including staging.
G.22	The CEMP shall confirm final project details, staging of work, and sufficient engineering design information to ensure that the Project remains within the limits and standards approved under this consent and that the construction activities avoid, remedy or mitigate adverse effects on the environment in accordance with the conditions of this consent. The CEMP shall identify where design information for a particular stage will be submitted at a later stage(s), in accordance with condition G.17.
G.23	At least 15 working days before submitting the CEMP to GWRC for certification the consent holder shall submit a copy of the draft final CEMP required by Condition G.20 to KCDC for comment. Any comments received shall be supplied to the Manager when the CEMP is submitted, along with a clear explanation of where any comments have not been incorporated and the reasons why.
G.24	The CEMP shall be implemented and maintained throughout the entire construction period, and updated if further design information is provided
G.25	A copy of the CEMP shall be held on each construction site at all times and be available for inspection by GWRC.
G.26	If the CEMP (including any of its constituent management plans) required to be revised as a result of any updated or new design information, the changes shall be certified by the Manager in accordance with the relevant condition. The revisions shall be submitted for certification at least 10 working days before the commencement of works in that part of the Project to which the information relates.
	Erosion and Sediment Control Management Plan
G.27	The consent holder shall finalise, submit and implement through the CEMP, an Erosion and Sediment Control Management Plan (ESCP) to be submitted to the Manager for certification at least 15 working days prior to works commencing in accordance with Condition E.1.
G.28	The consent holder shall prepare, submit and implement through the CEMP, site specific Construction [stage] Erosion and Sediment Control Plans (CESCP) to be submitted to the Manager for certification at least 5 days prior to work commencing in that site, in accordance with Condition E.2. The CESCP will be consistent and in accordance with the CEMP as required for G.20 and the ESCP as required for G.27 above.
	Groundwater (Level) Management Plan
G.29	The consent holder shall finalise, submit and implement through the CEMP, the Groundwater (Level) Management Plan (GMP) to be submitted to the Manager for certification at least 15 working days prior to works commencing. The purpose of the management plan is to address the minimum standards, outline the best practicable options for groundwater management and procedures to minimise the effects on groundwater levels. The GWMP shall include information regarding: i. the schedule of groundwater monitoring bores identifying piezometer depth, screen length and geological unit; ii. the locations of groundwater monitoring bores shown on plans; iii. the locations of monitoring stations on the Wharemauku Stream and Drain 5; iv. monitoring frequency; v. monitoring methods; vi. reporting requirements; vii. alert and action programmes; viii. response management; and

Reference	Wording of Draft Conditions
	ix. review procedures.
G.30	At least 15 working days before submitting the GMP to GWRC for certification the consent holder shall submit a copy of the draft GMP required by Condition G.29 KCDC for comment. Any comments received shall be supplied to the Manager when the GMP is submitted, along with a clear explanation of where any comments have not been incorporated and the reasons why.
	Settlement Management Plan
G.31	The consent holder shall finalise, submit and implement through the CEMP, the Settlement Management Plan (SEMP) to be submitted to the Manager for certification at least 15 working days prior to works commencing. The purpose of the management plan is to address the potential ground settlements (settlements) associated with construction and operation of the Expressway, and the effects of these settlements on existing buildings, services and transport infrastructure. The SEMP shall include information regarding: i. implementation and operational procedures; ii. estimated total settlements iii. monitoring methods; iv. monitoring locations set out on a plan; v. monitoring frequency; vi. reporting requirements; vii. alert and action programmes; and viii. review procedures.
	Contaminated Soils and Groundwater Management Plan
G.32	The consent holder shall finalise, submit and implement through the CEMP, the Contaminated Soils and Groundwater Management Plan (CSGMP) to be submitted to the Manager for certification at least 15 working days prior to works commencing. The purpose of this Plan is to highlight the minimum standards and identify the best practicable option for management of contaminated soil and groundwater for the Project. The CSGMP shall include information regarding: a) implementation and operational procedures including: i. roles and responsibilities of the Contaminated Land Specialist; ii. management of as yet un-investigated potentially contaminated sites; iii. management of areas of known contamination; iv. risk register records and v. a contingency action plan for unexpected discoveries. b) soil and groundwater contamination monitoring requirements and testing and disposal procedures; c) site validation report; d) consent monitoring requirements; and, e) review procedures.
G.33	The consent holder shall undertake appropriate investigations into the four areas of contaminated land that are proposed to be used for stormwater treatment (identified in Technical Report 23 – Assessment of Land and Groundwater Contamination Effects) to identify the level of contamination and what measures may be required to manage potential effects from the discharge of contaminants on human health. A report outlining the findings of this investigation shall be submitted to the Manager at least 15 working days prior to works commencing.
	Ecological Management Plan
G.34	a) The consent holder shall finalise, submit and implement through the CEMP, the Ecological Management Plan (EMP). The EMP shall be submitted to the Manager for certification at least 15 working days prior to works commencing. The purpose of the

Reference	Wording of Draft Conditions
	Plan is to outline the ecological management programme to protect, reduce and remediate impacts on the environment during the construction phase of the Project. This EMP shall also document the permanent mitigation measures, such as restoration planting, and the mechanisms by which to develop relevant mitigation and restoration plans for terrestrial and freshwater habitat. b) The EMP shall detail the monitoring to be undertaken pre-construction, during construction and post-construction as outlined below in Condition G.38-G.40. c) The EMP shall provide information on how the following outcomes will be achieved: i. Minimise loss of valued vegetation and habitats; ii. Minimise construction effects on freshwater and the marine environments; iii. Minimise effects on identified wetlands resulting from hydrological changes to water tables; iv. Minimise effects on fish during stream works; v. Minimise disturbance of nationally threatened or at-risk birds (as listed by the most up to date Department of Conservation threat classification lists) during breeding periods; vi. Re-establish affected lizard habitat and minimise lizard mortality resulting from construction of the Project; vii. Carry out monitoring in a manner that will confirm that adverse effects are as predicted; any exceedance is identified; and appropriate actions are undertaken to rectify; viii. Ensures that mitigation requirements are undertaken and monitored to ensure success is achieved; and ix. Carry out monitoring in a manner that confirms that mitigation meets objectives.
G.35	The EMP shall be prepared by suitably qualified and experienced ecologist, and shall implement the principles and outcomes sought by the Ecological Impact Assessments (Technical Reports 26 – 31). The EMP shall be prepared in accordance with: a) NZTA's Environmental Plan; b) The Conservation Management Strategy for the Wellington Conservancy; and c) The Greater Wellington Pest Management Strategy (2009)
G.36	The EMP shall be consistent with the Landscape Management Plan (LMP) that is required to be certified by KCDC under the designation conditions.
G.37	At least 15 working days before submitting the EMP to GWRC for certification the Consent Holder shall submit a copy of the draft EMP required by Condition G.34 to KCDC for comment. Any comments received shall be supplied to the Manager when the EMP is submitted, along with a clear explanation of where any comments have not been incorporated and the reasons why.
	Ecological Monitoring – General
G.38	Monitoring shall be carried out in accordance with the EMP as required by Condition G.34 in order to: a) collect baseline information on vegetation, wetlands, freshwater and marine ecology for 1 year prior to construction work starting; b) collect ecological information on vegetation, wetlands, freshwater and marine ecology during construction work; c) collect ecological information on vegetation, wetlands, freshwater and marine ecology for 2 years post construction works completion.
G.39	All ecological monitoring required under the EMP shall be managed by a suitably qualified and experienced ecologist. The results of all monitoring carried out pursuant to the EMP shall be: a) available for inspection during normal office hours where such data is available; b) submitted to the Manager at quarterly intervals for certification that the appropriate monitoring has been undertaken; c) submitted to the Director-General of Conservation and KCDC for information; and

Reference	Wording of Draft Conditions
	d) summarised and submitted as part of the annual report required under Condition G.14.
G.40	An Adaptive Management approach shall be taken to responding to ecological effects as outlined in the EMP. The Adaptive Management monitoring shall seek to: a) Provide a level of baseline information of pre-construction vegetation, wetlands, freshwater and marine habitats in order to develop 'trigger' levels; b) Undertake monitoring during construction to observe whether 'trigger' levels are exceeded and to determine the effectiveness of the environmental management methods; and c) In the event that trigger levels are exceeded an Adaptive Management approach shall be enlisted that will seek to: i. Investigate a plausible cause-effect association with the Project; should the event be linked to the project the following steps will be undertaken: A. Identify the on-site practice that is generating the effect; B. Seek to alter the operational measure in consultation with GWRC; C. Undertake further monitoring to assess the effectiveness of the altered on-site practice. ii. If the trigger level exceedance is not attributable to works associated with the Project, the consent holder shall not be held liable for any remediation or mitigation works; iii. Trigger level exceedances during construction should be treated as management triggers and not compliance triggers in the first instance.

33.3 Proposed consent conditions for earthworks and discharges to land

- **Land Use Consent – Earthworks** (NSP 12/01.003) to disturb soil to construct roading and tracking for the MacKays to Peka Peka Expressway;
- **Land Use Consent – Earthworks** (NSP 12/01.004) to disturb soil in areas identified as being erosion prone, and undertake large scale vegetation clearance for the MacKays to Peka Peka Expressway.
- **Discharge Permit to land** (NSP 12/01.005) to discharge sediment and chemical flocculant in treated stormwater runoff to water, and to land where it may enter water, in association with bulk earthworks for the MacKays to Peka Peka Expressway.
- **Discharge Permit to land** (NSP 12/01.029) to discharge treated cement contaminated water to water, and to land where it may enter water, associated with the construction of the MacKays to Peka Peka Expressway.
- **Discharge Permit to land** (NSP 12/01.030) to discharge contaminants to land from the Otaihanga Construction Yard.

Reference	Wording of Draft Conditions
E	Earthworks Conditions Erosion and Sediment Control
E.1	The consent holder shall finalise, submit and implement through the CEMP, an Erosion and Sediment Control Management Plan (ESCP) to be submitted to the Manager for certification at least 15 working days prior to works commencing. The purpose of the ESCP is to describe the methods and practices to be implemented to minimise the effects of sediment generation and yield on the aquatic receiving environments associated with the Project. In addition, the ESCP shall: a) Outline the principles that the ESCP shall seek to adhere to; b) Be developed in accordance with the objectives outlined in NZTA's Environmental Plan, including: d) Ensuring construction and maintenance activities avoid, remedy or mitigate effects of soil erosion, sediment run-off and sediment deposition. e) Identify areas susceptible to erosion and sediment deposition and implement erosion and sediment control measures appropriate to each situation with particular emphasis on high-risk areas. f) Use bio-engineering and low-impact design practices where practicable. ***Advice Note:*** *Erosion and sediment control measures shall be constructed and maintained in accordance with the NZTA's Draft Erosion and Sediment Control Standard for State Highway Infrastructure and Draft Field Guide for Contractors (and any subsequent amendments to that document that occur after this consent is granted and prior to the commencement of construction), except where a higher standard is detailed in the ESCP referred to in Condition G.27 and E.1, in which case the higher standard shall apply.*
E.2	The consent holder shall prepare, submit and implement through the CEMP, site specific Construction [stage] Erosion and Sediment Control Plans (CESCPs) to be submitted to the Manager for certification at least 10 days prior to work commencing in that site. The purpose of the CESCP is to allow the consent holder and GWRC to further develop methodologies to be implemented throughout the duration of the project to address the specific characteristics of various sites along the route. In addition, the CESCP shall: a) The CESCP will be consistent with the CEMP as required for G.20 and the ESCP as required for G.27 and E.1 above. b) Any changes to the CESCP shall be approved by the Manager prior to the amendment being implemented.
E.3	The CESCPs shall meet the purpose in Condition E.2 and include, but need not be limited to:

Reference	Wording of Draft Conditions
	a) Contour information at suitable intervals; b) Erosion and sediment control measures including specific pond design (including calculations supporting pond sizing); c) Chemical treatment design and details; d) Catchment boundaries for the erosion and sediment control measures; e) Location of the Work, and cut and fill operations; f) Details of construction methods to be employed, including timing and duration; g) Design details including: i. Contributing catchment area; ii. Retention volume of structure (dead storage and live storage measured to the top of the primary spillway); iii. Shape of structure (dimensions of structure); iv. Location of flood waters v. Safety and access vi. Position of inlets/outlets vii. Stabilisation of the structure; and viii. Maintenance. h) A programme for managing non-stabilised areas of earthworks, including progressive stabilisation considerations; i) The identification of appropriately qualified and experienced staff to manage the environmental issues onsite; j) The identification of staff who have clearly defined roles and responsibilities to monitor compliance with the Consent Conditions and the ESCP; k) Provision of details of a chain of responsibility for managing environmental issues and details of responsible personnel; and l) Methods and procedures to be undertaken for decommissioning of erosion and sediment control measures.
E.4	Prior to any earthworks commencing within a site (other than those required to establish erosion and sediment control measures), a certificate signed by an appropriately qualified and experienced sediment control practitioner shall be submitted to GWRC to certify that the erosion and sediment control measures for that site have been constructed in accordance with the relevant CESCP.
E.5	A copy of the "as-built(s)" and the certified CESCPs shall be kept on site, and all erosion and sediment control measures (including staging boundaries and particularly the extent of exposed areas) shall be updated as soon as practicable as changes are made. As-built plans shall be prepared by a suitably qualified person and shall be accompanied by text detailing the relevant earthworks methodology, constraints and likely progressions, and shall be revised as required to enable clear interpretation as to the day-to-day operation and management of erosion and sediment control measures, provided that such revisions are in general accordance with the CESCPs.
E.6	All necessary perimeter controls for a site or stage shall be operational before earthworks (or relevant stage of earthworks) within the site or stage commence.
E.7	No sediment retention ponds, chemical treatment systems or perimeter controls shall be removed or decommissioned from a site, or stage before the entire area is stabilised, unless such removal and decommissioning is in accordance with the CEMP or a CESCP, and the Manager has been informed not less than 2 working days prior.
	Erosion and Sediment Control Monitoring
E.8	The Consent Holder shall carry out monitoring in accordance with the ESCP and the certified CESCP and which will seek to ensure that: a) The proposed erosion and sediment control measures have been installed properly; b) Methodologies are carried out properly; and

Reference	Wording of Draft Conditions
	c) Erosion and sediment control measures are functioning effectively throughout the duration of the project.
E.9	In the event of either a failure of erosion and sediment control devices or where a storm event exceeds the design volume of the device, and where the discharge is to a perennial or intermittent freshwater body, wetland or estuarine/marine environment, a suitably qualified ecologist(s) shall be notified within 24 hours, who shall then inspect the relevant area to determine whether significant adverse effects on the affected area's ecological values have occurred. The Project's Environmental Manager shall prepare a report on the effects of the failure and any recommended measures that may be required to remedy the effects; the report shall be submitted to the Manager for approval within 5 working days of the event. The remedial measures shall be implemented within 10 working days of the approval of the Manager.
E.10	The consent holder shall carry out weekly inspections of all site haul roads in order to ensure they are well maintained and that erosion and sediment control devices remain effective.
	Chemical Treatment (Flocculation)
E.11	a) Prior to the commissioning of chemical treatments for sediment management purposes, the Consent Holder shall provide GWRC with a Chemical Treatment Plan (CTP) for each site, or stage of the works, or in association with an CESCP, at least 10 working days before the commencement of flocculation works. b) The CTP shall be submitted to the Manager for certification that the proposed use of chemical flocculation will assist in achieving appropriate sediment removal efficiencies in accordance with the principles of the ESCP. c) Each CTP shall include, but need not be limited to: i) Specific design details of the chemical treatment system; ii) Monitoring, maintenance (including post-storm) and contingency programme (including a Record Sheet); iii) Details of optimum dosage (including catchment specific soil analysis and assumptions); iv) Procedures for carrying out an initial treatment trial; v) A spill contingency plan; vi) A performance monitoring plan; and vii) Details of the person or bodies that will hold responsibility for the maintenance of the chemical treatment system and the organisational structure which will support the system. d) Any amendments to a CTP shall be approved by the Manager at least 10 working days prior to implementation.
	Settlement Conditions
E.12	The consent holder shall establish a series of ground settlement monitoring marks to monitor potential settlement that might occur as a result of construction of embankments and drawdown of the groundwater table. The survey marks will be generally located as follows: a) 2 to 4 marks, established in cross-sections along the length of the Expressway as set out in Appendix D of the SEMP (as required by Condition G.31); b) adjacent to stormwater features where groundwater drawdown of more than 0.1 m has been predicted; c) at the KCDC wastewater treatment plant; and d) structures identified close to the Expressway where settlement of more than 12.5 mm is predicted. The locations of each type of settlement monitoring marks shall be confirmed in the SEMP.

Reference	Wording of Draft Conditions
E.13	The consent holder shall survey the settlement monitoring marks at the following frequency: a) Pre-construction - vertical at monthly intervals starting at least 12 months prior to construction commencing b) During construction i. vertical at 3 monthly intervals ii. within 500 m of active construction – vertical at monthly intervals iii. within 50 m of excavation in front of retaining walls – vertical at monthly intervals. c) Post-construction i. Vertical at 3 monthly intervals for 6 months ii. Vertical at 6 monthly intervals for a further period of at least 2 years.
E.14	a) Immediately following each monitoring round, the consent holder shall use the settlement monitoring results (together with the results of groundwater monitoring where they may provide an earlier indication of future settlements) to reassess the building damage categories and compare them to those estimated in Technical Report 35 - Assessment of Ground Settlement Effects, as included in Condition G.1a)-b). b) If the reassessment indicates that a building or structure has increased its damage category, this shall be considered to be an Alert Level and additional specific assessment of the structure shall be carried out by the consent holder to confirm this reassessment within 72 hours. c) If the additional assessment confirms the increase in damage category, this shall be considered an Action level and the owner and occupier of the structure shall be notified within 72 hours. d) Following consultation with the property owner and occupier, subsequent actions may include increased frequency and/or extent of monitoring, modification to the construction approach or mitigation works to the affected structure.
E.15	The consent holder may reduce the frequency of settlement monitoring required by Condition E.13: a) Once the active construction stage has passed; and b) 3-monthly monitoring has been carried out for a minimum of 6 months; and c) The monitoring indicates that any potential settlement effects are within a satisfactory range as specified in the SEMP; and d) The criteria in E.15a)-c) has been certified by GWRC.
E.16	The consent holder shall collate the results of the settlement monitoring (undertaken pursuant to Conditions E.12-E.15) and prepare a report that shall be made available to GWRC. A settlement monitoring report shall be prepared: a) prior to the commencement of construction; and b) at 3-monthly intervals throughout the construction period; and c) following completion of construction, a settlement monitoring report shall be prepared following each round of settlement monitoring undertaken (i.e. 3 monthly and then 6 monthly). The purpose of the reports is to highlight any Alerts or Actions and provide a full interpretation and/or explanation as to why these occurred, the likely effects and any mitigation measures initiated as a result.
E.17	The consent holder shall review and update the schedule of buildings and structures considered to be at risk in accordance with the criteria of the SEMP and maintain this schedule for review by GWRC. This schedule shall include but not be limited to, the following properties: a) KCDC wastewater treatment plant; b) The Waikanae Christian Holiday Park (El Rancho); and c) Specific buildings identified during the course of detailed design where the total settlements are estimated to be greater than 25 mm.

Reference	Wording of Draft Conditions
E.18	The consent holder shall consult with owners of buildings and structures identified in Condition E.17a)-c) and, subject to the owner's approval of terms acceptable to the consent holder, shall undertake a pre-construction condition assessment of these structures in accordance with the SEMP.
E.19	The consent holder shall employ a suitably qualified person to undertake the building assessments required pursuant to Condition E.18 and identify this person in the SEMP.
E.20	The consent holder shall undertake monthly visual inspections of the following properties during active construction: a) Dwellings where the total settlements are estimated to be greater than 25 mm; b) Dwellings where the predicted Building Damage category is greater than 'negligible' (noting that there are none in this category at this stage); c) KCDC wastewater treatment plant; and d) All other specifically identified buildings in Condition E.17. Active construction shall be defined as starting when earthworks commence within 500m of a particular location and ending when pavement construction is complete at that location.
E.21	a) The consent holder shall, subject to the owner's approval, undertake a post-construction condition assessment covering the matters identified in the SEMP and provide a copy to the owner. The assessment report shall include a determination of the cause of damage identified (if any) since the pre-construction condition assessment. b) The consent holder shall agree with the owner appropriate remedial works (if any) in conjunction with arrangements for implementation and/ or compensation. The requirements of this condition need not be fulfilled for any particular building with the written approval of the current owner of a building or where the NZTA can provide reasonable evidence to GWRC that the current owner of the building has agreed they do not require such a survey.
E.22	The consent holder shall provide a copy of the pre, post-construction and any additional building condition assessment reports for each building be forwarded to the respective property owner within 15 working days of completing the reports. The consent holder shall notify GWRC that the assessments have been completed.
E.23	Prior to construction commencing, the consent holder shall undertake CCTV surveys of services identified in the SEMP as being susceptible to damage or particularly critical. The consent holder shall monitor these services by undertaking additional CCTV surveys throughout the construction period. If damage is determined in relation to the Project, the consent holder shall undertake remedial action as required in consultation with the service provider.

33.4 Proposed consent conditions for earthworks and discharges to land

- **Land use consent and water permits** for activities within the Whareroa Stream Catchment (NSP 12/01.006 – NSP 12/01.008);
- **Land use consent and water permits** for activities within the Wharemauku Stream Catchment (NSP 12/01.009 – NSP 12/01.011);
- **Land use consent and water permits** for activities within the Waikanae River Catchment (NSP 12/01.012 – NSP 12/01.014);
- **Land use consent and water permits** for activities within the Waimeha Stream Catchment (NSP 12/01.015 – NSP 12/01.017);
- **Land use consent and water permits** for activities within the Ngarara Creek Catchment (NSP 12/01.018 – NSP 12/01.020);
- **Land use consent and water permits** for activities within the Hadfield/Te Kowhai Stream (NSP 12/01.021 – NSP 12/01.023).

For each of the affected watercourses in the above catchments the following consents and permits are sought:

- **Land Use Consent** – to remove an existing culvert and to divert and reclaim a section of, and place structures (culverts, rip rap and stormwater outlets) in, the bed of the watercourse, including the associated disturbance of, and deposit of material on, the watercourse bed.
- **Water Permit** – to temporarily divert the flow of the watercourse during construction of the culvert and associated structures in the bed of the watercourse.
- **Water Permit** – to permanently divert the full flow of the watercourse.

Reference	Wording of Draft Conditions
	General Conditions
WS.1	The consent holder shall use natural rock and soil material, where practicable, to reclaim the stream bed. All fill material shall be placed and compacted so as to minimise any erosion and/or instability insofar as it is practicable.
WS.2	The consent holder shall seek to ensure that all construction works authorised by this permit to be undertaken in the dry bed of the stream, and are completed before the flow of the stream is diverted back into the stream bed.
WS.3	The consent holder shall design and construct all permanent diversions in a manner that seeks to maintain stream flows (both volume and velocity) in a similar state to its natural state at the time of commencement of Work.
WS.4	The works shall be regularly inspected and maintained by the consent holder so that: a) the waterway within the culverts remains substantively clear of debris; b) any erosion of the stream banks or bed that is attributable to, and is within 20m up or downstream of, the stream works authorised by this consent are remedied as soon as practicable by the consent holder; and c) fish passage through the structure is not impeded. ***Explanatory Note**: Maintenance does not include any works outside the scope of the application. Any additional works (including structures, reshaping or disturbance to the stream bed) following completion of the construction works as proposed in the application may require further resource consents.*
	Pre-construction Conditions
WS.5	The consent holder shall prepare and implement a revegetation and mitigation strategy for the stream modifications and structures authorised by this consent. The strategy shall be submitted to the Manager at least 15 working days prior to any Work commencing. The revegetation and mitigation strategy shall include, but not be limited to: a) details, methods, timing and responsibilities for revegetation of all exposed areas of

Reference	Wording of Draft Conditions
	stream bank or dewatered channel or culvert fill slopes as a result of this consent, including the methods for the protection of such areas; b) planting plan and schedules; and c) monitoring and maintenance processes and procedures, including for replacement of dead plants, for a period of three years from completion of construction.
	Conditions During Construction
WS.6	Unless otherwise agreed in writing with the Manager, all temporary stream crossings shall be removed within not more than two years of their installation.
WS.7	Unless otherwise agreed in writing with the Manager, upon removal of any temporary crossing, the consent holder shall reinstate the stream bed to, as far as practicable, a natural state to closely match the upstream and downstream riparian and instream habitats and visual appearance.
WS.8	The structures erected as part of the Work shall be regularly inspected and maintained by the consent holder in accordance with NZTA's operational and maintenance manual and maintenance programme, so that: a) the waterway within or over the culverts and fords remains substantively clear of debris; b) any erosion of the stream banks or bed that is attributable to the stream works authorised by this consent are remedied as soon as practicable by the consent holder; and c) fish passage through culverts is not impeded.

33.5 Proposed consent conditions for borehole construction and groundwater takes

- **Land Use Consent – Borehole Construction** (NSP 12/01.024) to construct boreholes for groundwater extraction and the formation of holes for bridge piles that may intercept groundwater.
- **Water Permit – Groundwater Take** (NSP 12/01.025) to take water for bore testing, dewatering of excavations, dust suppression and construction purposes associated with the MacKays to Peka Peka Expressway.
- **Water Permit – Groundwater Diversion** (NSP 12/01.026) to divert groundwater from wetlands adjacent to the MacKays to Peka Peka Expressway.

Explanatory note: these are global consents relating to all bores that intercept groundwater.

Reference	Wording of Draft Conditions
	General Conditions – Borehole Construction
BC.1	The location, design, implementation and operation of the bore(s) shall be in general accordance with the resource consent application and its associated plans and documents, and outlined in Condition G.1.
BC.2	Within one month after completion of all monitoring bore installations, the consent holder shall submit to the Manager a copy of the borehole log details of the piezometer installation.
BC.3	Within one month after completion of each water supply well, the consent holder shall submit to the Manager a copy of the driller's bore log form as completed by the driller who constructed the bore(s) and details of the well installation.
BC.4	The bore(s) shall be constructed and maintained in accordance with the New Zealand Environmental Standard for Drilling of Soil and Rock (NZS 4411:2011).
BC.5	In the event of a bore(s) being decommissioned or abandoned, the bore will be backfilled in accordance with NZS 4411:2011.
BC.6	If so requested by the Manager, the permit holder shall make their bore available for the monitoring of water levels and water quality.
	General Conditions – Groundwater Take
GT.1	The location, design, implementation and operation of the takes shall be in general accordance with the consent application and its associated plans and documents, and outlined in Condition G.1.
GT.2	The rate at which water is taken from each water supply bore shall not exceed 275,000 m3/year at 800 m3/day and a maximum pumping rate of 35 litres/sec.
GT.3	The consent holder shall undertake the following: a) install and maintain a water meter on each water supply bore take prior to the commencement of the take and for the duration of the abstraction from the point of take. The water meter shall measure both cumulative water abstraction and the instantaneous rate of take, and be capable of providing a pulse counter output; b) The water meter shall be calibrated to ensure that the error does not exceed +/- 5%. The water meter shall be installed in accordance with manufacturer's specifications; c) The permit holder shall install and maintain a water meter on the point of take XXX by XX (for existing takes with no meters) or prior to the commencement of the take (for a new take). The water meter shall measure both cumulative water abstraction and the instantaneous rate of take, and be capable of providing a pulse counter output. d) The permit holder shall ensure the water meter shall be calibrated to ensure that the error does not exceed +/- 5%. The water meter shall be installed and maintained in accordance with manufacturer's specifications.
GT.4	A stepped rate pumping test shall be carried out in each new water supply bore to determine the volume of water that can be abstracted from the bore.

Reference	Wording of Draft Conditions
GT.5	Within 3 months of the completion of each pumping test, the consent holder shall submit a report to the Manager, which contains but need not be limited to, the following information: a) Presentation of and analysis of the collected pumping test data b) Use results to simulate drawdown at any potentially affected neighbouring boreholes c) An assessment of the potential effect on nearby streams / wetlands; and d) An assessment on the risk of saline intrusion.
GT.6	If so requested by the Manager, the consent holder shall make its bores available for monitoring of water levels and water quality.
	Conditions – Groundwater Diversion
G.1–G.40	The effects will be managed under the relevant General Conditions applicable to the Project.

33.6 Proposed consent conditions for wetland reclamation and vegetation clearance

- **Land Use Consent – Wetland Reclamation** (NSP 12/01.027) for the partial reclamation of wetlands in the vicinity of the MacKays to Peka Peka Expressway alignment, including the associated disturbance of their beds.
- **Land Use Consent – Vegetation Clearance** (NSP 12/01.028) to remove vegetation in the beds of various watercourses and wetlands, including the associated disturbance of their beds.

Reference	Wording of Draft Conditions
	Conditions – Wetland Reclamation
G.1–G.40	The effects will be managed under the relevant General Conditions applicable to the proposed wetland reclamation.
	Conditions – Vegetation Clearance
G.1–G.40	The effects will be managed under the relevant General Conditions applicable to the proposed clearance of vegetation.

PART I: STATUTORY ASSESSMENT

34 Approach to the assessment

Overview

The purpose of this Chapter is to highlight relevant parts of the AEE which contain further detail regarding the provisions of the RMA applicable to the approvals sought for the Project.

The approvals sought comprise:

- Notice of Requirement to designate land in the Kāpiti Coast District Plan;
- Land use consent from KCDC; and
- Land use consents and water and discharge permits from the GWRC.

34.1 Introduction

This Chapter provides a checklist and cross-reference to the parts of the AEE which discuss relevant RMA assessment matters. The Chapter that follows provides a statutory planning assessment (Chapter 35 – Statutory Assessment) and considers the applicable objectives, policies and regulations contained within these documents, assesses the Project against these provisions and concludes with an assessment of the Project under Part 2 of the RMA.

Part B, Volume 2 of the AEE identifies the designation sought for the Project and also lists the resource consents that are required and the status of the activities to which the consents relate (refer Part B, Chapter 3, Volume 2).

Part B of the AEE also identifies some of the relevant provisions of the RMA in relation to the Project. In particular, under section 104 of the RMA (consideration of resource consents) and under section 171 of the RMA (consideration of NORs for designations), the BoI must have regard to the relevant provisions of any national policy statement, national environmental standard, and regional and district planning documents when considering the applications.

34.2 Approach to the statutory planning assessment

As outlined in further detail in Part B, Chapter 3, Volume 2 of the AEE, the following consents and approvals are sought:

- A NOR by the NZTA to designate land in the Kāpiti Coast District Plan for the purposes of constructing, operating and maintaining an Expressway;

- A land use consent from KCDC to undertake works on contaminated land (in line with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2012);
- Land use consents from GWRC to undertake bulk earthworks and for earthworks and construction erosion and sediment control; and
- Land use consents, discharge permits and water permits from GWRC to cross, occupy, realign and use water bodies.

34.2.1 Approach to assessments for section 104 and section 171

Under section 149P a BoI is required, when considering an application for resource consent, to apply section 104. Section 104(1)(b), in turn, requires that when considering an application for resource consent and any corresponding submissions 'regard' must be had, subject to Part 2, to any relevant provisions contained in the following RMA instruments:

- a national environmental standard;
- other regulations;
- a national policy statement;
- a New Zealand coastal policy statement;
- a regional policy statement or proposed regional policy statement; and
- a plan or proposed plan.

In addition, section 104(1)(c) requires a consent authority to have regard to 'any other matter the consent authority considers relevant and reasonably necessary'.

Section 149P also requires a BoI, when considering a NOR for a designation, to have regard to the matters set out in section 171(1). Section 171(1)(a) requires that in considering a requirement for a designation and any submissions received, 'particular regard' must be had to 'any relevant provisions of' the RMA instruments identified in section 104(1)(b), with the exception of national environmental standards and regulations. Section 171(1)(d) is expressed in similar terms to section 104(1)(c).

Neither provision identifies which aspects of any policy statement and plan are of specific relevance, leaving such matters to be judged according to the particular circumstances of the application being considered. The phrases 'have regard to' and 'have particular regard to' also allow discretion to exercised regarding the weight applied to particular RMA instruments or their associated provisions. It is not a requirement of either section 104 or 171 that an activity upholds, gives effect to or is not contrary to any particular RMA instrument or its objectives, policies or other provisions. However, it is recognised that where any conflict or inconsistency exists between the provisions contained in national, regional or local level RMA instruments, that certain instruments may need to be accorded greater weight due to their relative status or significance.

34.2.2 Consideration of Notices of Requirement

The matters outlined in section 171(1)(a)-(d) that have, subject to Part 2, been considered in this AEE are as follows:

- Section 171(1)(a) – Part I, Chapter 35, Volume 2 evaluates the Project against the relevant statutory and non-statutory planning instruments.
- Section 171(1)(b) – Part E, Chapter 9, Volume 2 outlines the history of the Project, the reasons for selecting the route and the integrated design process that informed the location and design of the proposed Expressway with inputs from a comprehensive range of technical specialists.
- Section 171(1)(c) – Part C, Chapter 6 and Part D, Chapters 7 and 8, Volume 2 outline the works required for the Project. The background to the Project, including the rationale for the Project and the Project Objectives, is set out in Part A, Chapter 2, Volume 2.
- Section 171(1)(d) – Part G and Part I, Chapter 35, Volume 2 set out the matters identified and considered in the relevant Technical Reports prepared for the Project (refer Volume 3 of the AEE).

The RMA documents relevant to consideration of the Project under section 171(1)(a) are as follows:

- National Policy Statement for Freshwater Management 2011;
- National Policy Statement for Electricity Transmission 2008;
- New Zealand Coastal Policy Statement 2010;
- Proposed Wellington Regional Policy Statement 2009;
- Wellington Regional Policy Statement 1995;
- Wellington Regional Freshwater Plan 1999;
- Wellington Regional Air Quality Management Plan 2000;
- Wellington Regional Soil Plan 2000;
- Wellington Regional Coastal Plan 2000;
- Wellington Regional Plan for Discharges to Land 1999; and
- Kāpiti Coast District Plan 1999.

The relevant provisions of these documents, along with an analysis of the Project against these requirements, are provided in Part I, Chapter 35, Volume 2 of the AEE.

34.2.3 Resource consent applications – Section 104

The matters outlined in Section 104(1)(a)-(c) that have, subject to Part 2, been considered in this AEE are as follows:

- Section 104(1)(a) – actual or potential effects of allowing the activities associated with the Project are identified and assessed in Part G, Volume 2 of the AEE and the Technical Reports in Volume 3 of the AEE;
- Section 104(1)(b) – relevant provisions of the statutory documents identified in section 34.2.2 are evaluated in Part I, Chapter 35, Volume 2; and
- Section 104(1)(c) – other matters considered relevant and reasonably necessary to determine the application are evaluated in Part I, Chapter 35, Volume 2.

The documents relevant to consideration of the Project under section 104(1)(b) are as follows:

- Documents listed in section 34.2.2 of this Chapter;
- National Environmental Standard for Air Quality 2004;
- National Environmental Standard for Sources of Human Drinking Water 2008;
- National Environmental Standard for Electricity Transmission Activities 2010; and
- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2012.

Relevant cross-references and a brief commentary relating to section 104 are set out in Table 34.1 below.

Table 34.1: Relevant assessment matters under Section 104 of the RMA

Section 104	Comment	Cross-reference
Section 104(1)(a) Any actual and potential effects on the environment of allowing the activity	Considered in depth in Part G, Volume 2 of the AEE and in the associated Technical Reports in Volume 3 of the AEE.	Part G, Volume 2 and Technical Reports, Volume 3
Section 104(1)(b) Any relevant provisions of statutory documents	Each of the relevant statutory documents has been assessed and a conclusion drawn about the Project's consistency with those documents.	Part I, Chapter 35, Volume 2
Section 104(1)(c) Any other matters	There are a number of other statutory and non-statutory documents that have either been publicly notified, been through a public process or are widely available in the public arena. Those considered to be of relevance to the Project have been assessed in Chapter 35, Volume 2 of the AEE.	Part I, Chapter 35, Volume 2
Section 104(2) May disregard an adverse effect of an activity on the environment if a NES or Plan permits an activity with that effect	There are no logical or sensible permitted baseline comparisons that can be made in relation to this Project.	Not relevant

Section 104	Comment	Cross-reference
Section 104(3) A consent authority must not...*etc*	No written approvals from potentially affected parties have been sought in relation to Section 104(3), and trade competition has not been identified as a relevant consideration for this Project. This situation will be reviewed again following receipt of submissions.	Part I, Chapter 35, Volume 2
Section 104(5) A consent authority may grant a resource consent on the basis that the activity is a controlled activity, a restricted discretionary activity, a discretionary activity, or a non-complying activity, regardless of what type of activity the application was expressed to be for	The NZTA has discussed the resource consent applications with the relevant Councils as part of the pre-lodgement process, and an agreed consenting approach has been confirmed.	Part F, Chapter 10, Volume 2
Section 104(6) and (7) Provision of information	There has been an extensive pre-lodgement process in which the NZTA has engaged with the relevant regulatory authorities, including the EPA, to review and consider the adequacy of the information and technical reports that will be supplied.	Not applicable

35 Statutory assessment

Overview

The objectives and policies that are relevant to the Project span national, regional and district planning documents. An analysis of these is provided in this Chapter, the conclusions of which are as follows:

- The Project is a key part of the Government's national policies for transportation: as part of the Wellington RoNS the Project will, as a whole, result in significant safety and travel time savings between Wellington Airport and Levin, remove congestion, improve travel time reliability, route security, and ease freight movements into and out of Wellington;
- Overall, the Project is not inconsistent with the objectives and policies of the relevant national and regional statutory planning documents;
- The Project is consistent with the transport related policies in the Regional Policy Statement, the Regional Land Transport Strategy and the Kapiti Coast District Plan;
- The Project will enable communities at a local, regional and national level to provide for their social, economic and cultural wellbeing. The Project will meet the growing transportation needs of the Region and does not preclude future opportunities for other land transport development, such as public transport;
- The Project will sustain the potential of natural and physical resources for future generations, and safeguard the life supporting capacity of air, soils, water and ecosystems;
- As set out in Part H of this AEE, the adverse effects of the Project on the environment will be sufficiently avoided, remedied or mitigated (including by offsetting) to satisfy the requirements of section 5 of the RMA;
- The Project recognises and provides for the matters in section 6 of the RMA;
- The Project has appropriately responded to those matters in Sections 7;
- Engagement with tangata whenua in developing the Project has taken into account the principles of the Treaty of Waitangi in accordance with section 8 of the RMA.

Consequently, the Project meets the statutory tests of the RMA,and is consistent with its purpose and principles, particularly when the benefits of the proposal are considered alongside the proposed measures to avoid, remedy and mitigate the adverse effects. To this end, it is considered that the sustainable management purpose of the RMA will be achieved by confirming the designation and granting the resource consents sought.

35.1 Introduction

The assessment of the Project against relevant statutory documents generally follows the hierarchy of applicable planning documents shown in Figure 35.1 below, and concludes with an assessment against Part 2 of the RMA. Further detail regarding the specific provisions within these documents relevant to

the Project is contained in TR2 – Analysis of Policy Framework Objectives & Policies, Volume 3 of the AEE.

Figure 35.1: Hierarchy of Relevant Planning Documents

35.2 National Policy Statement for Freshwater Management 2011

The National Policy Statement for Freshwater Management (NPSFW) is relevant to the Project. The NPSFW contains a Preamble and five sections containing objectives and policies which are grouped into the following topics:

- Water quality
- Water quantity
- Integrated management
- Tangata whenua roles and interests
- Progressive implementation programme

35.2.1 Water quality

The objectives related to water quality are of particular relevance to the Project:

Objective A1

To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water, in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A2

The overall quality of fresh water within a region is maintained or improved while:

(a) protecting the quality of outstanding freshwater bodies

(b) protecting the significant values of wetlands and

(c) improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.

The NPSFW sets out a staged implementation programme, over which time Councils are required to include objectives and policies in their plans to reflect the stated objectives (including those above). In particular, the NPSFW provides a transition Policy A4 that has immediate effect on discharge consent applications. This policy applies until such time as GWRC adopts policies for inclusion in its RPS and Regional Plans to give effect to Policy A1 and Policy A2 (freshwater quality limits and targets). Policy A4 states that:

1. *When considering any application for a discharge the consent authority must have regard to the following matters:*
   a) *the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh water; and*
   b) *the extent to which it is feasible and dependable that any more than minor adverse effect on fresh water, and on any ecosystem associated with fresh water, resulting from the discharge would be avoided.*
2. *This policy applies to the following discharges (including a diffuse discharge by any person or animal):*
   a) *a new discharge or*
   b) *a change or increase in any discharge – of any contaminant into fresh water, or onto or into land in circumstances that may result in that contaminant (or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering fresh water.*
3. *This policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management takes effect on 1 July 2011.*

Options to avoid discharges to freshwater that will have a more than minor effect have been extensively considered during the development of the Project, including stormwater treatment during the construction and operation of the proposed Expressway, along with a wider package of measures to avoid, remedy and mitigate adverse effects of the Project as a whole (Policy 1(b)). Methods to avoid adverse effects, and consider alternative options, are discussed in Chapters 22 and 28, Volume 2 of the AEE, and include an integrated approach between specialists.

Overall, it is concluded that the Project will be generally consistent with the intent of the NPSFW in relation to water quality.

35.2.2 Water quantity

The NPSFW sets out objectives for water quality, which are aimed at:

- Sustainably managing the taking, using, damming, or diverting of fresh water to safeguard the life-supporting capacity, ecosystem processes and indigenous species (B1);
- Avoiding any further over-allocation and phasing out existing over-allocation (B2);
- Improving and maximising the efficient allocation and efficient use of water (B3); and
- Protecting significant values of wetlands (B4).

The route assessment process resulted in the identification and avoidance of significant wetlands in selecting the final alignment of the proposed Expressway. However, the proposed alignment does include some minor degraded wetlands which cannot be avoided; it is proposed to offset the loss of these wetlands by promoting the regeneration of neighbouring wetlands.

The Project will require the abstraction of groundwater for use during construction, a series of streams will be temporarily diverted during construction, and small sections of the Muaupoko Stream and Paetawa Drain would be permanently realigned. Due to the use, take, diversion and realignment of water bodies, Objectives B3 and B4 are relevant as is Policy B7, as set out below:

Policy B7

1. *When considering any application the consent authority must have regard to the following matters:*
   a) *the extent to which the change would adversely affect safeguarding the life-supporting capacity of fresh water and of any associated ecosystem and*
   b) *the extent to which it is feasible and dependable that any adverse effect on the life-supporting capacity of fresh water and of any associated ecosystem resulting from the change would be avoided.*
2. *This policy applies to:*
   a) *any new activity and*
   b) *any change in the character, intensity or scale of any established activity – that involves any taking, using, damming or diverting of fresh water or draining of any wetland which is likely to result in any more than minor adverse change in the natural variability of flows or level of any fresh water, compared to that which immediately preceded the commencement of the new activity or the change in the established activity (or in the*

> *case of a change in an intermittent or seasonal activity, compared to that on the last occasion on which the activity was carried out).*
>
> *This policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management takes effect on 1 July 2011.*

As outlined in Chapters 24 and 28, Volume 2 the Project proposes a range of measures to safeguard the life-supporting capacity of fresh water and of any associated ecosystem, including the construction of sediment retention ponds and use of swales and wetlands to attenuate stormwater discharge.

While the proposed Expressway will result in the culverting and diversion of several waterbodies, the design of the features takes into account the existing character and nature of the waterbodies. In addition, it is proposed that restoration work will be undertaken on streams and wetlands elsewhere to offset any loss or adverse effect. Overall, it is considered that the Project will result in a net environmental benefit in terms of this Policy.

35.2.3 Integrated management

Part C of the NPSFW emphasises the importance of integrated management. Objective C1 states:

> 1. *To improve integrated management of fresh water and the use and development of land in whole catchments, including the interactions between fresh water, land, associated ecosystems and the coastal environment.*

While this objective and corresponding policies C1 and C2 is particularly relevant for local authority policy development, there is direction that this Objective is taken into account in resource consents and Notices of Requirement. The development of the Project followed an integrated process, by which the interrelationships of various aspects of the proposed Expressway and its effects were assessed and considered in the alignment and design of the Project. Overall, it is considered that the Project achieves the objective of improving integrated land use and development (i.e., the proposed Expressway) with freshwater management.

35.2.4 Tangata whenua roles and interests

Part D of the NPSFW seeks

> *To provide for the involvement of iwi and hapu, and to ensure that tangata whenua values and interests are identified and reflected in the management of fresh water including associated ecosystems, and decision-making regarding freshwater planning, including on how all other objectives of this national policy statement are given effect to.* (Objective D1)

Part D requires local authorities to take reasonable steps to work with iwi and hapu and to reflect tangata whenua interests (Policy D1).

Whilst the NPS requires actions to be taken by regional councils to develop policies (rather than requiring actions by an applicant for consents and approvals), it is relevant to highlight that this Project has been developed in consultation with tangata whenua, including in terms of how the Project may affect freshwater systems and ecology.

35.3 National Policy Statement for Electricity Transmission 2008

The National Policy Statement on Electricity Transmission (NPSET) sets out one objective and a number of policies for managing the electricity transmission network under the RMA. Local authorities are required to, within 4 years of the gazetting of the NPSET, give effect to its provisions. The NPSET gives guidance to the drafting of plan rules and decision-making on resource consents.

There is one objective in the NPSET:

> *To recognise the national significance of the electricity transmission network by facilitating the operation, maintenance and upgrade of the existing transmission network and the establishment of new transmission resources to meet the needs of present and future generations, while:*
>
> - *managing the adverse environmental effects of the network; and*
> - *managing the adverse effects of other activities on the network.*

Policy 1 seeks to have the national benefits of sustainable, secure and efficient electricity transmission recognised. Policies 2 – 9 manage the environmental issues generated by transmission infrastructure. Policies 10 and 11 manage the adverse effects of third parties on the transmission network.

With respect to the Project, the alignment of the proposed Expressway crosses under the Hayward to Bunnythorpe Transmission Line 220kV line in the vicinity of Smithfield Road. Any changes that may be required to the line in this section to ensure the continued safety and capacity of the line are anticipated to be minor (for example, raising the height of conductors), and will occur prior to the construction of the proposed Expressway. This work would be undertaken in liaison with, and with the agreement of Transpower. Accordingly, it is considered that the Project is consistent with the NPSET.

35.4 NZ Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement 2010 (NZCPS) provides policy guidance and direction on management of the coastal environment.

While the Project is not considered to be located within the coastal environment, the Project has the potential to affect the streams its crosses and consequently the final receiving environments within the coastal environment, including the Waikanae River Estuary and the mouths of the Waimeha and Wharemauku Streams.

Policy statements and plans produced by regional and territorial authorities must give effect to the NZCPS.[245] Matters addressed in the NZCPS include:

- Preservation of the natural character of the coastal environment;

[245] Sections 62(3), 67(3)(b) and 75(3)(b) RMA.

- Protection of those characteristics of the coastal environment of special value to tangata whenua;
- Provision of appropriate subdivision, use and development of the coastal environment; and
- The Crown's interest in the Coastal Marine Area.

These matters are addressed at a regional level within the objectives, policies, rules and other provisions of the Proposed Wellington Regional Policy (PRPS) Statement and the Wellington Regional Coastal Plan (Coastal Plan) which are discussed separately below. It is acknowledged that the statutory planning documents will be out of date with respect to aspects of the new NZCPS which only came into effect in December 2010.

The following planning assessment is provided for relevant objectives and policies of the NZCPS.

35.4.1 NZCPS objectives

There are seven overarching objectives of the New Zealand Coastal Policy Statement, of which Objectives 1, 2, 3, and 6 are most relevant to this Project. These set out the high level direction for management of the coastal marine area, and the policies seek to give effect to that direction. The following assessment considers both the relevant objectives and policies together.

35.4.2 The Extent and Characteristics of the Coastal Environment (Objectives 1 and 2, and Policy 1 and 4)

The NZCPS 2010 introduced a new focus on the extent and characteristics of the coastal environment (Policy 1). Technical Report 7 - Assessment of Landscape and Visual Effects, Volume 3 concludes that the proposed Expressway corridor is not situated within the coastal environment (as defined in Policy 1 of the NZCPS). Where the proposed Expressway crosses the Waikanae River, about 2km upstream from the coast, there may be minor coastal influence in the River (due to tidal movement downstream, and migration of some fish species), but the water in this section of the River is not saline and the area has no perceptible coastal characteristics.

The Project does not require resource consents under section 12 of the RMA (Restrictions on use of coastal marine area), or under the Regional Coastal Plan. However, as outlined in Chapter 28, Volume 2 the Project has the potential to have adverse effects on the coastal environment, in particular the Waikanae Estuary, arising from land-based construction activities (re NZCPS Policy 4). Having regard to the extent and, in particular, the characteristics of the coastal environment, assessments have been undertaken to consider the effects of the Project on the coastal environment and coastal processes. In particular, this is reflected in Technical Report 22 - Assessment of Hydrology and Stormwater Effects, Technical Report 26 - Ecological Impact Assessment and Technical Report 31- Marine Habitat and Species – Description and Values in Volume 3 of the AEE.

In summary, the development of the Project had detailed regard to the potential to have effects on the coastal environment by assessing methods to avoid or mitigate effects on freshwater, through either contamination or sediment runoff. The assessment concludes that any adverse effects on the ecological values of the coastal environment would be very low to neutral in the long term, subject to the effective implementation of erosion control and sediment management and the preparation of a risk management

plan for storm events. Further discussion about the regionally specific objectives and policies in the PRPS and the Coastal Plan and regionally specific features and effects follow below.

35.4.3 Treaty of Waitangi, Tangata Whenua and Māori (Objective 3 and Policy 2)

Through engagement with tangata whenua, and by making key design decisions in consultation with tangata whenua, matauranga Māori (Māori customary knowledge, traditional knowledge or intergenerational knowledge) has been incorporated into the consideration and design of the Project (refer to Chapter 14).

35.4.4 Natural Character (Objective 2 and Policies 13 and 14)

Policy 13 relates to preserving the natural character of the coastal environment and recognises that natural character is different to natural features, landscapes and amenity values. Policy 14 promotes the restoration or rehabilitation of the natural character of the coastal environment.

As discussed above, the Project is not considered to be located within the wider coastal environment from a landscape perspective. In terms of an ecological perspective, the actual and potential adverse effects on the identified estuaries from construction works on the streams and wetlands, are considered to have low to neutral impacts, subject to the implementation of erosion and sediment controls.

35.4.5 Water Quality (Objectives 1 and 6, and Policy 21, 22 and 23)

Policy 21 requires that where water quality in the coastal environment has deteriorated such that it is having a significant adverse effect, priority be given to enhancing it. Policy 22 requires consideration of controls to manage the effects of sedimentation on the coastal environment, including through managing land uses, forestry and vegetation removal. Policy 23 seeks to manage the discharge (of contaminants) to the coastal environment.

Water quality is a primary issue for the coastal environment in the consideration of the Project, particularly during construction. The extent of effects on the coastal environment, from this Project, relate to construction activities that generate an increase in sediment upstream of the estuaries.

Having regard to Policies 21, 22 and 23, the following assessment is made:

- The Coastal Plan identifies that the coastal water along the Kāpiti coast are to be managed for contact recreation purposes.
- Technical Report 22, Volume 3 details the characteristics, water quality and ecological values of each of the three estuaries Waikanae Estuary, Waimeha/Ngarara Stream mouth, and Wharemauku Stream mouth – all of these estuaries have high ecological values.
- Land use activities within the catchments upstream of the estuaries have resulted in varying levels of water quality both in the water discharging into the estuaries and the coastal water. Whereas the Waimeha Stream mouth has moderate water quality, influenced by lowland agricultural land uses, the streams and water bodies upstream of the Wharemauku Estuary are highly modified by land use, and water quality and ecological values are relatively low. The

Waikanae River has good water quality, reflecting the forest and pastoral land use in the catchment, but the quality of water in the River reduces near the coast due to the discharge of treated wastewater via the Mazengarb Drain. Overall, it is anticipated that the effects of the proposed Expressway on water quality entering coastal water will be negligible, and, indeed the proposed stormwater treatment systems may result in overall improved water quality.

- The likely sedimentation as a result of the construction activities is considered to have a negligible adverse effect, while the likely quality of stormwater runoff from the operation of the proposed Expressway is considered to be either neutral or positive due to proposed wetland treatment measures, retirement of grazed land and the removal of stock contributions (Technical Report 24 – Baseline Water and Sediment Quality Investigation Report andTechnical Report 27 - Ecological Impact Assessment, Volume 3).

Overall, it is concluded that the Project will be consistent with these objectives and policies of the NZCPS.

35.5 Relevant National Environmental Standards

There are four national environmental standards (NES) that are relevant to the Project:

- NES for Air Quality (2004, amended 2011) – Regulation 8 prohibits the burning of bitumen on a road and Regulation 13 sets the ambient air quality standards and the requirements for management of air quality within those air sheds identified. It is the responsibility of Regional Councils to manage air quality and to comply with the Regional Air Quality targets for their air-shed(s). No consents relating to this standard are required, but the relevant regulations in the NES have informed the assessment of construction and operational air quality effects and proposed mitigation measures included in Technical Report 13 – Assessment of Operational Air Quality Effects and Technical Report 14 – Assessment of Construction Air Quality Effects, Volume 3 of the AEE.
- NES for Sources of Drinking Water (2007) – This NES requires regional councils to ensure that effects on drinking water sources are considered in decisions on resource consents and regional plans. No consents relating to this standard are required. The potential effects of the Project on the District's groundwater resources that are used for water supply are addressed in Technical Report 21 – Assessment of Groundwater Effects, Volume 3 of the AEE. The assessment concludes that there should be no deleterious effect on potable water supplies, but that appropriate monitoring and management should be implemented during construction.
- NES for Electricity Transmission Activities (2010) contains regulations relating to the relocation of existing transmission lines. This may apply at one section of the Project in relation to the HAY-BUN 220kV line at Waikanae North, where minor work on the transmission line might be required to ensure safety standards are met. Any work on the transmission line would be undertaken in liaison with Transpower in accordance with the provisions of the NESETA.

- NES for Assessing and Managing Contaminants in Soil to Protect Human Health (2011) – This NES provides a mix of permitted activities and resource consent requirements for certain activities on land affected or potentially affected by contaminants in soil. The assessment of land and groundwater contamination effects (Chapter 27, Volume 2 and Technical Report 23, Volume 3 of the AEE) has had regard to the relevant standards in the NES. The property at 55 Rata Road appears on the GWRC Selected Land Use Register for the historical storage of fuel at the site. As this activity is listed on the Hazardous Activities and Industries List (HAIL) the NES Regulations apply to this land parcel. The volume of soil disturbance at the site is likely to be more than 25m3 per 500m2 and require more than 5m3 of soil to be removed from the site. This exceeds the permitted activity volumes detailed in the Regulations and therefore this activity will require a consent. As the concentrations of contaminants at location TP209 (refer to Drawing EN-CL-005, Technical Report Appendices, Report 23, Volume 5) exceed the health guideline values set out in the NES, the activities at this site will require consent as restricted discretionary under Regulation 10. Further detail regarding the site investigations, potential effects and proposed methods to manage and/or dispose of contaminated soil are included in Technical Report 23, Volume 3 of the AEE.

35.6 Wellington Regional Policy Statement 1995

The operative Regional Policy Statement (RPS) for the Wellington Region came into effect in 1995. The RPS identifies the regionally significant issues around the management of the Region's natural and physical resources and sets out what GWRC is seeking to achieve (objectives) and the way in which they will seek to achieve those objectives (policies and methods). It is also a key statutory instrument that regional and district plans are required to give effect to.[246]

At this stage, the PRPS is considered to carry greater weight than the operative RPS, because the PRPS has been through the public notification and submissions process, and is currently in the final stage where appeals on some of its provisions are being resolved. Nevertheless, the RPS contains similar themes and topic areas, and the assessment of the Project against the objectives and policies of the PRPS are considered to cover these issues well.

35.7 Proposed Wellington Regional Policy Statement 2009

The PRPS for the Wellington Region was publicly notified in March 2009. The hearing of submissions took place in November 2009, with the decisions on the submissions released in May 2010. The PRPS is currently subject to appeals to the Environment Court.

A full assessment of the Project has been undertaken against the relevant objectives and policies of the PRPS and is provided below. The PRPS is intended to provide a robust, integrated approach to promoting the sustainable management of natural and physical resources. Under section 59 of the RMA "the purpose of a regional policy statement is to achieve the purpose of the Act by providing an overview

[246] Section 65(6), 67(3), 73(4), 75(3), RMA.

of the resource management issues of the region and policies and methods to achieve integrated management of the natural and physical resources of the whole region."

35.7.1 PRPS – air quality

The PRPS separates air quality issues into two categories: Amenity (Objective 1) and Health Effects (Objective 2). Policy 1 corresponds to Objective 1, while Policy 2 provides direction for both Objectives. The PRPS states that overall regional air quality in Wellington is generally good: the PRPS seeks to maintain and enhance air quality in the Region. In consideration of the relevant objectives and policies, the following conclusions are reached in respect of the Project:

Amenity Effects (Objective 1)

Amenity values can be adversely affected by contaminants in the air, such as when dust and smoke reduces visibility or when odour is objectionable.

Policy 1 directs the inclusion of provisions in district plans to manage reverse sensitivity effects; whereby sensitive activities may adversely affect the operation of land uses that "emit odour, smoke or dust, which can affect the health of people and lower the amenity values of the surrounding area".

In relation to amenity, Policy 2 requires consideration of reducing the effects of odour, smoke, dust and fine particulate matter. Dust emissions from the earthworks associated with construction will be a source of contaminants and could have an adverse effect on amenity. These potential adverse effects would be temporary and are proposed to be satisfactorily managed through best practice construction methods set in the CEMP.

It has been determined that there will be negligible air quality amenity effects arising from the use of the proposed Expressway.

Health Effects (Objective 2)

The potential for health effects in relation to roading infrastructure relate primarily to fine particulate emissions from vehicles and, to a lesser extent, from concrete batching when this is undertaken. Policy 2 requires consideration to be given to reduction of the effects of odour, smoke, dust and fine particulate matter with respect to health effects.

As outlined in Chapter 20, Volume 2 it is anticipated that the Project will have negligible effects on the ambient air quality and level of existing contamination and therefore will not have any effects on human health.

Overall, it is concluded that the proposal will be entirely consistent with the relevant objectives and policies that relate to air quality.

35.7.2 PRPS – coastal environment

The regionally significant resource management issues for the coastal environment and corresponding objectives and policies are categorised into four areas: adverse effects on natural character, and

restoring natural character (Objective 4 and Objective 5 respectively); and natural habitats and features, coastal water quality and ecosystems (Objectives 3, 6 and 7). In relation to this Chapter of the PRPS the following conclusions are made:

Natural character (Objectives 4 and 5)

The Project does not propose the construction of any structures or features in the coastal environment. The Project is not considered to be located within the wider coastal environment (Policy 37).

Natural Habitats and Features (Objective 3), Coastal Water Quality (Objective 6) and Ecosystems (Objective 7)

As demonstrated in Chapter 23, Volume 2 and Technical Report 26 - Ecological Impact Assessment, Volume 3, the magnitude of the actual and potential effects on the quality of coastal ecosystems will be low to negligible.

Public Access (Objective 8)

The Project will not adversely affect public access to the coastal environment because there are no works proposed close to or within the coastal marine area. Maintaining and enhancing public access is an important tenet of all the statutory documents, and this Project will not adversely affect access.

Overall, it is concluded that the proposal is consistent with the relevant objectives and policies that relate to the costal environment.

35.7.3 PRPS – energy, infrastructure and waste

Regionally Significant Infrastructure

The "Infrastructure" objective (Objective 10) and policies (Policies 6, 8 and 9) are particularly relevant to the Project.

Objective 10 states that the "social, economic, cultural and environmental benefits of regionally significant infrastructure are recognised and protected", where the definition of 'regionally significant infrastructure[247]' includes "the Strategic Transport Network, as defined in the Wellington Regional Land Transport Strategy 2007-2016", and includes the State Highway network. It is relevant that Central Government has nominated the Project as a key part of the Wellington Northern Corridor RoNS, in the GPS on Land Transport Funding. The Project is therefore consistent with the policy direction in the PRPS and related documents such as the Regional Land Transport Strategy.

Policy 6 refers to "the social, economic, cultural and environmental benefits of regionally significant infrastructure" (such as the proposed Expressway) and directs regional and district plans and policy to recognise these benefits.

[247] Refer Appendix 3, PRPS

The Project will be entirely consistent with, and will further Objective 10 insofar as the Project provides for a more efficient road transport network that will allow people to travel more quickly and more reliably around the Region.

As discussed in Chapter 12, Volume 2 and Technical Report 32 – Assessment of Transport Effects, Volume 3 the Project will:

- improve travel time reliability;
- reduce traffic travelling through local coastal communities;
- reduce travel times around the Region; and
- improve safety (through crash reduction and route resilience improvements).

Therefore, the Project will provide social and economic benefits in particular, to people and communities by:

- improving the amenity of communities along existing SH1 through a reduction of through traffic – it will be easier for people to cross the road, stop and park on the road, and potentially make it safer to get out of vehicles on the road and visit local shops and businesses;
- enhancing safety for pedestrians and cyclists using the existing SH1 benefitting from less through traffic;
- enhancing safety for people travelling both short and longer distances through the Region by using the new route which has been designed to meet modern safety standards and will result in reduced crashes in comparison to the existing route;
- increasing the reliability of travel times meaning that people will be better able to predict how long it will take to travel, providing greater certainty and less stressful/uncertain travel experiences; and
- reducing travel times around the Region will have benefits for commuters, as well as for tourism and freight movements (which are key aims of the GPS), which will both improve productivity with faster freight movements, along with enhancing trip enjoyment for both tourists and commuters.

Recognising the benefits from regionally significant infrastructure (under Policy 6) is an important consideration for this Project, and it is concluded that the Project will be entirely consistent with this Policy.

Consumption of Non- renewable Transport Fuels and Promoting Travel Demand Management

The PRPS also provides direction on reducing the use and consumption of non-renewable transport fuels and promoting travel demand management, in Policies 8 and 9 respectively. These policies recognise the significant contribution the transport sector makes to carbon dioxide emissions and non-renewable fuel consumption. The policies seek that a reduction in both emissions and consumption is advanced through the Wellington Regional Land Transport Strategy.

Policy 9 also directs district plans to promote travel demand management mechanisms, including improvements to the efficiency of the existing network. The Policy also recognises that it is important to ensure good connectivity within and between settlements to optimise walking, cycling and public transport.

As outlined in Chapter 12, Volume 2 the Project is expected to yield a range of benefits which would be consistent with achieving Policy 9. These include:

- reduced average travel time journeys, both on the realigned State Highway (i.e., Expressway) and on local roads;
- a significant reduction in congestion;
- reduced levels of stopping and starting;
- the establishment of a significant new section of walking and cycleway network;
- provision of a second bridge over the Waikanae River, opportunities for improvements to bus services; and
- provision of opportunities to enhance access to public transport facilities at Paraparaumu and Waikanae town centres.

35.7.4 PRPS – freshwater (including public access)

The PRPS identifies that freshwater is integral to our health, wellbeing, livelihood and culture and that it is a matter of national importance to protect wetlands, lakes, rivers and streams from inappropriate use and development. In this regard Chapter 22, Volume 2 notes two particular concerns as follows:

- *the ecosystem function of some rivers, lakes and wetlands has been impaired, with some wetland and lowland stream ecosystems coming under particular pressure.*
- *The water quality of rivers and streams, lakes, wetlands and groundwater in the region is being polluted by discharges and intensive urban and rural land uses*

Objectives 12 and 13 respond to these concerns and focuses on water quantity and quality, and freshwater ecosystems respectively:

Objective 12

The quantity and quality of fresh water:

(a) meet the range of uses and values for which water is required;

(b) safeguard the life supporting capacity of waterbodies; and

(c) meet the reasonably foreseeable needs of future generations.

Objective 13

The region's rivers, lakes and wetlands support healthy functioning ecosystems.

Policies 39 – 41 set out resource consent considerations, until such time as regional plans have given effect to Policies 5-11, and are therefore relevant:

- Policies 11 and 39 encourage the maintenance and, where possible, enhancement of aquatic ecosystem health, both in freshwater and the coastal marine area;
- Policy 40 identifies the management of earthworks and vegetation disturbance activities to minimise erosion and runoff and to sustain healthy aquatic ecosystems; and.
- Policy 41 identifies a series of mechanisms to reduce adverse effects of stormwater run-off, with specific reference to the following:

(f) using roadside swales, filter strips and rain gardens;

(g) using constructed wetland treatment areas;

(h) using in situ treatment devices; and

(i) using stormwater attenuation techniques that reduce the velocity and quantity of stormwater discharges.

Technical Report 26, Volume 2 concludes that the health of streams and their riparian margins within the Project area is generally poor. This poor quality was attributed to a range of sources, including existing land development (rural and urban land uses), and discharges from the now closed Otaihanga landfill.

The proposed CEMP and ESCP will be the principal methods to avoid or mitigate any adverse effects on aquatic ecosystem health that have the potential to arise during construction to and the adverse effects of potential sediment runoff. Best practice construction methods will also be used to avoid adverse effects on wetlands and riparian vegetation outside the construction footprint of the proposed Expressway.

Technical Report 26, Volume 2 identifies wetlands affected by the Project and sets out their respective ecological value. This information was used in the route selection process through which significant wetlands were avoided in the selection of the final alignment. The alignment would still include the permanent loss of some small degraded wetlands, and measures are proposed to mitigate this loss, including wetland restoration. The total area of wetland restoration has been calculated against off-set ratios, implemented in previous infrastructure projects, and the wetland and riparian areas set aside for restoration to meet these ratios. The proposed restoration will contribute to the Region's ecological values over the longer term.

The Project itself will use a range of devices to capture, treat and discharge stormwater from the proposed Expressway, including those described above. As a result of wetland restoration, riparian planting, culvert design and stream realignment there will be enhancements to water quality in the long term. This is consistent with the approach of Policies 11 and 39.

The proposed project landscaping has been specifically designed with ecology and landscape specialists input in order to provide a coordinated approach to addressing effects. This includes effects on riparian margins of stream crossings and realignments, and wetland replanting and restoration. The final project design also incorporates landscaped swales, and use of areas for stormwater runoff attenuation and filtering. This is consistent with the approach of Policy 41.

In conclusion, the construction and operation of the proposed Expressway will minimise the effects on aquatic ecosystems in a manner that is fully consistent with these policies.

Public Access (Objective 8)

Objective 8 and Policy 52 of the RPS both seek to enhance access to the coastal marine area and to lakes and rivers, and it is considered that this Project will be entirely consistent with this aim. The Project, through the development of a corridor-long walkway/cycleway, will enhance public access to watercourses along the route, including to the Waikanae River and Wharemauku Stream.

35.7.4.1 Historic heritage

The PRPS seeks to avoid the inappropriate modification and use and development of historic heritage (Objective 15). There are no registered or scheduled items of historic heritage value directly affected by the Project, and only two within proximity to the proposed Expressway. However, 20 recorded archaeological sites within the Project designation will be affected, and it is likely that the Project will also have an effect on unknown or yet to be identified archaeological sites in discrete areas along the proposed alignment.

Technical Report 9 – Archaeological Scoping Report and Technical Report 10 – Assessment of Built Heritage Effects) explain the investigative approach to identifying and examining the effects of the proposed Expressway on historic heritage values within the Project area. Early identification of built heritage structures scheduled in the KCDP and/or registered by the NZHPT and registered archaeological sites or areas of high archaeological potential allowed for the modification of the project alignment to avoid these features as far as practicable.

As the adverse effects of the Project on actual and potential archaeological sites that cannot be avoided is likely to be significant an integrated and comprehensive set of mitigation measures is proposed and are detailed in Chapter 13, Volume 2. The affect of the Project on built heritage has been assessed as negligible to minor. However, the Project will adversely affect an unscheduled building of potential historic heritage value (the Stringer 'wind/rain' house in Raumati), and options for its future are being investigated in consultation with the NZHPT.

Policy 45 sets out the matters that particular regard are to be had to in assessing whether an activity may affect a place, site or area with historic heritage value and whether it is appropropriate. The process, findings and response to the impact of the proposed Expressway on historic heritage within the Project area has been informed by these matters and therefore aligns with the intent of Policy 45.

35.7.4.2 Indigenous ecosystems

The PRPS acknowledges that ecosystems are constantly changing, and that all parts of an ecosystem are important to support each other. Objective 16 and Policies 22 and 23 have a particular focus on identifying and protecting indigenous ecosystems with significant biodiversity values, as these relate to future regional and district plan provisions. The PRPS also acknowledges the importance of healthy ecosystems is central to Māori cultural values.

Policy 46 addresses projects requiring consent or notice of requirement, and provides guidance on the determination of *"whether an activity may affect indigenous ecosystems and habitats or areas with significant indigenous biodiversity values."* Of the matters to give regard to, paragraph (g) states that *"remedying or mitigating adverse effects on the indigenous biodiversity values where avoiding adverse effects is not practicably achievable" is an appropriate determinant."*

Consistent with Policy 22, extensive field investigations were carried out, providing comprehensive vegetation mapping of the proposed alignment and construction footprint. The vegetation and indigenous habitats were assessed and valued against a proven and tested evaluation technique, the results of which are presented in Technical Report 26, Volume 3. The main conclusion of the assessment was that there was low-moderate value in terrestrial vegetation as the majority of the Project area is either productive farmland or is extensively infested with noxious and pest weeds. The principal value of indigenous ecology within the Project corridor is associated with the modified wetlands located within and immediately downstream of the alignment.

Technical Report 26, Volume 3 concludes that there is potentially a moderate level of effect on indigenous ecology as a result of the permanent loss of some small degraded wetlands, but that the corresponding restoration and replanting can offset these adverse effects and create long term ecological benefits. This, in turn, is consistent with the intent expressed in Policy 46.

35.7.4.3 PRPS – landscape

The PRPS acknowledges that the Region has a diversity of distinctive landscapes and that different values are attributed to these landscapes, "depending on their characteristics and our own culture, personal history, relationship with the land and ideas about what is significant". The PRPS also states that 'landscape' is shaped and constantly re-shaped by a combination of natural processes and human actions.

The PRPS outlines the Region's significant resource management issue as being the inappropriate modification and destruction of outstanding natural features and landscapes, and significant amenity landscapes, which is causing a loss of the values associated with those landscapes and features.

Objective 17 sets the overarching aim for landscape management in the Region, which is "to identify the Region's outstanding natural features, and landscapes, and protect their values from inappropriate subdivision, use and development". Policies 24, 25, 26, 27 provide direction on regional and district plan policy and regulation with respect to outstanding natural features and landscapes, and the management of 'significant amenity landscapes'.

The PRPS nominates policies that are of particular relevance in the consideration for resource consents, notices of requirements and plan changes/variations. Both Policy 49 and 52 are relevant for the assessment of the landscape, visual and open space values of the Project.

Technical Report 7, Volume 3 provides a detailed assessment of the visual and landscape effects of the Project, and this assessment is summarised in Chapter 17, Volume 2 of the AEE.

PRPS Policy 24 requires identification of outstanding natural landscapes to be achieved through District Plans (in this case, the Kāpiti Coast District Plan). Technical Report 7, Volume 3 also identifies the

existing identified outstanding natural landscapes that are both within the Project area and within the broader context of the Project. The Waikanae River, for example, is an outstanding natural feature within the immediate Project area, while Kapiti Island represents a key, highly visible landscape feature within the wider Project areaKāpiti.

Policy 49 provides matters to have particular regard to when considering the level of effects from an activity on an outstanding natural feature and/or landscape, or significant amenity landscape, in order to determine whether or not an activity is inappropriate. The relevant matters that this policy lists are:

(a) the degree to which the natural feature or landscape values will be modified, damaged or destroyed including:

(i) the duration and frequency of any effect, and/or

(ii) the magnitude or scale of any effect;

(b) the irreversibility of adverse effects on landscape values;

(c) the resilience of the natural feature place or area to change;

(d) the opportunities to remedy or mitigate previous damage to natural feature or landscape values; and

(e) whether the activity will lead to cumulative adverse effects on the natural feature or landscape values.

The only identified outstanding natural landscape feature directly affected by the proposed Expressway is the Waikanae River, and it is acknowledged that the proposed bridge will affect a short section of the river corridor landscape. However, the bridge has been architecturally designed to sit low in the landscape, and the structure will be visible for only a small length of the River; proposed planting will assist in mitigating this effect. It is noted that a bridge somewhere in this location has long been anticipated with previous motorway and local arterial road designations.

In the wider landscape, it is accepted that the proposed Expressway will result in a significant change in the local landscape, where the corridor has long been protected from development by previous motorway and local arterial designations. While the alignment and design of the Project has sought to fit the proposed Expressway within the landscape, and use existing topography to screen it wherever practicable, it will still be visible from many locations, particularly where it crosses local roads. The proposed planting and other mitigation will mitigate these effects in the long term, although the proposed Expressway will remain a significant change to that which currently exists.

In conclusion, whilst it is acknowledged that the Project will have an undeniable effect on the landscape, the policy direction (Policy 49) acknowledges that managing effects is an appropriate response. It is considered that the proposal will not be inconsistent with the overall policy direction of the PRPS in this regard.

35.7.5 PRPS – natural hazards

The PRPS has three natural hazards Objectives 18, 19 and 20. In summary, these objectives seek to reduce the risks and consequences from natural hazards; ensure that these risks are not exacerbated by hazard mitigation measures; and, ensure that communities are more resilient to natural hazards, including from the impacts of climate change. In addition, Policy 50 provides a list of matters to be considered when determining whether the risk and consequences of natural hazards on people,

communities, their property and infrastructure are minimised, to assist the in determining whether an activity is inappropriate.

One of the NZTA's key objectives for the Project is to improve regional network security by "providing an alternative strategic link" for Wellington and by improving the resilience of the State Highway network. This objective was also a key driver in the Western Corridor Plan, which was adopted as part of the RLTS. The proposed Expressway will significantly improve the existing level of resilience in the network, providing a second crossing of the Waikanae River and providing a road that will improve safety and travel reliability.

In terms of the design of the proposed Expressway itself, Technical Report 1 - Design Philosophy Statement and Technical Report 36 - Geotechnical Interpretative Report, Volume 3 of the AEE detail how these important considerations have influenced and informed the Project's design. A significant amount of geotechnical investigation was undertaken to identify natural hazards along and/or affected by the Project route. The design standards that have been applied to the groundwork and all structures are high to maximise the resilience of the proposed Expressway during earthquakes, recognising the vital role it plays in enabling efficient access throughout the Wellington Region.

In relation to flooding, Technical Report 22, Volume 3 outlines the comprehensive modelling and assessments that were undertaken to ensure the proposed Expressway did not exacerbate flooding risks, with all bridges meeting appropriate GWRC and/or KCDC flood design standards. Additional floodwater storage is proposed to be established in areas in which the proposed Expressway embankment would otherwise affect floodwater levels.

Having regard to these matters, it is concluded that the Project will reduce the risks and consequences from natural hazards by improving network resilience by providing an alternative transport route into and out of Wellington, thus reducing the risks and consequences to people, communities, businesses, property and infrastructure from natural hazards (Objective 18 and Policies 50 and 51) and reducing the consequences of natural hazards (Objective 19). Overall, the proposed Expressway will contribute to making the community more resilient and resistant to hazards (Objective 20).

Accordingly, the Project will be entirely consistent with these objectives and policies.

35.7.5.1 PRPS – regional form, design and function

The Regional Form section of the PRPS is concerned with "the physical arrangement within and between urban and rural communities". The PRPS acknowledges that the Wellington Region has a generally compact pattern of development, based on strong transport "corridors". This regional pattern is a strength as it reinforces local centres, supports passenger transport, reduces energy use and makes services more accessible. One issue highlighted in the PRPS is that "the region also has limited east–west transport linkages, which means freight and commuter movements are focused along the north–south corridors, increasing congestion on some major routes".

Objective 21 states "A compact, well designed and sustainable regional form that has an integrated, safe and responsive transport network" and goes on to list twelve further attributes (a) – (l) which add to the regional form. In terms of the Project, the relevant attributes from Objective 21 are:

(b) an increased range and diversity of activities in and around the regionally significant centres to maintain vibrancy and vitality;...

(i) integrated land use and transportation;

(j) improved east-west transport linkages;

(k) efficiently use existing infrastructure (including transport Network infrastructure); and

(l) essential social services to meet the region's needs.

Policies 29 and 53 are directly relevant in implementing this objective. Policy 29 identifies the regionally significant centres in Wellington City, and the sub-regional centres which include Paraparaumu's town centre. The policy directs district plans to provide a range of land uses that will maintain and enhance the vitality and vibrancy of these identified areas. Parallel to this, Policy 53 requires a thorough consideration of the PRPS urban design principles for any Notice of Requirement[248].

Policy 56 is also relevant insofar as it directs the consideration of integrated land and transport matters for the assessment of Notice of Requirement. The matters identified in this policy are:

(a) whether traffic generated by the proposed development can be accommodated within the existing transport network and the impacts on the efficiency, reliability or safety of the network;

(b) connectivity with, or provision of access to, public services or activities, key centres of employment activity or retail activity, open spaces or recreational areas;

(c) whether there is good access to the strategic public transport network;

(d) provision of safe and attractive environments for walking and cycling; and

(e) whether new, or upgrades to existing, transport network infrastructure have been appropriately recognised and provided for.

Having regard to the objective and policies (including the urban design principles), the following points are noted:

- In relation to the integrated approach to land use and transportation promoted by Objective 21, the NZTA has, in developing the Project, prepared an Urban Design and Landscape Framework (Technical Report 6, Volume 3). The Framework sets out an overall urban design vision and principles for the Project and its wider surrounding context. It also incorporates aspirations from KCDC, GWRC and the local community – including objectives around maintaining the viability of local centres (Policy 29).
- The impact on the vitality and vibrancy the town centres of Paraparaumu and Waikanae were investigated. The findings from Technical Report 6 and Technical Report 20 - Assessment of Social Effects, Volume 3 of the AEE, along with the conclusions reached in the assessment of economic effects (Chapter 29, Volume 2), confirm that the Project will remove most of the heavy freight traffic and commuter traffic that currently travels through these two town centres, and in so doing affects their amenity values and quality of urban environment. The removal of this type of traffic will be a positive effect and allow these town centres to reconnect and revitalise.

[248] The urban design principles are set out in Appendix 3 of the PRPS and include principles relating to context, character, choice, connections, creativity, custodianship, and collaboration

- The economic impact from reduced traffic passing through the area would be adverse for some businesses, but the overall vitality of the town centres was not expected to be significantly adversely affected, and the general economic wellbeing of the District was expected to be enhanced.
- There would be minor impacts on existing walkways (mainly informal ones), and on connections to and from main public spaces as a result of the Project. These connections were all taken into account in the choice of alignment and design of the proposed Expressway. In addition to two proposed pedestrian/cycle bridges over the proposed Expressway, at Raumati and Paraparaumu, a corridor long new walkway/cycleway will enhance the overall District network of cycleways, walkways and linkages. Provision for a bridleway is also made along some sections of the proposed Expressway.
- The Project will reduce traffic congestion on the existing SH1, and accommodate significantly improved traffic flows for through traffic including tourism and freight movement on the new route (Policy 57).
- The Project assists in accommodating the Region's growth in a manner consistent with the PRPS and its strategic objectives, by improving accessibility and efficiency of the transport network between centres of economic development and growth (Policy 29, 56 and 57).
- The Project promotes an integrated approach to land use and transport development (Objective 21(h) and Policy 57) insofar as the Project is recognised in a number of the strategy documents for the Region, and will assist the relevant authorities to fulfil their objectives – as demonstrated in the assessment contained in Chapter 15, Volume 2. The Project promotes transport efficiency in a way that does not compromise the intrinsic values of the Region's natural resources by taking an integrated approach to development of the design and the methods to manage actual and potential adverse effects – particularly those on the natural environment.
- While the route of the proposed Expressway will adversely affect the current urban growth strategy for the Waikanae North area, requiring a revision of the planning for the area, the alignment of the proposed Expressway sought to reduce the overall effect on growth potential in this area. The current KCDC District Plan review enables necessary adjustments to be made as KCDC considers appropriate.
- All local west-east local roads, with one exception at Leinster Avenue, are to be maintained, and a range of opportunities for future links across the proposed Expressway have been identified in liaison with the KCDC in areas of future growth.

In conclusion, consistent with the regional objectives around an integrated approach to development of the transport network, the Project will improve the overall functionality of the transport network (as demonstrated in Technical Report 1 and Technical Report 6 – Assessment of Urban Planning and Design Effects, Volume 3) and will not be inconsistent with the overall policy direction in this Chapter in regard to urban form and functioning.

35.7.6 PRPS – resource management with Tangata Whenua

Chapter 3.10 focuses on tangata whenua aspirations for achieving an integrated and holistic approach to managing the Regions' natural and physical resources. The PRPS explains that Kaitiakitanga is the environmental guardianship system used by tangata whenua, which is based on Māori views of the world

and its origins, and the principle that everything is interrelated and interconnected. Mauri is the life force that exists in all things in the natural world. Tikanga, or customary practices, are followed in order to protect mauri. Observing tikanga is central to the exercise of kaitiakitanga. Kaitiakitanga is a parallel system of environmental management that should be given equal consideration in resource management.

Objective 22 promotes working together on resource management, and Policy 66 seeks to enhance the involvement of iwi in decision-making processes. Objective 23 and Policy 47 emphasise the statutory requirement to take into account the principles of the Treaty of Waitangi and Objective 25 seeks to ensure the concept of kaitiakitanga is integrated into the regions resource management. Policy 48 implements the tangata whenua objectives by directing the avoidance of adverse effects on matters of significance to tangata whenua, and links are made back to topic based Chapters (indigenous ecosystems, heritage, and water quality) to ensure integrated resource management.

The Takamore Trust and Te Rūnanga o Āti Awa ki Whakarongotai Inc were identified as iwi authorities representing the tangata whenua along the proposed Expressway alignment. Engagement has also taken place with Muaupoko, Ngāti Toa, and Ngāti Raukawa. Both iwi authorities were engaged in consultation at the beginning and throughout the progression of the Project. The engagement of these iwi authorities was based on the matauranga Māori concept, whereby considerable effort was made to understand Māori values of the area and natural resources. As part of this process of understanding, both iwi authorities were engaged to prepare cultural impact assessments for the Project (Technical Report 11- Takamore Trust Cultural Impact Assessment and Technical Report 12 – Te Rūnanga o Āti Awa ki Whakarongotai Inc Cultural Impact Assessment).

To this end, tangata whenua were key stakeholders and contributors of information for the route selection process, and a key goal of this consultation was to identify and assess potentially significant adverse effects on cultural values, and measures to avoid, remedy or mitigate these effects. Through the development of the NZTA's environmental response to the Project, which included the preparation of mitigation measures for natural and cultural resources, the iwi authorities have had input into, and helped shape, the final package of mitigation measures.

The proposal is therefore entirely consistent with tangata whenua objectives and policies in the PRPS, and the process for engaging with Māori has been in accordance with the principles of the Treaty of Waitangi.

35.7.7 PRPS – soil and minerals

Issue 3 of the PRPS acknowledgesthat highly productive agricultural land is under threat from development, including the construction of roads. Accelerated soil erosion is another key issue (Issue 1) and Objective 28 promotes land management practices that do not accelerate soil erosion. Objective 29 promotes maintaining the desirable characteristics of soils that enable them to have an ecosystem function. To implement these objectives, Policies 14 and 40 seek to minimise effects from earthworks and vegetation disturbance on aquatic ecosystem health from silt and sedimentation and Policy 59 directs consideration of the productive capability for agriculture of Class I and II land. Having regard to these objectives and policies, the following points are noted:

- The Project area traverses environments with different soil, vegetation and hydrological characteristics, and the design and construction of the proposed Expressway, and the environmental management has been tailored to address these different characteristics.
- Significant earthworks, permanent vegetation removal and disturbance will necessary along the proposed Expressway alignment. The impact of these works on health of streams and wetlands has been evaluated in Technical Reports 24 and 26, Volume 3 of the AEE. The findings of these assessments conclude that the water quality of majority of the existing streams has been degraded through historical rural and urban land uses. To avoid, remedy and mitigate any further degradation, an extensive environmental management system would be in place during construction, and erosion and sediment controls will be tailored to each section of the alignment. Riparian planting is proposed as part of the overall mitigation planting, and this will improve the health of the water bodies which the alignment crosses, and those which are realigned as a result of the Project.
- The Te Harakeke/Kawakahia wetland is nationally recognised for its ecological value. The alignment of the proposed Expressway avoids directly impacting on this wetland, but this wetland is a main receiving environment of the Ngarara Stream catchment. Technical Reports 24 and 26, Volume 3 of the AEE conclude that the environmental management system that is proposed to manage stormwater and sediment runoff during construction and subsequently runoff from the road will avoid significant adverse effects on the health and functioning of that wetland and others that are downstream of the proposed Expressway.
- The alignment of the proposed Expressway will not result in the significant loss of productive land, as much of the terrain comprises former dunes or low-lying peat soils that provide limited pastoral grazing.

In conclusion, the Project is largely consistent with achieving the objectives and policies of the PRPS in respect of managing the soil resources of the District.

35.8 Wellington Regional Freshwater Plan 1999

The Regional Freshwater Plan (RFWP) for the Wellington Region came into force in December 1999. There have been five plan changes that have been made operative since 1999, the relevant ones being:

- Plan Change 1, which changed rules relating to access to groundwater on the Kāpiti Coast, identified minimum flows and allocation limits for three rivers in the region and made small changes to improve the plan. This plan change came into effect in May 2009.
- Plan Change 4 to the Regional Freshwater Plan, which inserted policies to give effect to policies A4 and B7 of the National Policy Statement for Freshwater Management. Plan Change 4 was made in December 2011.

The RFWP applies to the freshwater resources of the Wellington Region, including all water in rivers, lakes, streams, ponds, aquifers and artificial water courses, but excluding freshwater in the coastal marine area. It also applies to all land in river and lake beds, and to all types of activities that use freshwater or that are in the beds of rivers and lakes. A number of consents are required under the RFWP for the Project. In particular, these consents relate to:

- Discharges to freshwater;
- The taking, using, damming or diverting of freshwater;
- The building and modifying of structures in river and lake beds;
- Disturbances of river and lake beds;
- The depositing of substances on river and lake beds;
- Reclamation or drainage of river and lake beds;
- Development on the flood plain; and
- Flood mitigation.

Table 3.4 in Chapter 3, Volume 2 of the AEE provides further detail on the type and activity status of the regional consents required.

Key Issues for the Region are set out in Chapter 2 of the RFWP as:

- The relationship of tangata whenua with fresh water;
- Natural and amenity values and access;
- Flood mitigation;
- Use and development;
- Water quality and discharges to fresh water;
- Water quantity and the taking, use, damming or diversion of fresh water; and
- Use of the beds of rivers and lakes and development on the floodplain.

The objectives and policies are then set out in Chapters according to their accompanying rules:

- Chapter 4 - General Objectives & Policies;
- Chapter 5 - Water quality and discharges to fresh water;
- Chapter 6 - Water quantity; and
- Chapter 7 - Use of the beds of rivers and lakes and development on the floodplain.

Chapters 5, 6 and 7 contain the objectives, policies and rules that address specific uses and development of water bodies and river and lake beds. Many of the objectives and policies in the RFWP are consistent with, and reflect those, identified in the NZCPS and PRPS. In such cases, these objectives and policies are also discussed and in the relevant sections above.

35.8.1 RFWP – general objectives and policies

Chapter 4 of the RFWP sets out general objectives and policies which the consent authority will have regard to when assessing applications for resource consents for Projects that involve works that affect freshwater resources. In summary, objectives and policies considered to be particularly relevant to this Project include:

- Objectives 4.1.1-4.1.3 and Policies 4.2.1-4.2.8 (the relationship of tangata whenua with fresh water);
- Objectives 4.1.4-4.1.6 and Policies 4.2.9-4.2.14 (Natural values);
- Objectives 4.1.7 and 4.1.8 and Policies 4.2.15-4.2.17 (Amenity values and access);
- Objectives 4.1.9 and 4.1.10 and Policies 4.2.18-4.2.22 (Flood mitigation); and
- Objectives 4.1.11-4.1.17 and Policies 4.2.23-4.3.38 (Use and development).

These topic areas are assessed below.

35.8.2 RFWP – The Relationship of Tangata Whenua with Freshwater

Objectives 4.1.1- 4.1.3 and Policies 4.2.1- 4.2.8

Consultation with tangata whenua has been a significant part of the information gathering and development stages of the Project. Consultation with iwi authorities, in particular Takamore Trust and Te Rūnanga o Āti Awa ki Whakarongotai, commenced in early 2010 and continued throughout the development phases of the Project, providing NZTA with an understanding of the cultural values of the site and the wider locality. Tangata whenua have been key stakeholders since the commencement of project investigations and influenced the shaping of the final project and mitigation measures. The NZTA considers that the process and outcomes of the Project demonstrate recognition of principles of the Treaty of Waitangi (the partnership between tangata whenua and the NZTA as a Crown agency). On this basis it is concluded that the Project is consistent with these objectives and policies (Objective 4.1.1 and 4.1.3 and Policies 4.2.2 and 4.2.6).

The mauri of water in a number of streams and wetlands has been adversely affected over time through changing land use patterns and modifications to water courses. The Project, through the proposed mitigation measures such as wetland restoration and riparian planting, will allow for long-term overall improvement of freshwater habitats. These mitigation measures have been developed with input from Takamore Trust and Te Rūnanga o Āti Awa ki Whakarongotai. This approach is entirely consistent with the objective of protecting the mauri of waterbodies (Objective 4.1.2 and Policies 4.2.3 and 4.2.5).

During construction of the Project there will be ongoing involvement with tangata whenua (Policy 4.2.7). Also, the Project will enable opportunities for improved access (including general public access) to waterways.

Overall, it is concluded that the Project will allow tangata whenua to maintain and enhance their relationship with freshwater.

35.8.3 RFWP – natural values

Objectives 4.1.4- 4.1.6 and Policies 4.2.9- 4.2.14

The natural values objectives cover matters in relation to the natural character of wetlands, lakes and rivers (and their margins), life-supporting capacity of water and aquatic ecosystems and significant indigenous aquatic vegetation and habitats. The objectives reflect the purpose and principles of Part II

set out in sections 5(2)(b), 6(a) and 6(c) of the RMA, in reference to freshwater natural resources. The policies provide methods to characterise (and therefore identify) high priority water resources and then apply commensurate levels of protection.

Given the national priority of protection of natural character (RMA Section 6(a)), there is a consistent direction in the objectives and policies of the RPS and PRPS which flows through into the RFWP.

Policy 4.2.9 sets out the characteristics to be considered when classifying streams and wetlands as having a high degree of natural character, and this policy is implemented through the listing of water bodies and wetlands with a high degree of natural character in Appendix 2. The application of Policy 4.2.10 will ensure that these natural values are not degraded through inappropriate development.

The Te Harakeke Swamp at and around R26 827 377 is included in Part B of Appendix 2, and is to be managed for aquatic ecosystem purposes. This wetland is not within the proposed route alignment, but is the main receiving environment for the northern end of the proposed Expressway. The Explanation to Policy 4.2.10 states:

> *In this policy "to avoid adverse effects" means that when "avoiding, remedying or mitigating adverse effects", as identified in subsection 5(2)(c) of the Act, the emphasis is to be placed on avoiding adverse effects. "To avoid adverse effects" means that only activities with effects that are no more than minor will be allowed in the water bodies identified.*

Policy 4.2.11 requires adverse effects on freshwater environments to be avoided, remedied or mitigated.

Technical Report 26, Volume 3 concludes that adverse effects on listed wetlands and stream will be avoided through the effective implementation of the CEMP and ESCP, applying an adaptive management approach to monitor and respond to any adverse changes that may not have been adequately mitigated through the primary measures.

The fieldwork and investigations undertaken to assess all water bodies (streams, wetlands) that may be adversely affected by the Project are also reported in Technical Report 26. The aquatic ecological values were one of many layers of information that influenced the final alignment of the proposed Expressway (Refer to Chapter 9, Volume 2). A key design intention of the proposed Expressway was to avoid adverse effects on streams and wetlands wherever possible, and if not, to remedy or mitigate effects (including by offsetting).

Technical Report 26 further concludes that in overall terms, the proposed modification of freshwater resources (such as the culverting of streams) and their natural character will be satisfactorily mitigated by proposals such as riparian planting and restoration and by offsetting the loss of natural stream courses and wetlands (Objective 4.1.4). Indeed, the reinstatement of freshwater features through reconstruction elsewhere, revegetation, riparian planting and other measures to manage effects is anticipated to lead to a positive overall effect and an improvement to the life-supporting capacity of water and aquatic ecosystems (Objectives 4.1.5 and 4.1.7).

In sum, it is concluded that the Project and its associated works in relation to waterways and freshwater aquatic ecology can be achieved without long term loss to values and quantity. Further, the mitigation proposed will cause a net gain in those values post construction which will secure a long term environmental enhancement of these habitats for the Region (Policies 4.2.9 and 4.2.11).

35.8.4 RFWP – amenity values and access

Objectives 4.1.7 and 4.1.8 and Policies 4.2.15- 4.2.17

Maintaining and enhancing access to lakes and rivers (and the coast) is to be recognised and provided for as a matter of national importance under Section 6(d) of the RMA. Consequently, this is given a high status in the relevant planning instruments including the RFWP. Section 7(c) of the RMA also requires particular regard to maintaining and enhancing amenity values.

Having regard to these objectives and policies, the following assessment is made:

- Policy 4.2.15 refers to those water bodies identified as regionally important for recreational and amenity values (Appendix 5 of the RFWP). The only such waterbody affected by the Project is the Waikanae River. The construction and use of the proposed bridge across the Waikanae River will affect the amenity values and recreational values of this section of the River. However, this part of the River has long been the identified crossing point for a major road through previous designations for motorways and the Western Link Road. A bridge is not an unanticipated feature for rivers, particularly those flowing through growing urban areas. The design of the bridge has been designed to minimise its presence and obtrusiveness in the river corridor, and proposed planting will help to soften its visual impact.
- The Project will offer more direct public access to key streams and waterways by providing greater opportunities for walking, cycling and horse riding, consistent with the RMA's intention to maintain and enhance access (Objective 4.1.7 and 4.1.8).
- While there will be some limitations on public access to the margins of streams during construction of the proposed Expressway for public safety reasons, alternative routes for recreational users will be made available and will be well signposted. Regardless of this, the overall end result will be a substantial improvement in access to streams and their margins in the long term (Objective 4.1.7 and 4.1.8).
- The wetland areas within the construction footprint will be carefully worked around to minimise the loss and degradation of these areas. Mitigation planting, as well as wetland restoration in the Otaihanga section, will provide amenity benefits, ecological mitigation, and water quality benefits (Objective 4.1.7 and Policy 4.2.16).
- The proposed stream works comprise the installation of culverts, temporary stream diversions during construction and two permanent stream realignments. The permanent works include enhancement work, primarily riparian planting. As the majority of the existing streams have little riparian cover, the proposed works and planting will have a positive effect on amenity and recreational values (Objective 4.1.7, Policy 4.2.15).

Overall, as amenity values and access to watercourses within the Project area will be substantially enhanced, the Project will be consistent with the relevant objectives and policies.

35.8.5 RFWP – flood mitigation

Objectives 4.1.9 and 4.1.10 and Policies 4.2.18- 4.2.22

These objectives and policies are concerned with health and safety of the public and the effects of flooding both on natural and physical resources including people's property.

Having regard to these policies the following assessment is made:

- Targeted hydrological investigations have improved understanding of the behaviour of flood flows and the potential for adverse effects from flood events which have informed both the proposed Expressway design and the mitigation measures proposed (Policies 4.2.18 and 4.2.20).
- The design approach of the Project sought to achieve hydraulic neutrality (i.e., no exacerbation of the existing situation), taking into account both increased run-off from the proposed Expressway footprint and the loss of flood plain storage under the footprint. In accordance with the recommendations in Technical Report 22, Volume 3, a number of mitigation measures are proposed to achieve hydraulic neutrality, including:
    - Attenuation in swales and wetlands;
    - The creation of off-set storage areas;
    - Low head culvert designs
    - Rip-rap protected culverts and outlets; and
    - The creation of new open channel drains resembling natural streams.
- Accordingly, the potential effects of the proposed Expressway on flood risk are able to be satisfactorily addressed through mitigation (Objectives 4.1.9 and 4.1.10, Policies 4.2.18 and 4.2.22).

Overall, the proposed stormwater system (in addition to the design standards of the bridges and culverts) will ensure that the proposed Expressway will not exacerbate flood risks during large rainfall events. Consequently, the Project is consistent with Objectives 4.1.9 and 4.1.10, which promote management of flood risks to an acceptable level.

35.8.6 RFWP – use and development

Objectives 4.1.11- 4.1.17 and Policies 4.2.23- 4.3.38

The use and development objectives and policies refer to the enabling aspect of the RMA, as set out in section 5, where people and communities are able to use and develop freshwater resources to provide for their social, economic and cultural well being and for their health and safety (Objective 4.1.11). Encouragement is also provided to activities that enhance freshwater resources (Objective 4.1.13) and recognition given to the adverse effects of the use and development of freshwater resources being avoided, remedied and mitigated (Objective 4.1.12).

Having regard to these objectives and policies, the following assessment is made:

- With respect to lawful water users (Objective 4.1.14 and Policy 4.2.29) the NZTA has worked with the GWRC to understand their water use needs in relation to the Regional water supply, and will continue to manage the continuity of quality and supply during construction. Landowner access to water will also be provided, as required, by the NZTA (Objective 4.1.14).
- As discussed in Technical Report 26, Volume 3, the Project will have some adverse effects on water quality during construction but these effects will be countered in the long term by the benefits that will arise from the riparian and wetland enhancement works that will be undertaken post-construction (Objectives 4.1.12 and 4.1.13, and Policy 4.2.23). Opportunities have also been identified along the alignment to restore and rehabilitate degraded water resources through riparian planting and revegetation and protection of land within the catchments surrounding key streams (Policy 4.2.27).
- Conditions have been developed that offer an effective means to manage adverse effects during construction (Objective 4.1.7). Policy 4.2.34 seeks to avoid, remedy or mitigate effects by using conditions, and the Policy explanation cross-references to Section 108 of the RMA. Policies 4.2.35 and 4.2.36 set out the matters to have regard to when determining the nature and extent of any conditions that may be imposed on a resource consent. The approach to developing conditions and the methods to be used, particularly for controlling the effects of earthworks, are set out in Part H, Volume 2 and Volume 4 of the AEE, with the conditions proposed being entirely consistent with these policies and their corresponding objectives. Policy 4.2.33 seeks to provide for those activities which will have no more than minor adverse effects on the environment and sets out specific criteria (1) to (7) to assess an activity against. As the Project will generate effects that are more than minor this Policy is not strictly relevant.
- Overall, it is considered that the Project will be consistent with the Use and Development objectives and policies.

35.8.7 RFWP – water quality and discharges to freshwater

Objectives 5.1.1- 5.1.3 and Policies 5.2.3, 5.2.6, 5.2.7, 5.2.10, 5.2.13, 5.2.14, 5.2.15 and 5.2.16

The Water Quality Objectives emphasise the sustainable management of fresh water resources (Objective 5.1.1 and 5.1.2), and also specify that the quality of water, as far as possible, is consistent with the values of the tangata whenua (Objective 5.1.3).

Having regard to the policies that implement sustainable management the following assessment is made:

- The Project design has sought to maintain and, in some cases, enhance water quality discharged to coastal receiving waters. While there will be some temporary adverse effects on water quality during construction, there will be a long term positive effect on water quality discharged into these waters as a result of stormwater treatment, riparian revegetation and native planting, which will be an important long term benefit that will be derived from the Project (Objective 5.1.1 and 5.1.2; Policy 5.2.1).

- The Takamore Trust and Te Rūnanga o Āti Awa ki Whakarongotai Inc have advised that better management (i.e. improvement) of water quality is a key issue for tangata whenua, and the maintenance (and in some cases enhancement) of water quality proposed by the Project is consistent with this (Objective 5.1.3).
- The water quality of streams affected by the Project will be managed during the construction phase and there will be a low magnitude impact on in-stream habitat in the short to medium term. It is also anticipated that some streams will experience positive effects in the medium to long term due to the extensive planting and mitigation measures proposed (Objective 5.1.2 and Policy 5.2.6).
- The proposed Expressway design incorporates swales and attenuation wetland areas along the alignment to capture stormwater discharge and treat this water as it moves westward towards the coast. Policy 5.2.14 encourages the treatment of stormwater discharges and the Project is consistent with this approach.
- The discharge of water associated with the operation of the proposed Expressway (for example, general surface run off, washing and maintenance) will be carried out in a way that appropriately manages the quality of the discharge (Objective 5.1.2). In this regard, the design incorporates swales and attenuation wetland areas along the proposed Expressway alignment to capture and treat stormwater discharge consistent with the relevant standards in the RFWP (Policy 5.2.14).
- Policy 5.2.10 allows for consideration of applications to discharge contaminants where they do not satisfy Policies 5.2.1 to 5.2.9, subject to criteria (1) to (5). Although there will be some adverse construction effects on water quality, it is considered that the Project will meet these criteria because the construction works are temporary in nature, and because of the unusual and exceptional nature of the Project, being part of a proposal of national significance and a RoNS.
- As part of the CEMP, the position of the refuelling, machinery storage and construction are not in close proximity to surface water bodies. As a precaution, the CEMP also requires contractors to have an agreed accidental spill management process in case an event should happen, to ensure that contractors will be able to minimise the impact of any event.
- Overall, it is considered that the Project will be consistent with the Water Quality objectives and policies.

35.8.8 RFWP – water quantity

Objective 6.1 and Policies 6.2.2 – 6.2.8 set out the water quantity objectives and policies in Chapter 6 of the RFWP. These relate to the taking, use, damming or diversion of fresh water and managing water abstraction and water takes, along with protecting lawful water users.

Having regard to these objectives and policies, the following assessment is made:

- The Project involves the temporary diversion of water courses, the impact of which will be low in the short-term and neutral to positive following completion of mitigation works (Objective 6.1.1 and Policy 6.2.2). Diversion of water between catchments is not proposed as part of the Project in accord with tikanga Māori (Policy 6.2.16).
- Technical Report 21, Volume 3 indicates that:

- A small change to groundwater level, flow direction and aquifer through-flow is likely to occur as a result of groundwater take during Project construction;
- A very small change to groundwater level and flow direction is likely to occur as a result of the proposed Expressway embankment and associated peat treatment, but there will be no discernable change in aquifer through-flow; and
- No discernable change to the existing groundwater regime will occur where stormwater devices are constructed at the approximate groundwater level.

- To ensure that appropriate mitigation measures are triggered in the event that actual changes differ from those predicted, a monitoring programme will be implemented prior to the commencement of construction. Any effects that may arise during construction will be addressed through the Groundwater (Level) Management Plan.
- To ensure continuity of supply the NZTA has worked with the GWRC and affected bore owners, with alternative options relating to other lawful water supplies affected by the Project (though none have been identified at this stage) being managed on a case by case basis (Objective 6.1.2).

Overall, it is considered that the Project will be consistent with the Water Quantity objectives and policies.

35.8.9 Use of the beds of rivers and lakes and development on the floodplain

Objective 7.1.1 and Policies 7.2.1 and 7.2.2

Chapter 7 of the RFWP is particularly concerned with appropriate use of the beds of lakes and rivers while avoiding, remedying or mitigating any adverse effects and being consistent with the values of tangata whenua. Maintaining flood mitigation works is also recognised. The Project involves activities and installing structures in the beds of streams. Policy 7.2.1 is relevant because it seeks to allow for particular uses within river and lake beds where adverse effects can be avoided, remedied or mitigated (with reference to Policy 7.2.2), which include:

structures for transportation and network utility purposes;

structures for activities which need to be located in, on, under, or over the beds of rivers and lakes;

the diversion of water associated with activities that are otherwise authorised; and

the enhancement of the natural character of any wetland, lake or river and its margins.

Having regard to these objectives and policies, the following assessment is made:

- The integrated engineering and environmental team design processs, comprising a wide range of technical specialists, has enabled a continuing refinement of the project design and the approach to avoiding adverse effects on the environment (Objective 7.1.1).
- Policy 7.2.1 seeks to provide for particular uses within river and lake beds provided that any adverse effects are avoided, remedied or mitigated and that the significant adverse effects identified on the matters and values identified in Policy 7.2.2 are avoided. Policy 7.2.2 lists the following:

- the values held by tangata whenua; and/or
- natural or amenity values; and/or
- lawful public access along a river or lake bed; and/or
- the flood hazard; and/or
- river or lake bed or bank stability; and/or
- water quality; and/or
- water quantity and hydraulic processes (such as river flows and sediment transport); and/or
- the safety of canoeists or rafters.

- Technical Report 26, Volume 3 concludes that there will be streams permanently lost and/or significantly modified through culverting or through the shortening of stream length associated with diversion. While most of these effects take place in low value streams, the Project incorporates an extensive area of protection and restoration to mitigate the loss. Further, the large areas of planted flood attenuation wetlands will also contribute to the mitigation.
- Although there will be some adverse effects on streams within the Project area, the proposed mitigation is sufficient to ensure that their functional integrity is maintained, and that no fish species are lost. Further, as the medium to long term ecological health of streams and wetlands will be raised through planned retirement and re-vegetation, it is therefore considered that the Project will be consistent with Policies 7.2.1 and 7.2.2.
- In regard to the Waikanae River, some minor effects are likely due to the bridging of the River and the need to protect the river banks under the bridge from erosion. However, in relation to the total length of the River, any effects of these changes are anticipated to be negligible.

While there will be some adverse effects on the beds of streams and the Waikanae River as a result of the Project, in the long term there will be an improvement in water quality, and in the quality of in-stream habitats. This meets the intent of the high level policy direction set in the RMA as to recognising and providing for the preservation of natural character, and the giving of particular regard to maintenance and enhancement of amenity values and the quality of the environment (sections 6(a) and 7(c) and (f)).

35.9 Wellington Regional Air Quality Management Plan 2000

The Regional Air Quality Management Plan for the Wellington Region (RAQMP) applies to discharges to air in the whole of the Wellington Region excluding the coastal marine area and sets out objectives and policies to manage these discharges.

Table 3.4 in Chapter 3, Volume 2 of the AEE provides further detail on the type and activity status of the relevant regional consents required.

Objective 4.1.1 aims to maintain and protect the high quality air in the Region, enhance degraded air quality, and ensure there is no significant deterioration in ambient air quality. Objective 4.1.2 aims to manage (avoid, remedy and mitigate) adverse effects from air discharges.

The assessment of the RAQMP is relevant to the Project because of the anticipated air discharges associated with the construction activities. Policies 4.2.6, 4.2.7, 4.2.14 and 4.2.15 provide direction on the analysis of effects, sensitive environments, and best practice (minimise at source). Policies 4.2.22 and 4.2.23 are also noted in terms of their reference to effects of discharges to air from mobile transport sources, the promotion of improved air quality through different modes of transport and reduction of motor vehicle congestion in urban centres.

An evaluation of the impact of the Project on air quality is included in Technical Reports 13 and 14, Volume 3 of the AEE. Based on these assessments the Project is considered to be consistent with the intent expressed in the relevant objectives and policies for the following reasons:

- Air Quality: Overall, the existing ambient air quality close to the proposed Expressway route reflects the typical characteristics of rural and urban receiving environments. The rural areas have low existing levels of air quality pollutant, whereas the urban areas tend to be affected by PM_{10} emissions from home heating during winter time.
- Sensitive activities: No schools, preschools or healthcare facilities are located within 200m of the proposed Expressway. The assessment identifies the following sensitive receptors within 200m of the proposed Expressway:
    - El Rancho Holiday Camp;
    - Metlife Kāpiti Retirement Village;
    - Makarini Street Reserve;
    - Linwood Drive Recreational Reserve;
    - Waikanae River corridor; and
    - Wharemauku Stream.
- The assessment concluded that the effects of the proposed Expressway on air quality when it is in operation will comply with the relevant standards.
- Effects from construction - Project construction has the potential to generate dust which may have an adverse effect on air quality, particularly during the large scale earthworks. This potential effect is proposed to be mitigated to an acceptable level through the dust management measures detailed in the Construction Air Quality Management Plan (Appendix F of the CEMP, Volume 4).
- Effects from operation - Overall, once the Project is in operation and the proposed Expressway is in use, the results of the dispersion modelling indicate that cumulative PM_{10}, NO_2, CO and benzene concentrations are unlikely to exceed the relevant NESAQ and AAQG thresholds. In relation to the ambient concentrations of pollutants, the predicted contribution of vehicles using the proposed Expressway would be low and therefore on-going monitoring of vehicle exhaust emissions associated with the Project is not considered necessary.

35.10 Wellington Regional Coastal Plan 2000

There are no activities or structures proposed to be undertaken within the coastal marine area, and no resource consents are required for works in this area. There are also no anticipated direct effects on

marine ecological values due to the construction or operation of the Project, as the alignment is located some distance from marine environments. However, potential indirect effects could occur during the construction and operational phases of the Project as a result of runoff to streams and rivers that discharge to the marine environment. Therefore, the objectives and policies in the Regional Coastal Plan (RCP) relating to the discharge of contaminants in the coastal environment are of limited relevance to the Project.

Technical Reports 26 and 31, Volume 3 investigate and evaluate the marine ecology associated with the Project and surrounding area.

For the most part, the objectives and policies are directed at managing activities within the coastal marine area, and in particular those that require approvals under section 12 of the RMA. As a result, many are not directly relevant to this Project. The most relevant are considered to be the general objectives and policies in Clause 4.1 and 4.2, and discharges to land and water in Clause 10.1 and 10.2. Section 4 of the RCP follows similar themes to the RFWP and reference is made to the detail in those assessments. In this regard, the proposal is considered to be consistent with the objectives and policies in Section 4.

Section 10 of the RCP relates to the discharge of contaminants to coastal water, water in the lower reaches of rivers within the coastal marine area, and land in the coastal marine area. Although not technically relevant to the Project, regard has been had to managing and enhancing coastal water quality with particular emphasis given to the policies relating to shellfish gathering (Policy 10.2.1), contact recreation (Policy 10.2.2), improving the adverse effects from land-based discharges (Policies 10.2.10, 10.2.12), and tangata whenua interests (Policy 10.2.11). The assessments in this AEE confirm that the Project will be consistent with the relevant objectives and policies because:

- The Waimeha and Wharemauku Streams discharge to high energy, open sandy beaches, affording significant and rapid dilution and removal of any stormwater discharges; and
- The Waikanae Estuary is lower energy and has more potential to accumulate sediment and associated contaminants. Therefore, it is particularly important to ensure that construction and operational phase stormwater discharged to the Waikanae River from the Project is treated to a high standard to protect the ecological values of the estuary and the adjacent marine reserve.

Further detail is provided in Technical Reports 26 and 31, Volume 3 of the AEE.

35.11 Wellington Regional Plan for Discharges to Land 1999

The Wellington Regional Plan for Discharges to Land (RPDL) applies to the whole of the Wellington Region, except the coastal marine area, and manages discharges of contaminants to land, both solid (such as contaminated soil) and liquid (such as stormwater and human effluent), to ensure that the receiving environment is sustainably managed. Discharges of particular relevance to the Project that are regulated under the plan include:

- Disposal to land of any contaminated material; and
- Discharge of hazardous substances (including pesticides, waste oil, discharges from contaminated sites).

- Table 3.4 in Chapter 3, Volume 2 of the AEE provides further detail on the type and activity status of the relevant regional consents required.

The Project has been assessed against all the objectives and policies in the RPDL, and Policies 4.2.1, 4.2.8, 4.2.30, and 4.2.41 - 4.2.49 have been identified as being particularly relevant. These policies address matters relating to waste management and the management of identified contaminated soil, particularly its use, capping and/or disposal.

- The NZTA implements a general Environmental Plan[249] that contains objectives on Resource Efficiency (Objective RE1 and RE2) and aims to manage waste in a cost effective and sustainable manner. Consequently, the waste generated during the construction of the Project would be managed, taking into consideration the waste management hierarchy of reduce, re-use, recycle, recovery, and responsible disposal of residual waste. This consideration of waste minimisation and management will be consistent with Policy 4.2.1 and Policy 4.2.8.
- Policy 4.2.30 seeks to reduce the environmental effects of unplanned discharges of hazardous substances. The CEMP includes methods to ensure good practice is implemented with respect to the use and application of hazardous substances, and to reduce the risk of unplanned hazardous discharges occurring (refer Chapter 27, Volume 2).
- Policies 4.2.44 – 4.2.49 address the identification, use and management of contaminated sites. The Project has investigated and identified four contaminated sites:
    - 55 Rata Road (HAIL[250] site): previously used by transport operator. Hydrocarbons stored on site in bulk quantities
    - Kāpiti Road Interchange: Potential for illegal dumping to have occurred
    - 160 Otaihanga Road: Historical landfill, potential contaminants may include metals, fuels, oils, landfill gas and leachate, and
    - 124-154 Te Moana Road: Pesticides/metals from horticultural activities.
- The disturbance and/or use of the land in these contaminated sites have the potential to affect human health and the receiving environment during the construction and operation of the Project. These four sites have each been assessed and (refer to Technical Report 23 – Assessment of Land and Groundwater Contamination Effects, Volume 3). Chapter 27, Volume 2 of the AEE identifies the following methods to avoid potential adverse effects:
    - adherence to the Contaminated Soils and Groundwater Management Plan (Appendix K of the CEMP, Volume 4);
    - the Construction Air Quality Management Plan (Appendix G of the CEMP, Volume 4);

[249] Transit New Zealand (2008), Environmental Plan. This specific plan is incorporated within NZTA's broader Environmental Policy Manual.

[250] Hazardous Activities and Industries List (HAIL) is a compilation of activities and industries that are considered likely to cause land contamination resulting from hazardous substance use, storage or disposal.

- resource consent conditions;
- containment of contaminants on–site; and,
- disposal of contaminated soil to licensed landfills.

- Accordingly, with the implementation of these measures, the construction and operation of the proposed Expressway would be consistent with the objectives and policies of the Regional Plan for Discharges to Land.

35.12 Wellington Regional Soil Plan 2000

The Regional Soil Plan (RSP) manages soil and vegetation disturbance activities for the purpose of soil conservation and water quality. Consents relating to earthworks and land disturbance are being sought for the Project, and Table 3.4 in Chapter 3, Volume 2 of the AEE provides further detail on the type and activity status of the relevant approvals required.

This Section includes an assessment of these proposed works against the relevant objectives and policies for these consents. It is noted that many of the objective and policy matters identified in the RSP are consistent with, overlap with, and reflect those identified in the NZCPS, PRPS and RFWP.

The assessment of the Project against the RFWP is particularly relevant because, during its construction, the Project is essentially a large scale earthworks site and the consideration of effects is directly related to the instream health of the freshwater habitats in the District. The themes in the objectives and policies of the RFWP and the RSP are similar, and the conclusion of the assessment of the proposal against the RSP is therefore similar. The objectives and policies are contained in Section 4 of the RSP are all considered to be directly relevant to assessment of this Project.

The assessment drew the following conclusions:

- Objectives 4.1.8, 4.1.9, 4.1.10 and 4.1.11 promote avoiding, remedying and mitigating the effects of vegetation removal and earthworks, with a particular emphasis on riparian vegetation. The Project is entirely consistent with this approach, and a flexible conditions framework involving use of management plans and performance standards to promote this approach during construction is sought.
- An ESCP has been prepared for this Project and is to be read and implemented in conjunction with the CEMP (Refer Volume 4 of the AEE). The plan is consistent with both GWRC[251] and the NZTA's[252] erosion and sediment control guidelines and is therefore consistent with Policy 4.2.15 and 4.2.16. Fundamental erosion and sediment control principles contained within the ESCP include:

[251] Wellington Regional Council, Erosion and Sediment Control Guidelines for the Wellington Region, September 2002

[252] The New Zealand Transport Agency, draft NZTA Erosion and Sediment Control Standard for State Highway Infrastructure, August 2010

- Minimising disturbance;
- Staging construction;
- Protecting steep slopes;
- Protecting waterbodies;
- Progressive and rapid stabilising of disturbed areas;
- Controlling surface water; and,
- Using sediment retention devices.

- With further innovation and more detailed design occurring as the Project progresses, site specific CESCPs will be prepared and implemented prior to construction.
- Landscape and visual measures to mitigate the effects of the Project on landform are also proposed. These were derived from the assessment of landscape and visual effects that was undertaken (Refer Technical Report 7, Volume 3) and involve, in particular, the shaping of bunds and the visual treatment of inland dune lands disturbed by the Project.
- Mitigation planting is proposed to be extensively undertaken throughout the Project area. The integrated approach to the design and plant mix specifications of the proposed planting will achieve a result that respects ecological, landscape and cultural values. The vegetation will also help improve long term soil conservation values, an outcome which would be consistent with Policies 4.2.13 and 4.2.14

35.13 Kāpiti Coast District Plan 1999

The list of considerations for requirements, as set out in Section 171 of the RMA, include, amongst other things, having particular regard to any relevant provisions of a district plan or proposed plan. The NoR relates to land managed under the provisions of the Kāpiti Coast District Plan (KCDP).

The "relevant provisions" of the KCDP are matters to which particular regard is to be given when considering the NoR, and the land use consent applications required under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESAMCS) 2011.

The KCDP provides a framework to promote sustainable management of the Kāpiti Coast's land resources with specific methods developed to address the significant resource management issues the community has identified. The KCDP contains objectives and policies that apply to subdivision, development, land uses and activities within the district.

The KCDP became operative on 30 July 1999. There are a number of operative and proposed plan changes and variations to the Plan, several of which are considered relevant to the Project as outlined below:

35.13.1 Existing designations

The KCDP includes a designation relating to the WLR route:

- Designation D0102 "Western Link Road" (WLR) – KCDC is the requiring authority responsible for this designation, which has not been given effect.

The proposed Expressway designation has a similar alignment as the WLR, and as such would occupy much of the land included in the current WLR designation.

The existing SH1 designation is also included in the KCDP, referred to as D0101 "*State Highway*", and is designated for State Highway 1 purposes, for which the NZTA is the requiring authority.

The proposed Expressway alignment also traverses a small part of two other KCDC designations, these being:

- Designation D1110 "Paraparaumu Sewage Treatment Plant"; and
- Designation D1119 "Otaihanga Landfill".

It will also affect Designation D1135, which is a KCDC "*Roading*" designation that applies district-wide to all local roads.

Additionally, the GWRC has land designated for river management purposes, being D0403 "*River Management*", and the Project involves an area of land subject to this designation.

The NZTA will need the prior written consent of all requiring authorities for existing designations affected by the Project[253]. It has been working closely with the relevant organisations to address the effects of the proposed Expressway in order that the Project will not significantly affect the purpose of these designations, with the exception of the WLR.

In regard to the WLR, it is anticipated that this designation (or the greater part of it) will be withdrawn once the designation for the proposed Expressway has been given effect. The legal effect of the proposed Expressway designation would also override the need to obtain land use consents under the KCDP.

35.13.2 Zones

The proposed Expressway alignment crosses a number of different zones as follows:

- Rural;
- Residential;

[253] Pursuant to section 177 of the RMA.

- Open Space;
- Industrial / Service;
- Ngarara; and
- River Corridor.

In addition to these underlying zones, there are a number of other KCDP items that are located under the proposed Expressway alignment or are close to the land required for the designation:

- Notional Road (Ihakara Street);
- Outstanding Natural Landscape (Waikanae River);
- Ecological Sites (K066 – Te Harakeke Swamp, and K170 – El Rancho Manuka Wetland);
- Wāhi Tapu Sites (W1 – Takamore Cemetery, and W4 – Takamore Wāhi Tapu Area);
- Low Impact Urban Area (Ngarara Zone);
- EcoHamlet (Ngarara Zone);
- High Voltage Transmission Lines; and
- Natural Gas Lines.

There are a number of objectives and policies contained in the following sections of the KCDP that are of relevance to the Project: Residential Zone (C1.1), Rural Zone C2.1, Ngarara Zone (C.22), Tangata Whenua C6.1, Earthworks C7.3.1, Heritage C8.1, Landscape C10.1, Ecology C11.1, Noise C14.1, Natural Hazards C15.1, and Transport C18.1.

In assessing the Project against these provisions key points are as follows:

- The Objectives and Policies relating to the Residential Zones seek to maintain the character and amenity of these areas. Policy C1.1.1.1 lists activities and scenarios that could reduce amenity values, with the expectation being that residential development respects the natural environment and avoids, remedies and mitigates any adverse effects. Policies also encourage access to pedestrian, cycle and public transport. As the Project is largely contained within the existing KCDC designation for the WLR (and previous motorway designations), it is located on the edge of established residential areas in Paraparaumu and Waikanae. Activities associated with the Project such as earthworks and landform modification that are within or adjacent to these areas have been designed to reduce, as far as practicable, the impact on residential character and amenity consistent with these objectives and policies. Any construction related effects that might arise from the Project will be addressed through the relevant CEMPs.
- The northern sections of the Project traverse Rural zoned land. Within this Zone, areas to the south and north of Waikanae are predominantly lifestyle properties. Recent plan changes provide for the development of eco-hamlets in this vicinity, small clusters of housing that sit within a primarily rural landscape. The KCDP recognises the value of the appearance and character of the rural environment as a major determinant of the unique visual character of the district and aims to avoid, remedy or mitigate adverse effects from activities on the natural and physical environment (Objective C.2.1/1.0). Activities associated with the Project within the

rural landscape such as earthworks, landform modification and the location of structures have been designed to sit in the landscape and to reduce, as far as practicable, the impact on rural character consistent with this objective.

- In terms of the natural environment, a definition of the landscape characteristics of the Project area, along with an evaluation of the effects of the Project on these characteristics, is included in Technical Report 7, Volume 3 of the AEE. As part of this technical evaluation, the effects on scheduled outstanding natural features and landscapes were identified, both those within the proposed route alignment and the wider context. Objective (C10.1/1.0) in the Landscape Chapter specifies that outstanding landscapes are to be identified and protected from the adverse environmental effects of use and development. To implement this Objective, Policy C10.1.1 clarifies that new buildings, structures and earthworks within outstanding landscapes are to be located so that they will not be visually dominant. In the Rural Zone, Policy C2.1.2 seeks to maintain, enhance and protect the District's outstanding landscapes from inappropriate use and development. Although the Project traverses the Waikanae River, the location and design of the proposed Expressway has been informed by relevant objectives and policies and the design is consistent with their intent: for example, the proposed bridge over the River design to 'sit' within the landscape insofar as practicable. In addition, extensive designation conditions are proposed to mitigate the effects of the Project on the river corridor, and any effects that might arise during construction will be addressed through the Ecological Management Plan (Appendix M of the CEMP) and the Landscape Management Plan (Appendix T of the CEMP) that have been prepared as part of this Project. As noted above, a new road bridge has long been anticipated in the lower reaches of the Waikanae River.
- The Ecology Chapter of the KCDP aims to protect and enhance the natural environment and ecological integrity of the District, including protection of significant indigenous vegetation and significant habitats for indigenous fauna and flora. The associated Policies provide for the avoidance, mitigation and remediation of adverse effects on the natural environment. Policy C11.1.4 seeks to ensure that significant native vegetation is not removed and that any disturbance is avoided remedied or mitigated, while under Policy C11.1.5 any effect on the water table of a significant wetland by a land use is discouraged. Policies C11.1.8 - C11.1.10 encourage the protection of suitable areas that will provide corridors for fauna; planting, particularly adjacent to water bodies; the restoration of ecological corridors and linkages; and eco-sourcing. Technical Report 27, Volume 3 identifies the ecological values of both terrestrial vegetation and wetlands throughout the Project area and within the wider natural environment, and the Ecological Sites identified in the KCDP (K066 – Te Harakeke Swamp and K170 – El Rancho Manuka Wetland) were included in this assessment. The values of herpetofauna and avifauna are respectively identified in Technical Reports 28 and 29, Volume 3. The overall effects generated by the Project are calculated and presented in Technical Report 26, including the magnitude of effects with and without mitigation and the residual impact after mitigation. The Project seeks to avoid, as far as practicable, significant ecological areas such as wetlands in the location and design of the proposed Expressway, consistent with the intent of aim of the relevant objectives and policies. Where this has not been possible the design of the proposed Expressway, in conjunction with the proposed designation conditions, seeks to mitigate the effects of the Project on the ecology of the area, and any effects that might arise during construction will be addressed through the Ecological Management Plan (Appendix M of the CEMP) and the Landscape Management Plan (Appendix T of the CEMP) that have been prepared as part of this Project.

- Regarding Tangata Whenua, Objective C6.1/1.0 adopts similar wording to that in Part 2 of the RMA, with reference to taking into account the principles of the Treaty, having particular regard to kaitiakitanga and ensuring that the relationship of tangata whenua with the natural environment is recognised and provided for. Objective C11.2.3 (Ecology) also seeks to recognise and provide for the relationship of tangata whenua with the natural environment. As outlined in Technical Reports 11 and 12, Volume 3 and Technical Report 3 - Consultation Summary Report, Volume 3, there has been ongoing recognition and engagement with iwi throughout the development of the Project, the preparation of relevant technical reports and the AEE for these applications consistent with the intent of Policy C.6.1.1.1. Iwi were provided with opportunities to influence the design of the proposed Expressway at a number of key stages throughout the Project. An early awareness among the Project team (Policy C.6.1.1.2) of the issues that were of primary interest to tangata whenua (C.6.1.1.4), and that influence their role as kaitiaki of the natural resources of the area (C.6.1.1.5 and C.6.1.1.5), was an important early step, and which demonstrates consistency with the relevant objectives and policies.
- Regarding Heritage, Objective C8.1/1.0 is relevant as it relates to identifying and protecting heritage features of significance. There are no historic buildings or structures listed in the KCDP Register that are within the proposed designation, and the Technical Report 10 - Assessment of Built Heritage Effects, Volume 3 concludes that the effects associated with the Project beyond this area will be negligible to minor. A small portion of the KCDP listed Takamore Wāhi Tapu Area will be affected by the Project but however any adverse effects will be mitigated by measures that have been developed in association in consultation with the Takamore Trust.
- Regarding Noise, Objective C14.1/1.0 and Policies C14.1.1, C14.1.2 and C14.1.3 require consideration to be given to the impact of noise from non-residential activities on the amenity, character and health of residents in residential and rural environments, and that any adverse effects are avoided, remedied or mitigated. Objective C14.2. is specific to the effects of traffic noise on residential amenity values, while C14.2.2 and C14.2.4 are specific to new roads. An assessment of traffic noise effects (refer Technical Report 15, Volume 3) has been carried out and consideration given to potential effects on sensitive receptors (houses) close to the proposed Expressway. Where a higher than acceptable noise level was measured, methods to manage the effects consistent with Policy C14.2.5 were identified. These measures include construction of noise bunds, planting and use of noise reducing road surfaces. It is acknowledged that new noise will be introduced into the environment due to the presence of the proposed Expressway and that this will influence ambient noise levels. However, noise assessments have demonstrated that these levels will be within the acceptable limits specified in relevant noise standards (Objective 14.2). An assessment of construction noise effects (refer to Technical Report 16, Volume 3) has also been carried out and the temporary noise effects arising during proposed Expressway construction will be addressed through the Construction Noise and Vibration Management Plan (Appendix F of the CEMP, Volume 4).
- Natural hazards such as identified flood areas are recognised in the Plan and are included on the associated Planning Maps. Objective C15.1/1.0 and Policies C15.1.1, C15.1.2 and C15.1.6 are relevant, and focus on avoiding, remedying and mitigating actual and potential adverse effects arising from development within the vicinity of a natural hazard. The Project traverses areas subject to potential flooding and the proposed Expressway has been located and designed consistent with the intent to avoid, remedy or mitigate any effects on flood risks.

- The objectives and policies of Chapter 17 of the KCDP are focused on the potential adverse effects associated with the storage and use of hazardous substances on public health and ecological processes of the natural environment. Policy 4 requires that particular regard is given to a number of matters when assessing consent applications for hazardous facilities, including:
    - The location of any special natural features to be protected, or other environmentally sensitive areas;
    - Any risk related to natural hazards, such as earthquakes or floods, and the structures, procedures and contingency plans that may be required to prevent or minimise any adverse effects beyond the boundary of the site. Of particular relevance is the accidental discharge of any hazardous substances into water, whether directly, through land, or through a drainage system.
- A full assessment of the effects of the construction and operation of the proposed Expressway on actual or potentially contaminated land within the proposed designation was undertaken, the results of which are presented in Technical Report 23, Volume 3. A process for managing any contented soil has been identified, and will be implemented through a Contaminated Soils and Groundwater Management Plan (Appendix K of the CEMP, Volume 4), consistent with the policies of the KCDP.
- The aim of the objectives and policies that relate to network utilities (Objective C16.1 and Policies C16.1.1-5) is to provide for the efficient operation of these essential services. The NZTA has been working closely with all potentially affected utility providers, the outcome of which is that the Project will be entirely consistent with this aim.
- Transport Objective C18.1/1.0 is particularly relevant to the Project as it seeks to achieve a transport infrastructure that provides for efficient and safe movement of people and goods throughout the district, and which avoids, remedies or mitigates adverse effects of existing and new traffic routes. Policies 6 to 14 are also of relevance, with Policy 12 being particularly relevant due to its focus on protecting the existing and proposed State Highway network. Given that the Project will result in more efficient movement of people and goods throughout the District (and Region), improved travel times and a safer and more reliable alternative to the existing SH1, it is entirely consistent with this objective.
- Transport policies emphasise the relationship between transport and land uses (Policies 7 and 8). Policy 9 is of relevance as it relates to walking and cycling systems that link natural features, community facilities, schools, commercial and public transport together with residential activities. The assessment of urban planning and design effects (refer to Technical Report 6, Volume 3) and the principles outlined in Technical Report 5 - Urban and Landscape Design Framework, Volume 3 have influenced the route alignment, proposed Expressway design and the linkages and public spaces around interchanges and bridges, the results of which are consistent with these policies. There are also policies which focus on the effects of new roads, including Policy 11 which is directed towards ensuring that the adverse effects of associated earthworks are avoided, remedied or mitigated. Policy 11 (and its reference back to the Earthworks policies (C7.3)) is directly relevant to the assessment of landscape and visual effects contained in Technical Report 7, Volume 3 due to the extent of earthworks necessary for the construction of the proposed Expressway alignment, and will be addressed through the mitigation measures proposed as part of the Project.

The key themes in the relevant objectives and policies are similar to those considered in the PRPS and other planning documents – particularly the provisions addressing natural landscapes, inappropriate subdivision and development and earthworks management – and, as previously mentioned, the Project is considered to be consistent with these.

35.14 Other relevant documents

Other relevant documents in terms of section 104(1)(c) and 171(1)(d)) include both statutory documents (for example, those required to be prepared under other legislation such as the Land Transport Management Act 2003 or Conservation Act 1987) and those non-statutory documents that, whilst not having a regulatory function under the RMA, have been through a public process and/or are important policy documents that set national regional direction on key resource or environmental matters.

The following documents are considered relevant:

- New Zealand Transport Strategy (2008);
- National State Highway Strategy (2007);
- Government Policy Statement on Land Transport Funding (2009/10 – 2018/19);
- National Land Transport Programme (2009 – 2012);
- NZTA Environmental Plan (2008);
- New Zealand Cycling and Walking Strategy – Getting there on Foot by Cycle (2008);
- New Zealand Urban Design Protocol (2005);
- National Infrastructure Plan (2011);
- Wellington Regional Strategy (2007);
- Wellington Regional Land Transport Strategy (2010 – 2040);
- Regional Freight Plan - Greater Wellington Regional Council (2007);
- Western Corridor Plan (2006);
- Wellington Conservation Management Strategy (1996);
- Greater Wellington Parks Network Plan (2011);
- Kāpiti Coast Choosing Futures: Community Plan (2009);
- Kāpiti Coast Development Management Strategy (2007);
- Kāpiti Coast Sustainable Transport Strategy (2008);
- Kāpiti Coast Cycleways, Walkways and Bridleways Strategy (2009);
- Kāpiti Coast Subdivisions and Development Principles and Requirements (2005); and
- Kāpiti Coast Streetscape Strategy (2006).

Other documents that have also been considered are:

- Kāpiti Coast Coastal Management Strategy (2006);

- Kāpiti Coast Environmental Management Strategy (2002);
- Kāpiti Coast Community Outcomes (2009);
- Kāpiti Coast Local Outcomes Statements;
- Kāpiti Coast Youth Action Plan (2011);
- Water Matters - Kāpiti Coast Sustainable Water Management Strategy (2002); and
- Positive Ageing on the Kāpiti Coast (2011).

35.14.1 New Zealand Transport Strategy (2008)

The NZ Transport Strategy (NZTS) seeks to provide direction for the transport sector through to 2040. The strategy relates to all parts of the transport sector, and includes the following relevant aims:

- Environmental sustainability including: reducing vehicle emissions, renewable fuels, fuel efficient technology and electric vehicles, increasing the area of Crown transport land covered with indigenous vegetation;
- Assisting economic development: improving journey times and journey time reliability;
- Assisting safety and personal security: reducing road deaths and serious injuries;
- Improving access and mobility: increasing public transport, walking and cycling; and
- Protecting and promoting public health; reducing people exposed to transport noise and reducing people exposed to dangerous concentrations of air pollution.

The Project will be generally consistent with all these aims for the following reasons:

- It involves extensive areas of revegetation and planting of native, locally sourced vegetation which will be maintained to mitigate the effects of the Project;
- It will significantly improve journey times around the Region and improve journey time reliability;
- There will be a reduction in road crashes and a significant improvement in overall traffic safety both through reduction in through traffic on some local roads, including existing SH1, and through a modern designed new route;
- It will not preclude opportunities for improved development of public transport, and provides some new opportunities for recreational walking, cycling and riding; and
- Transport noise effects and air quality effects have been modelled. Properties likely to be exposed to higher levels of noise than allowed under the relevant standard will be protected by noise mitigation measures, including noise barriers.

35.14.2 National State Highway Strategy (2007)

The National State Highway Strategy (NSHS) sets out how the NZTA will develop and manage the State Highway network as an integral part of a multimodal transport system over the next 30 years. It

provides a link between the NZTS, the Land Transport Management Act 2003 (and other legislation) and NZTA's plans and policies. The goals of the strategy are to:

- Ensure State Highway corridors make the optimum contribution to an integrated multimodal land transport system;
- Provide safe State Highway corridors for all users and affected communities;
- Ensure State Highways enable improved and more reliable access and mobility for people and freight;
- Improve the contribution of State Highways to economic development; and
- Improve the contribution of State Highways to the environmental and social wellbeing of New Zealand, including energy efficiency and public health.

The Project is consistent with these goals for the same reasons outlined in section 35.14.1.

35.14.3 Government Policy Statement on Land Transport Funding (2009/10 – 2018/19 and 2012/13- 2021/22)

A Government Policy Statement on Land Transport Funding (GPS) is developed and issued under the Land Transport Management Act 2003, which is the main statute for New Zealand's land transport planning and funding system. The current GPS came into force in May 2009 and was amended in November 2010. The GPS is reviewed every three years. As such the GPS 2009 covers the financial period from 2009/10 to 2014/15 and provides indicative figures for 2015 -2019. A revised GPS will come into effect on 1 July 2012, which will cover the period from 2012/13 until 2021/22.

The NZTA must ensure that the National Land Transport Programme gives effect to the GPS and must take into account the GPS when deciding whether or not to approve activities for funding from the national land transport fund. Regional transport committees preparing a Regional Land Transport Strategy must take into account the GPS and Regional Land Transport Programmes must be consistent with the GPS.

The GPS identifies and recognises the RoNS as New Zealand's most essential routes, and that they require significant development in order to reduce congestion, improve safety and support economic growth. The purpose of listing roads as nationally significant in the GPS is to ensure that they are taken fully into account when the NZTA develops the National Land Transport Programme.

This Project is one of eight that comprise the Wellington Northern Corridor RoNS.

35.14.4 NZTA Environmental Plan (2008)

The NZTA Environmental Plan outlines NZTA's environmental policies and provides guidance on a wide range of environmental considerations including:

- Noise (operation and construction)
- Air quality

- Water management (runoff, stormwater, use)
- Erosion and sediment control
- Social responsibility
- Cultural and heritage
- Ecological
- Spill response and contamination
- Resource efficiency
- Climate change
- Visual quality
- Vibration

The Project is consistent with these policies. In particular, they have influenced and shaped the proposed route alignment and proposed Expressway design, and have also informed relevant technical assessments, such as the Ecological Impact Assessment (Technical Report 26, Volume 3), the Assessment of Landscape and Visual Effects (Technical Report 7, Volume 3), the Assessments of Construction and Operational Air Quality Effects (Technical Reports 15 and 16, Volume 3) and the Assessment of Built Heritage Effects (Technical Report 10).

35.14.5 New Zealand Cycling and Walking Strategy – Getting there on Foot by Cycle (2005)

The New Zealand Cycling and Walking Strategy sets out a strategy to advance walking and cycling in New Zealand transport. It is a high level strategic document with a vision of "*A New Zealand where people from all sectors of the community walk and cycle for transport and enjoyment*". This vision is supported by the following goals:

- Community environments and transport systems that support walking and cycling;
- More people choosing to walk and cycle, more often; and
- Improved safety for pedestrians and cyclists.

The integration of cycling and walking opportunities into the Project was a key consideration throughout the initial investigations, the alternative route assessment and also the proposed Expressway design process.

As a result, cycling and walking connectivity will be significantly enhanced by the Project through the provision of a shared path along the full length of the proposed Expressway. The shared path will connect to all local roads and to two well used paths at Wharemauku Stream and Waikanae River. The path is expected to provide additional options for students moving to and from local schools.

Connections to other walking networks will also be provided, and the grades on embankments are designed to enable the best practicable slopes for walking and cycling. At the Waikanae River crossing, provision will be made for horse traffic to share the walking/cycle bridge.

35.14.6 New Zealand Urban Design Protocol (2005)

The New Zealand Urban Design Protocol provides a platform to make New Zealand towns and cities more successful through quality urban design. The Protocol is a voluntary commitment by central and local government, property developers and investors, design professionals, educational institutes and other groups to promote better design and to undertake specific urban design initiatives. The NZTA is a signatory to the Protocol.

Consistent with the intent of the Protocol an Urban and Landscape Design Framework (ULDF) has been developed for the Project. The ULDF has helped to inform the nature and extent of investigations into the urban and landscape design matters relating to the Project, and also sets out the underlying design principles to guide Project development and implementation.

35.14.7 National Infrastructure Plan (2011)

The National Infrastructure Plan outlines the Government's 20 year vision for New Zealand's infrastructure to 2030, and provides a three year programme of work to progress this vision. The overall purpose of the Plan is to improve investment certainty for businesses by increasing confidence in current and future infrastructure provision.

A transport Chapter is contained within the Plan. The Chapter assesses the current situation, current work programme and key issues for transport infrastructure. The vision for transport is outlined as "a transport sector that supports economic growth by achieving efficient and safe movement of freight and people".

The relevant goals for transport are as follows:

- Maximising the potential synergies between regional planning and central government strategies.
- A flexible and resilient transport system offering greater accessibility and can respond to changing patterns in demand.
- A network of priority roads to improve journey time and reliability, and ease severe congestion, boosting the growth potential of key economic areas and improving transport efficiency, road safety and access to markets.
- A continued reduction in the number of accidents, deaths and serious injuries that occur on the network.

The Project is consistent with all of these goals.

35.14.8 Wellington Regional Strategy (2007)

The Wellington Regional Strategy (WRS) was developed by the nine local authorities in the region, working in tandem with central government and business, education, research and voluntary sector interests. The WRS is a sustainable economic growth strategy and contains a range of initiatives to realise economic potential. It aims to enhance the Wellington Region's "regional form" by addressing

such issues as transport, housing, urban design and open spaces, which are all the things that contribute to quality of life.

The WRS identifies three focus areas for sustainable growth. They are:

- **Leadership and partnership** – Key players working together to deliver the region's sustainable growth.
- **Grow the region's economy, especially its exports** – Export more and become less reliant on trade within New Zealand.
- **Good regional form** – Building on the physical arrangement of our communities and how they link, and strengthening our city and town centres, matching transport decisions and land use, creating quality urban design, creating strong open spaces and recreation amenities, and providing good housing choice – essentially, making the Wellington Region a great place to live, with a good quality of life.

Relevant WRS initiatives to promote an efficient regional form include:

- Integrating transport with urban and rural needs - The WRS identifies that more employment needs to be created close to where people live. The efficient operation and use of the transport system and consideration of the development 'fit' with the transport network are fundamental to creating a good regional form;
- More homes close to city centres and transport links - One of the region's strengths is its wide range of housing and lifestyle options. An identified need is to enable medium and higher density development close to centres and transport links, while protecting the character of the traditional low-density family-focused suburbs; and
- Rural lifestyles - The WRS identifies that the region offers excellent opportunities for rural residential living. It recognises the benefits in making lifestyle options available in certain areas including making better use of poor productivity areas, strengthening smaller communities, unlocking economic development opportunities, and enhanced management of special environmental features. However, it also recognises that in delivering on these opportunities caution needs to be exercised regarding removing high quality soils from primary production, threatening sensitive ecosystems or significant landscapes, and land fragmentation creating urban expansion difficulties.

The strategy also identifies the area between Paraparaumu town centre and Paraparaumu beach as an area of change and notes that it is subject to residential and retail – especially 'big box' – development pressure which could potentially undermine town centre intensification and passenger transport goals. It also notes that the area is affected by the proposed "SH1 Kāpiti Expressway".

The Project will be entirely consistent with the WRS initiatives because:

- It will strengthen cross-region linkages and improve connectivity;
- It will enhance the liveability of coastal communities as the significant reduction in traffic volumes and speeds will improve local amenity;

- It will improve the town centres at Paraparaumu and Waikanae through the removal of freight and long haul transportation, allowing the town centres to reconnect;
- It will improve linkages to public transport through well designed and functional upgrades at proposed interchanges and existing urban centres; and
- It will not preclude future development of rail and other public transport modes.

35.14.9 Wellington Regional Land Transport Strategy (2010 – 2040)

The Wellington Regional Land Transport Strategy (RLTS) 2010-2040 is a statutory document prepared under the Land Transport Management Act 2003, and incorporates the Western Corridor Plan 2006. It is the strategic transport document that guides the development of the Region's transport system. It sets the framework and vision for the provision and management of movement and transport throughout the Region.

The vision of the Wellington RLTS 2010-40 is:

> *To deliver an integrated land transport network that supports the region's people and prosperity in a way that is economically, environmentally and socially sustainable.*

The objectives of the RLTS are to:

- Assist economic and regional development
- Assist safety and personal security
- Improve access, mobility and reliability
- Protect and promote public health
- Ensure environmental sustainability
- Ensure that the Regional Land Transport Programme is affordable for the regional community.

The Project was designed and developed to be consistent with all of these objectives.

35.14.10 Regional Freight Plan - Greater Wellington Regional Council (2011)

The Wellington Regional Freight Plan is a supporting document to the RLTS as it provides a pathway to implement the RLTS objectives and policies that are relevant to freight. It also supports the GPS on Land Transport Funding with its focus on economic growth.

The key actions identified within the Freight Plan 2011 that are relevant to the Project are as follows:

- Integrate planning processes – Support the implementation of projects in the Corridor Plans identified as having significant freight benefits
- Improve road freight reliability – Ensure the design of State Highway projects facilitate the efficient movement of freight, including provision for over-dimension and over-weight vehicles

The Project implements these actions as the proposed Expressway will have significant freight benefits.

35.14.11 Wellington Conservation Management Strategy (1996)[254]

NZTA guidelines for State Highway work within or adjacent to Public Conservation Land require that any works within a reserve or conservation area must address any relevant conservation management strategy.

The Wellington Conservation Management Strategy (the Strategy) is a statutory document under the Conservation Act 1987 which implements general policies and establishes objectives for the integrated management of natural (including land and species) and historic resources. It indicates the Department of Conservation's position on, and how it intends to respond to, requests to use the natural and historic resources it manages.

The Project is consistent with the Strategy in that the potential effect of the proposed Expressway on the area's natural and historic resources were fully taken into account in the selection of the alignment and design of the Project. Technical Reports 7 and 26, Volume 2 refer to, and have taken into consideration, priority ecosystems and habitats, and natural landscape values identified in the strategy and these have been used to inform the mitigation measures outlined within these reports.

35.14.12 Greater Wellington Parks Network Plan (2011)

The Greater Wellington Parks Network Plan (GWPNP) is a statutory document prepared under section 41 of the Reserves Act 1977. It combines and supersedes previous separate management plans for each of the regional parks in the Region, including Queen Elizabeth Park in Paekākāriki.

The Queen Elizabeth Park section of the GWPNP identifies 'projected changes' in section 6.7.6 and includes a list of external influences, community projects and important working relationships. The list reflects the relationship with the NZTA and states that GWRC will:

> *Work with the New Zealand Transport Agency (NZTA) and other agencies to maximise recreational opportunities from any proposed roading developments by NZTA.*

The GWPNP also includes a corresponding map (Map 17) that illustrates an Expressway option that traverses the north-east corner of the Park. As a result of route and alignment refinements that have occurred during the development of the Project the extent of this intrusion into the Park has been significantly reduced.

35.14.13 Kāpiti Coast Choosing Futures: Community Plan (2009)

Kāpiti Coast Choosing Futures: Community Plan is the KCDC's Long Term Plan (LTP). It was adopted prior to the proposed Expressway being announced. There are seven key community outcomes identified in the Plan:

[254] A further preliminary draft Wellington Hawke's Bay Conservation Management Strategy has been released but it is currently a non-statutory draft document.

- There are healthy natural systems which people can enjoy;
- Local character is retained within a cohesive District;
- The nature and rate of population growth and development is appropriate to community goals;
- The Community makes wise use of local resources and people have the ability to act in a sustainable way on a day to day basis;
- There is increased ability to work locally;
- The District is a place which works for young people; and
- The District has a strong, healthy, safe and involved community.

The district-wide outcomes are applied to eight individual areas within the District,[255] and a set of locality-specific outcomes (Local Outcomes) have been identified for each of these areas.

These relate to such matters as the natural features, unique characteristics and urban environments of the Kapiti Coast and their associated values. For example, the Otaihanga Local Outcomes emphasis the strong connection to the Waikanae River and Estuary, the Otaihanga Oxbow, pockets of native bush, and the recreation values aligned with these features. Outcomes for Raumati South include reference to the protection of the remaining dunes, while those for the Paraparaumu Town Centre focus on the open space network created by the Wharemauku Stream, key roads and the open spaces, including the dunes. The East/West view shaft to Kāpiti Island is also valued.

The Local Outcomes were considered as part of the design of the proposed Expressway insofar as practicable. For example, the assessments of landscape and visual effects and of ecological impacts detailed respectively in Technical Reports 7 and 26, Volume 3 took into account the local outcomes in addressing the potential effects of the proposed Expressway on the natural and landscape values of the District.

35.14.14 Kāpiti Coast Development Management Strategy (2007)

The Development Management Strategy's purpose is to set a framework for:

- the management of location and intensity of growth pressures and change;
- improvement to the quality of the built environment; and
- the development management processes that Council will use over time.

It contains a range of policies that outline KCDC's high level aspirations for developing and shaping the district. The strategy refers to the WLR and a range of transport modes, a roading network that supports and encourages the development and use of pedestrian, cycle and bridle tracks and quality of design. Regard has been had to these policies in developing and refining the Project insofar as

[255] These areas are Greater Ōtaki; Waikanae North; Paraparaumu Town Centre; Paraparaumu Beach; Raumati Beach; Raumati South; Paekākāriki and Otaihanga.

practicable, recognising that the construction and operation of the proposed Expressway will require a re-evaluation of how the Strategy is to be implemented. The impact of the proposed Expressway on the quality of the built environment, present and future, was taken given particular regard in the selection of the alignment of the proposed Expressway and in its design. Opportunities for future east-west linkages in Waikanae North growth area were also considered, in liaison with KCDC.

35.14.15 Kāpiti Coast Sustainable Transport Strategy (2008)

The intent of the Kāpiti Coast Sustainable Transport Strategy is to act as a conduit between the transport direction outlined in the KCDP and that set out in the RLTS. It contains five focus areas as follow:

- Transport Network;
- Mode changes;
- Management of the Road corridor – road network hierarchy;
- Vehicle Fleet Emissions; and
- Living with the State Highway.

The strategy recognises that traffic congestion on SH1 is a problem. However, as it was published prior to the Expressway proposal being introduced, reference is made solely to the proposed WLR.

The Project will achieve or be consistent with the overall intent of the Strategy. The proposed Expressway would substantially improve accessibility through and within the Kāpiti Coast. Reduced congestion and improved travel movements will reduce the overall level of vehicle emissions. The proposed Expressway will remove through traffic from the existing State Highway which acts as an important local road, providing opportunities to enhance its role and function as a local road. It will also provide opportunities to enhance public transport nodes and routes.

35.14.16 Kāpiti Coast Cycleways, Walkways and Bridleways Strategy (2009)

The Kāpiti Coast Cycleways, Walkways and Bridleway Strategy provides direction for the future planning of cycling, walking and horse riding on the Kāpiti Coast, as well as providing a foundation for implementing a network of walkways, cycleways and bridleways that would enhance user experience. The vision of the strategy is that “The Kāpiti Coast is renowned for its walking, cycling and horse riding”.

The Project will improve cycling and walking linkages throughout the District and will also provide, where possible, bridle tracks (for example, as part of the Waikanae River connection). The Project is considered to consistent with this Strategy.

35.14.17 Kāpiti Coast Subdivisions and Development Principles and Requirements (2005)

This document sets out KCDC’s development requirements, with emphasis placed on the integrated management of the effects of activities on the environment.

The document contains one transportation objective as follows:

To plan, provide and maintain an efficient road network appropriate to the level of use that will ensure the safe and orderly passage of road users (including cyclists) and pedestrians throughout the Kāpiti Coast District. The Council wishes to encourage pleasant, cyclable and walkable neighbourhoods with a low speed environment which provides increased amenity.

The Project is consistent with this objective as it will contribute to achieving an efficient road network on the Kāpiti Coast, and an improved traffic environment through the town centres of Paraparaumu and Waikanae.

35.14.18 Kāpiti Coast Streetscape Strategy and Guideline (2008)

The Kāpiti Coast Streetscape Strategy and Guideline supports the assessment of applications for subdivision consents and proposals to upgrade existing streets. It provides design guidance to enable a coordinated approach to streetscapes.

A section on the SH1 streetscape is included in the document, outlining important issues and elements associated with the existing State Highway 1 streetscape. As a separate process, KCDC and NZTA having been evaluating opportunities to improve the existing State Highway once the proposed Expressway is in operation, with a public consultation process undertaken in 2011.

35.14.19 Proposed National Policy Statement on Indigenous Biodiversity

The proposed NPS on Indigenous Biodiversity is intended to provide clearer direction to local authorities on their responsibilities for managing and enhancing indigenous biodiversity under the RMA. The proposed NPS contains a list of criteria to identify areas of indigenous vegetation and habitats of indigenous animals that are considered to be rare and/or threatened at a national level, which applies outside the conservation estate. Under the proposed NPS, local authorities would be required to identify significant areas of biodiversity within five years after it takes effect. It would also require a "no net loss" approach to be applied to resource consents.

Although the NPS is not yet gazetted it may come into effect during the process of considering these applications. Regardless, the effects of the Project on indigenous biodiversity has been had regard in the selection of the proposed Expressway alignment and design and in developing appropriate measures to avoid, remedy and mitigate adverse ecological effects arising from the Project (for example, the proposed restoration of former wetlands). Further, the avoidance of a large number of statutorily recognised wetlands in the vicinity of the proposed Expressway has assisted in assuring their long-term survival. In overall terms, the proposed Expressway would have no net loss on indigenous biodiversity, and, in the longer term, would result in an improvement of the area's ecology.

35.15 Assessment of Section 105 matters

Section 105(1) sets out the matters that a consent authority must have regard to when considering a resource consent application for a discharge permit. In particular, consideration needs to be given to the nature of the discharge and the sensitivity of the receiving environment to adverse effects, the applicant's reasons for the proposed choice as well as any possible alternative methods of discharge, including discharge into any receiving environment.

As some of the applications relating to this Project are for permits to discharge contaminants into water and onto land, section 105 is therefore relevant.

Section 105(1)	Comments	Cross-references
Nature of the discharge and sensitivity of the receiving environment to adverse effects	Construction of the Project involves major earthworks, with the resultant effect being that stormwater discharge will contain higher levels of sediment than normal during the construction period and will potentially increase the volume of sediment run-off to freshwater, wetland and marine receiving environments. A detailed description of these receiving environments and the nature of the corresponding discharges proposed are included in Part G, Volume 2 and relevant Technical Reports, Volume 3 of the AEE.	AEE Chapters 21, 22, 23, 24 and 28. Technical Reports 22, 24, 27, 30 and 31.
The applicant's reasons for the proposed choice	The design process to date has, as far as possible, avoided creating adverse effects on sensitive receiving environments. In circumstances where this has not been achievable the best practicable option is to be employed to remedy, mitigate or offset any actual and potential effects on these areas as no other feasible alternative method of discharge is available. The selection of a best practicable option will be informed by the following principles regarding the control of erosion and sediment: ■ Minimising distrubance; ■ Staging construction; ■ Protecting steep slopes; ■ Protecting waterbodies; ■ Undertaking progressive and rapid stabilisation of disturbed areas; ■ Perimeter control; and ■ Deploying detention devices. The construction of the Project will involve all discharges being appropriately managed to ensure that any effects on freshwater, marine and wetland receiving environments are neglible to minor. These effects and their associated mitigation are discussed in detail in the relevant Technical Reports in Volume 3, Part G of Volume 2 and, in relation to the statutory provisions, in the preceding sections of this Chapter.	AEE Chapters 9, 21, 22, 23, 24 and 28.
Any possible alternative methods of discharge, including discharge into any other receiving environment		Technical Reports 22, 24, 27, 30 and 31. CEMP Appendix H

35.16 Assessment of Section 107 matters

Section 107 relates to discharge permits and this section is relevant because the Project involves the discharge of contaminants or water into water (i.e., it involves the potential discharge of silt laden water into streams) which are likely to increase sediment levels above current levels during construction. The relevant effects under section 107(1)(c) that may occur as a result of discharge of contaminants from the Project are:

- A conspicuous change in the colour or visual clarity (section 107(1)(d)) – earthworks and construction works will cause a change in colour or visual clarity of affected waterbodies running through the worksite at times. However, the proposed application of the CEMP will be focused on ensuring that the level of change does not cause significant or permanent adverse effects on water quality and on the receiving environment.
- Any significant adverse effects on aquatic life (section 107(1)(g)) – it is unlikely that there will be any adverse effects on shellfish and other organisms in the coastal marine environment (refer Technical Report 31, Volume 3).

A consent authority may grant a discharge permit which gives rise to these effects if it is satisfied—

- that exceptional circumstances justify the granting of the permit; or
- that the discharge is of a temporary nature; or
- that the discharge is associated with necessary maintenance work —

and that it is consistent with the purpose of the RMA to do so.

The assessments in this AEE and in the technical reports demonstrate that the Project will meet the tests within section 107(2)(b) for the following reasons:

- The discharges will be short term;
- The effects will be felt at times, but not consistently, during the construction period of the Project which isexpected to be in the order of four to five years;
- Any effects on the coastal environment will be those associated with sediment transport firstly from construction areas, then from rivers and streams that discharge into wetlands and/or the coastal marine area;
- The assessment of effects contained inTechnical Report 31, Volume 3 demonstrates that there will be negligible adverse effects on the marine environment;
- Effects on stream water quality are not representative of a “typical” day of work on the site, but instead represent the result of an unlikely or extreme weather event (1 in 10 year storm or worse);
- Measures can be taken to minimise the likelihood of adverse effects resulting from an extreme weather event - these are set out in the ESCP;
- As discussed in Technical Report 26, Volume 3, moderate adverse effects are only likely to arise when a combination of exceptional events all coincide at once, and there are a range of measures that can be used to further reduce the chances of all these factors coinciding;
- There will be no ongoing adverse effects once the Project’s construction has been completed, and there will be some positive effects arising from the implementation of the Project in terms of improving the overall level of discharge of contaminants from roads on the District; and
- It will be consistent with the purpose of the RMA to grant the discharge permits given the scale and significance of the Project and the temporary nature of the approvals sought. .

In summary, it is considered that the Project will meet the tests outlined in section 107 of the RMA.

35.17 Assessment of Part 2 matters and conclusion

Section 104(1)(b) of the RMA sets out the planning documents that decision-makers are required to have regard to when considering an application for resource consent and any submissions received. Similarly, section 171(1)(a) of the RMA sets out the matters that decision-makers must have particular regard to when considering a NoR and any submissions received.

Any such consideration is, however, subject to Part 2 of the RMA which sets out the purpose and principles of the RMA. The purpose of the RMA as expressed in section 5 is to promote the sustainable management of natural and physical resources, with 'sustainable management' defined in section 5(2) as:

> *means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while—*
>
> *(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
>
> *(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
>
> *(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Part 2 provides further direction on the matters of national importance (section 6), other matters (section 7) and the principles of the Treaty of Waitangi (section 8) which need to considered and responded to.

The promotion of sustainable management often requires a balance between competing resource values and the benefits and adverse effects associated with a proposal, recognising that development, particularly of large-scale projects, will bring about adverse effects. The designation of a public work involves careful consideration of the balance to be struck between the regional or national benefits that might accrue from the Project and the more localised adverse effects that the Project (and its activities) might have on the environment, including on people, communities, and natural resources and values.

In terms of section 5 of the RMA, the construction of this portion of the Wellington RoNS will enable people and communities to provide for their social, economic and cultural wellbeing and for their health and safety, by:

- Providing for the economic growth of the Region by improving accessibility and connectivity, particularly between economic centres and through new connections across the Region – consistent with the NZTA's project objectives;
- Providing significant community, social and transport benefits including:
    - Resilience in the transport network;
    - Health and safety benefits through reduced incidence of crashes both on the new route, and on the existing routes through reduced traffic flows;

- Reducing traffic flows on the existing SH1 making the local environments more pleasant – for example, through making it easier to get into and out of side streets, and walk and cycle along the road with less passing traffic;
- Social and economic benefits through improved travel time reliability and quicker trips;
- Improved reliability for freight movements and resulting economic benefits;
- Completing a portion of the Wellington Northern Corridor - an alternative strategic transport corridor to the existing SH1 coastal route.

The completion of the Project is consistent with the RLTS, and is therefore one component of the strategic land transport solution for the Region's economic prosperity and sustainable growth.

In balancing these considerations with the matters in section 5(2) (a) through to (c) of the RMA, the following conclusions are derived from the planning assessment contained in preceding sections of this Chapter:

- In terms of sustaining the potential of natural and physical resources for future generations, the Project is intended to meet the growing transportation needs of the Region and does not preclude future opportunities for other transport development, such as improvements to public transport, particularly rail, and additional improvements to walking and cycling routes beyond those new elements provided by the Project;
- The Project will safeguard the life supporting capacity:
    - of air, by reducing congestion and improving air quality both regionally and at a local level for the coastal communities where the existing SH1 passes through them;
    - of water, because, while there will be a short term adverse effect on water quality from sediment deposition, there will be important long term benefits arising from revegetation and planting and the treatment of stormwater discharges from the State Highway;
    - of soils, by the management of construction works (to control erosion and land disturbance) and remediation of sites of land contamination;
    - of ecosystems, by avoiding, remedying and mitigating the adverse effects on ecological values of the Project, including freshwater, herpetofauna, avian and terrestrial vegetation (including wetlands) ecology; and
    - of people and communities, by managing actual and potential adverse effects both during construction and operation, and by having significant positive effects on the transport network.
- The Project avoids, remedies and mitigates adverse effects on the environment, including through identification of mitigation and offsetting measures and conditions for the consent applications and designations (refer Part H, Volume 2 of the AEE).

The Project recognises and provides for the matters within section 6 of the RMA, particularly in the following aspects:

- The alignment of the proposed Expressway sought to avoid insofar as practicable impacting on stream and wetlands with high natural character – most of the streams it will cross have a highly modified character. The proposed restoration and planting along riparian edges and degraded wetlands will mitigate the loss of natural character, and in the long-term it is anticipated that the quality of instream habitats will be improved. The design of culverts and bridges has taken into account the effect on the ecological functioning of the affected waterways to mitigate their impact. Overall, the Project will result in an improvement in the freshwater habitat of the Project area;
- The Project has been designed to mitigate adverse effects on the characteristics and values of the Waikanae River corridor, currently an identified outstanding natural landscape, in a location that has long been identified as the crossing point of a major road;
- The alignment of the proposed Expressway sought to avoid insofar as practicable impacting on areas of significant indigenous vegetation. The indigenous biodiversity of the Project area will be enhanced through new plantings and the enrichment of existing vegetation using locally source indigenous species inasmuch as practicable, and overall it is anticipated that the indigenous biodiversity of the area will be enhanced. In regard to indigenous flora and fauna, the corridor was comprehensively investigated and it was concluded that the Project overall would not result in any significant effects on habitats of indigenous fauna;
- The maintenance and enhancement of public access to and along the margins of streams and rivers is provided for by the construction of new walking and cycling paths;
- The relationship of Māori and their culture and traditions with their ancestral lands, water, sites, Wāhi tapu, and other taonga was fully taken into account in the selection of the alignment of the proposed Expressway, and in the design of mitigation measures which occured in consultation with iwi;
- The protection of historic heritage has been explicitly recognised in the route selection and design process for the proposed Expressway and has been provided for through such measures as the mitigation proposed in the Takamore Wāhi Tapu Area, the detailed investigations that will be undertaken in areas of high archaeological potential prior to construction; and
- The Project does not impact on any recognised customary activities.

The Project has also had particular regard to and has appropriately responded to the matters in sections 7 and 8 of the RMA. While not exhaustive, the following are considered particularly relevant:

- The kaitiakitanga of tangata whenua has been recognised in seeking specific cultural impact statements from Te Rūnanga o Āti Awa ki Whakarongotai Inc and the Takamore Trust (refer Technical Reports 11 and 12, Volume 2). This process has recognised the principles of the Treaty of Waitangi (the partnership between Iwi and the NZTA as a Crown agency, and the retention by Māori of rangatiratanga over their resources and taonga in particular);
- The ethic of stewardship has been recognised through:
    - engagement with and participation of tangata whenua in hui and working groups early in the Project's development process; and
    - engagement with community groups who have specific interest in and who have exercised stewardship over particular resources.

- The Project will improve the efficient use of the State Highway network as a physical resource, and improve the use and function of the wider network;
- The selection of the alignment and the design of the proposed Expressway sought to avoid, where practicable, effects on ecosystems within the Project area. Where this was not achievable appropriate measures were developed to mitigate the effects of the Project on ecosystem values;
- The selection of the alignment and design of the proposed Expressway sought to mitigate the effect of the Project on local amenity values, with a focus on the relationship of the Project with the adjacent residential communities and on those points along the proposed road with which most of the Community would interact – interchanges and underbridges. An inter-disciplinary approach was undertaken to address all related aspects of the proposed Expressway design – noise attenuation, air quality, lighting, urban design, landscape and visual, and ecology – to develop the best practicable solutions in assessing alternatives and designing appropriate mitigation on adjoining amenity values;
- It is acknowledged that the proposed Expressway represents a permanent and considerable change to the existing character of the area and the quality of its environment, the route of the Project has been selected to minimise the overall impact on the District, aligned within a corridor sufficiently wide enough to provide a significant level of mitigation. In general terms, the development and use of a new major arterial route within a large and growing urban area that is part of a metropolitan region is in keeping with the urban form and environment.

Overall, when the benefits of the Project are considered alongside the proposed measures to avoid, remedy and mitigate the associated adverse effects, the Project will promote sustainable management of natural and physical resources and is consistent with the purpose and principles of the RMA. As a result, it is considered that the purpose of the RMA will be achieved by confirming the NoRs and granting the resource consents sought.

Appendix A

Guiding Objectives For Project Alliance Board

Guiding Objectives For Project Alliance Boad

See http://www.kapiticoast.govt.nz/Documents/Meetings/Current/1013-05-KCDC-OR-Progress-Report-expressway-objectives-SP-11-116.pdf for KCDC assessment of progress.

Objective
1. General
a. "The Project" is defined as the design and construction of the network (ie Expressway and local road network) between MacKays Crossing and Peka Peka, as altered by the construction of the Expressway.
b. Where objectives are in conflict with each other, the project is to provide the best compromise between the objectives whilst still seeking, as far as reasonably practicable, to deliver each objective as a whole.
c. That a Memorandum of Understanding is in place between KCDC and NZTA by the end of the design phase, which ensures the consented operation and maintenance standards, service levels and design standards are maintained, at least at that level, for the life of the Expressway.
2. Tangata Whenua
a. That the project is designed and constructed in a manner that acknowledges tangata whenua as treaty partners, respects their concerns and exhibits best practice mitigation where tangata whenua values are affected.
3. Levels of Service
That:
a. the Expressway achieves Level of Service 'B' between MacKays Crossing rail over-bridge and the location of the current intersection of Peka Peka Road and the existing SH1
b. level of Service 'C" is achieved at the intersections between the Expressway and local network
c. that the overall network operates to significantly improve travel times.
d. an integrated transport network can operate in a manner which reduces congestion in Waikanae town centre and at Elizabeth Street level crossing
e. the Level of Service set out in a. and b. above is not intended to restrict the number or location of connections in the network or pre-determine design solutions the test year for levels of service is 2026.
4. Connectivity
a. All existing and proposed east/west local road, cyclist and pedestrian connections are to be maintained consistent with existing KCDC Community Outcomes, Development Management Strategy, Sustainable Transport Strategy, and Cycle, Walkways and Bridleways Strategy, in particular for access to public transport systems, neighbourhoods, public open space, recreational amenities and local centres and services.
b. The Project will maximise connectivity (including grade separated and left on/left off interchanges) to the local network consistent with the Expressway's inter-regional function.
c. In determining connectivity solutions, particular consideration is to be given to: a. All travel modes

b. Access to schools and colleges (e.g. Kapiti and Paraparaumu colleges) c. Employment areas d. Other community facilities
d. The Council, NZTA and Alliance members will work together to confirm the need for multiple routes for local businesses and residents across the Waikanae River. This will include assessments of the design assumptions against urban design and traffic principles and will show how the design principles link to and are consistent with international best practice.
5. Resilience a. The Project will improve network resilience in the event of emergencies.
6. Delivery Programme a. The design process is to focus on providing certainty to residents as a priority consistent with appropriate community consultation, particularly at northern and southern connections.
b. The Project will achieve early project delivery consistent with the Government's infrastructure programme.
c. Opportunities for early physical works that deliver benefits will be identified during the design process.
7. Property Impacts a. The Project is to be designed and constructed in a way that seeks to minimise adverse impacts on adjoining and surrounding properties.
b. The Project delivers mitigation of noise and visual impacts on surrounding properties using best practice 'soft engineering' and landscape practice consistent with enhancement of the surrounding landscape and visual amenity values and specifically seeks to avoid the use of hard engineered surface sound barriers (such as noise walls.)
8. Local Planning That a. the Project is to be consistent with existing KCDC Community Outcomes, Development Management Strategy, Sustainable Transport Strategy, and Cycle, Walkways and Bridleways Strategy and will include recognition of and respect for the wider urban and rural contexts
b. the pre-eminence and economic viability of the District's existing major town centres as social, employment, retail and passenger transport nodes are maintained. In particular the Project is to include well designed, direct access via the Expressway into and out of Paraparaumu town centre, nearby commercial areas and the airport, consistent with the Expressway's inter-regional function.
9. Safety a. The design of the Expressway is to meet KwiwRap 4 star standards.
b. The design of the local network, including the existing state highway, is to exhibit best practice and be consistent with local urban design standards
c. The design and construction of required adjustments to the existing SH1 to deliver an appropriate local function is included in the project scope, including adequate consideration for the safety of elderly and young residents and the transport disadvantaged.
10. Urban Form That the Project is designed and constructed in a manner that: a. interchanges are configured to achieve integration with urban form and surrounding land uses
b. community severance is to be avoided, mitigated or minimised as far as reasonably consistent with local planning documents including KCDC

Community Outcomes, Development Management Strategy, Sustainable Transport Strategy, and Cycle, Walkways and Bridleways Strategy
c. the nature and scale of the existing State Highway 1, especially at Waikanae and Paraparaumu town centres, delivers a viable and attractive roading and access system for local needs (i.e. is able to accommodate the impacts of projected passenger transport movement and growth, vehicle, pedestrian and cycle movements and enhances those town centres).
d. avoids, mitigates or minimises any adverse impacts to local schools, community amenities and facilities and the local roading network, in particular the nature and character of residential streets
e. avoids, mitigates or minimises pressures for urban sprawl (including coastal development) and associated inefficient infrastructure systems
f. avoids, mitigates or minimises pressure for retail and other development outside the existing town centre and employment nodes, in particular, at Raumati, Otaihanga and north of Waikanae.
g. achieves consistency with the District's Development Strategy and associated regulatory policies (including the District Plan and Plan Changes 79 and 80.)
11. Stormwater and Groundwater That the Project is designed and constructed in a manner that: a. Conforms to the Kapiti Coast District stormwater requirements and associated best practice, in particular the Stormwater Management Strategy and the policy of on-site hydraulic neutrality
b. ensures the hills to coast stormwater flow (both surface and groundwater) is not impeded
c. ensures the natural flows in wetlands are not impeded.
12. Environmental That the project is designed and constructed in a manner that: a. minimises the loss of dunes and wetland landscape through which it passes, including any remnant native vegetation
b. provides a high quality of natural environment where the project crosses streams, wetlands and the Waikanae River and avoids culverting and closing in of streams
c. ensures that adverse effects on the environment and amenity of the Waikanae River corridor are avoided, mitigated or minimised
d. avoids, mitigates or minimises adverse impacts on local flora and fauna, particularly in areas currently protected or covenanted for their natural systems and ecological values
e. avoids, mitigates or minimises any adverse amenity, environmental, archaeological, waahi tapu and visual impacts in a manner representative of internationally accepted best practice, including but not confined to the NZTA's best practice statements on urban design and planning.
13. Value for Money a. Project solutions are to be value for money and consistent with NZTA funding requirements and mitigation requirements, noting that the project must integrate the Expressway into the local network and must take account of the impacts of this
b. Evaluation of project solutions will take into account life-cycle costs (e.g. maintenance costs and design life) as well as initial construction costs.

Appendix B

Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994

Departmental Notices

Agriculture and Fisheries

Animals Protection Act 1960

Approval of Code of Ethical Conduct Notice No. 5330 (100-A1-07)

Pursuant to section 19A of the Animals Protection Act 1960 and on the advice of the National Animal Ethics Advisory Committee, I hereby approve the code of ethical conduct submitted to me by Elanco Animal Health, which is the same as the approved code of ethical conduct of Massey University.

Dated at Wellington this 22nd day of February 1994.

JOHN FALLOON, Minister of Agriculture.
go1646

Revocation of Approval of Code of Ethical Conduct Notice No. 5329 (100-A1-07)

Pursuant to section 19A of the Animals Protection Act 1960 and on the advice of the National Animal Ethics Advisory Committee, I hereby revoke the approval of Tauhara Furs Partnership to use the code of ethical conduct of the Ministry of Agriculture and Fisheries.

Notice No. 4421 appearing in the *New Zealand Gazette* on the 30th day of June 1988, at page 2628 is hereby revoked.

Dated at Wellington this 22nd day of February 1994.

JOHN FALLOON, Minister of Agriculture.
go1647

Approval of Code of Ethical Conduct Notice No. 5328 (100-A1-07)

Pursuant to section 19A of the Animals Protection Act 1960 and on the advice of the National Animal Ethics Advisory Committee, I hereby approve the code of ethical conduct submitted to me by Lowe Walker Hawera Limited, which is the same as the approved code of ethical conduct of NZ Pastoral Agriculture Research Institute Limited.

Dated at Wellington this 22nd day of February 1994.

JOHN FALLOON, Minister of Agriculture.
go1648

Conservation

Resource Management Act 1991

Notice of Approval of Bylaws Amendment

The Minister of Transport and the Minister of Conservation, pursuant to section 424 (6) of the Resource Management Act 1991, hereby give approval to The Northland Regional Council Maritime Bylaw Amendment No. 5 (Bylaw Charges 1992/93) resolved by way of Special Order and confirmed by a meeting of the said Council on 19 May 1993.

Dated at Wellington this 14th day of February 1994.

DENIS MARSHALL, Minister of Conservation (in relation to section 232 (37) of the Harbours Act).

B. A. MARTIN, for Russell Kilvington, Director of Maritime Safety in exercise of powers delegated by the Minister of Transport.
go1499

Crown Law Office

Judicature Act 1908

Appointment of Temporary Judge Made Permanent

Pursuant to section 4 of the Judicature Act 1908, Her Excellency the Governor-General, in the name and on behalf of Her Majesty the Queen, has been pleased to appoint

The Honourable Dame Silvia Rose Cartwright

to be a Judge of the High Court.

Dated at Wellington this 17th day of February 1994.

PAUL EAST, Attorney-General.
go1498

Environment

Resource Management Act 1991

The Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994

Pursuant to sections 167 and 420 (6) of the Resource Management Act 1991, the Minister for the Environment, hereby gives the following notice:

Notice

1. Title and commencement—(1) This notice may be cited as the Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994.

(2) This notice shall come into force on the 7th day after the date of its publication in the *New Zealand Gazette*.

2. Interpretation—In this notice "State highway" and "motorway" have the same meaning as in section 2 (1) of the Transit New Zealand Act 1989.

3. Application of notice—This notice shall apply in addition to and not in substitution for the Resource Management (Approval of Transit New Zealand as Requiring Authority) Order 1992.

4. Approval as requiring authority—Transit New Zealand is hereby approved as a requiring authority under section 167 of the Resource Management Act 1991, for its particular network utility operation being the construction and operation (including the maintenance, improvement, enhancement, expansion, realignment and alteration) of any State highway or motorway pursuant to the Transit New Zealand Act 1989.

5. Approval in respect of existing designation—Transit New Zealand is hereby approved as a requiring authority under section 167 of the Resource Management Act 1991 for the Christchurch Northern Arterial (State Highway 74) in the district of Christchurch City Council.

Dated at Wellington this 17th day of February 1994.

SIMON UPTON, Minister for the Environment.
go1500

29 New Agency replaces Transit New Zealand as requiring authority

(1) This clause applies to any Order in Council, notice, or other instrument that approves of Transit New Zealand as a requiring authority and that was in effect immediately before 1 August 2008, including (without limitation)—

(a) the Resource Management (Approval of Transit New Zealand as Requiring Authority) Order 1992; and

(b) the Resource Management (Approval of Transit as Requiring Authority) Notice 1994.

(2) Without limiting clauses 26 and 28, on 1 August 2008,—

(a) the new Agency replaces Transit New Zealand as a requiring authority under any Order in Council, notice, or other instrument to which this clause applies; and

(b) every reference to Transit New Zealand in any Order in Council, notice, or other instrument to which this clause applies, is, unless the context otherwise requires, to be read as a reference to the new Agency; and

(c) anything done, or omitted to be done, or that is to be or may be done (under or in relation to an Order in Council, notice, or other instrument to which this clause applies) by Transit New Zealand is to be treated as having been done, or having been omitted to be done, or to be or may be done, by the new Agency; and

(d) every notice of requirement and designation of Transit New Zealand is transferred to and held by the new Agency, with the same status and priority as if Transit New Zealand and the new Agency were the same entity.

30 First members of new Agency

In appointing the first members of the new Agency, the Minister may, but need not, consult in accordance with section 98(2) of the Land Transport Management Act 2003.

Compare: 2004 No 97 Schedule 2 cl 4

31 Transferred employees

(1) The terms and conditions of employment of a transferred employee immediately before 1 August 2008 continue to apply in relation to that employee until—