PART H: MANAGEMENT OF ENVIRONMENTAL EFFECTS

28. Environmental management and monitoring

Overview

Where practicable, potential adverse effects have been avoided or reduced through the integrated design process. Potential adverse effects that are not able to be fully avoided will require careful management throughout the construction and operation of the Project. The Project delivery framework sets out the overall framework in which the Project will be delivered through to commissioning. This identifies where management plans and other key processes (such as the submission of outline plans to territorial authorities) will occur. The overall management plan framework is also set out, with three tiers of management plan being proposed:

- an overarching Construction Environmental Management Plan (CEMP);
- a series of topic specific management plans (e.g. noise, air quality etc); and
- a series of site specific environmental management plans (SSEMPs).

A draft CEMP and drafts of many of the topic specific management plan have been prepared and are contained in Volume 5. These provide indicative details about how potential environmental effects will be managed. SSEMPs will eventually be developed for all areas of Project in sequence with the staging of construction. At this stage indicative SSEMPs have only been developed for six key focus areas, which are some of the more complex areas throughout the Project. The initial consideration of how environmental effects are to be managed in these areas was therefore useful for environmental assessment and consenting purposes. 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.

As a result of the mitigation proposed, which can be delivered as conditions of the designations and resource consents, it is concluded that the potential adverse effects of the Project will be adequately and appropriately avoided, remedied or mitigated.

28.1 Introduction

The assessment of environmental effects in Part G (summarised in Chapter 11) identified a wide range of positive and adverse actual and potential environmental effects predicted to result from the construction and operation of the Project.

While many potential adverse effects have been able to be avoided completely or at least significantly reduced, the effects assessment identified a range of adverse effects that will require remediation and/or mitigation to ensure that they are appropriately managed. This chapter provides a discussion of the environmental management measures proposed to be implemented before, during and after construction, in order to manage potential environmental effects of the Project.

The remainder of this chapter provides the following information:

- the Project delivery framework identifying how conditions and management plans will be implemented through the further (detailed) design and construction phases of the Project (Section 28.2)
- the proposed management plan framework (Section 28.3); and
- a summary of the measures proposed to adequately manage potential adverse effects (Section 28.4).

It is suggested that the suite of proposed mitigation, remediation and monitoring measures summarised in Section 28.4 be formalised through the placement of conditions on the designations and resource consents. The summary of measures provides a reference to the relevant proposed condition(s).

Proposed conditions are set out subsequently:

- proposed conditions of the designations (Chapter 29)
- proposed conditions of the resource consents (Chapter 30).

28.2 Project delivery framework

Key to the future management of effects is the 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 chapter identifies the methods and plans that will be developed by the NZTA and/or PCC (or its nominated contractors/consultants) at the time detailed design and construction occurs, associated monitoring and processes for verification. This overall process for delivery of the Project is shown in Figure 28.1.

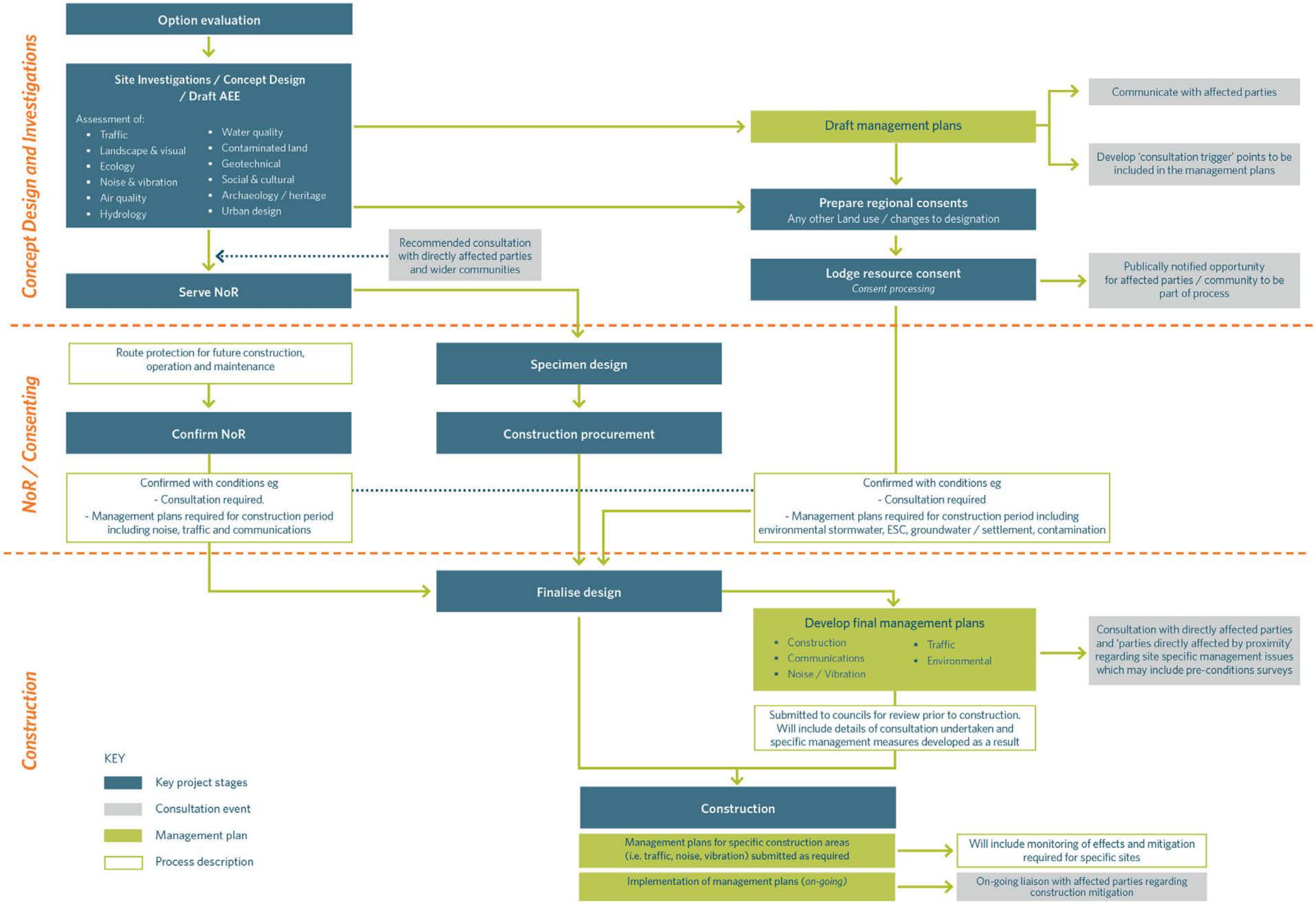


Figure 28.1: Overall Project delivery process

28.2.1 Principles for Project delivery

The following principles form the basis for the development of the 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 options 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 local authorities 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.

28.2.2 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

Mitigation measures are set out in this chapter. This section sets out actual and potential adverse environmental effects, and methods that should be used to manage them. Following that, management plans and conditions are discussed and described.

In addition, the assessment of alternatives (Chapter 9) discussed how the integrated approach to design has already led to the avoidance of effects and significant improvements in the design, which will result in a better environmental outcome than both the existing designated route and the design option that was preferred at the end of the Scheme Assessment Phase.

28.3 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 28.2.

Figure 28.2: Proposed management plan framework

28.3.1 Construction environmental management plan

A draft Construction Environmental Management Plan (CEMP) has been prepared for the Project (Refer Volume 5). The final CEMP will be prepared by the Project contractor prior to construction of the Project, and will be required to be generally in accordance with the draft prepared. The final CEMP will be provided to KCDC, PCC, UHCC and WCC prior to construction, to allow those councils to request changes (under section 176A of the RMA).

The CEMP is an overarching strategy document. The other plans generally 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 manage, 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 for delivering more detailed site specific management plans once construction contracts have been awarded. The delivery of detailed site specific environmental 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. 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, as far as is practicable, 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 that require preparation of a CEMP also provide flexibility to review and modify practices according to changing 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(s) 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.

28.3.2 Topic specific environmental management plans

The CEMP and the various 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 the Draft CEMP will be required once the consents and designations are obtained, by the selected contractors as part of the process of undertaking and

finalising detailed design and construction methods. The process for modifications is set out in the CEMP and includes a process involving inputs from Councils and key stakeholders.

This CEMP and its second tier plans are to be consistent with and complement the Project's AEE. The many 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.

28.3.3 Site specific environmental management plans

A set of six draft Site Specific Environmental Management Plans (SSEMPs) have been prepared as part of this suite of application documents. The opening text of the SSEMPs states:

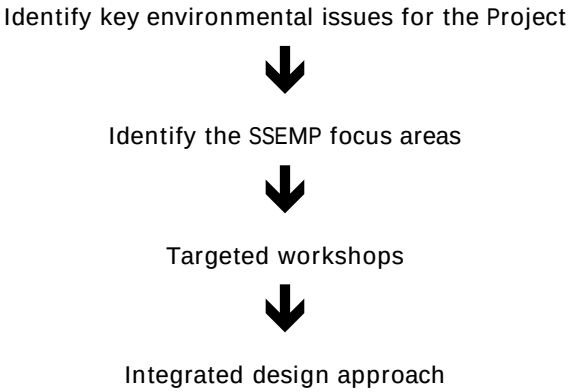
> *"This document, that is in the form of an SSEMP, is one of a number that have been developed for key focus areas along the TG Alignment. The focus areas were chosen to be representative of the range of sites along the route and to have between them the full range of environmental management issues likely to be encountered during construction of the route.*
>
> *The aims in producing these documents are to:*
>
> - *Provide confidence in design;*
> - *Assist in assessing effects;*
> - *Assist in developing mitigation strategies; and*
> - *Assist in consultation with stakeholders regarding construction management issues."*

The purpose of the SSEMPs is to:

- Provide more detailed design information about specific key areas along the route where there are a number of interacting discipline areas, technical challenges or particularly sensitive receiving environments;
- Prepare targeted environmental management measures to demonstrate how generic performance based construction management techniques could be applied to a tangible example across the route;
- Demonstrate a method for developing the design further at a later date in other areas along the Project route; and
- To better inform the development of performance based consent and designation conditions using the technical inputs of all the relevant technical specialists. The SSEMPs provide a more integrated consideration of the key performance standards relevant to controlling actual and potential effects on the environment.

28.3.3.1 Developing the SSEMPs

The following four step approach was used to develop the SSEMPs:



Steps 1 – Identify key environmental issues

The six SSEMP areas have been specifically chosen for a number of reasons which started with a process of identifying the key environmental issues associated with the Project. The areas were selected in a workshop by technical specialists through a process using the following criteria:

- **High profile (public)**. Sites that are clearly visible from public areas and that are known to be of particular interest to the public.
- **Visual and landscape**. Areas that are within close proximity to a regionally significant landscape, which have particularly significant natural landscape values in the context of the RMA, or which are clearly visible from public areas.
- **Social and community and urban design**. Areas where there is a significant amount of interaction with the public and where appropriate design is critical to achieve a better and more liveable outcome for people and communities.
- **Demonstrative of the Porirua City Council Link Roads**. An area that was specific to the PCC applications (as requiring authority for the Link Roads) was required in order to demonstrate the issues that are particular to the construction of local roads under the jurisdiction of a territorial authority.

  Noise. Areas where there are noise mitigation requirements recommended both for construction and operational noise management.
- **Traffic management**. Challenging traffic management issues arise at tie-ins with the existing state highways where construction will need to occur, whilst still providing for the through movement of traffic.
- **Constructability**. Some parts of the route will pose very challenging design and construction phasing requirements in order to adequately manage effects on the environment.
- **Water quality and potential for effects on Pauatahanui Inlet**. The Pauatahanui Inlet attracts significant public interest and any potential for effects on it – particularly from sediment associated with construction – needs to be very carefully managed.

- **Hydrology and flood risk**. The construction of the Project has the potential to cause damming and/or flooding.
- **Erosion downstream and culverts**. There will be approximately 115 culverts required for the Project of varying sizes, lengths and shapes.
- **Ecology**. Ecological effects on streams, vegetation, other terrestrial flora and fauna and aquatic ecology are identified as potential adverse effects of the Project.

Step 2 – Identify the SSEMP Focus Areas

In light of the above criteria, areas with a good geographical spread throughout focus areas the Project and with a high level of relatively complex issues were chosen:

SSEMP area	Reason for selection
Te Puka Stream	• Complex construction methodology likely entailing stream diversions and fish translocation requirements. • High ecological values (notably freshwater).
Upper Horokiri Stream	• "Appendix B" stream[160] in good condition ecologically. • Number of diversions, reclamation and crossings. • Visually important landscape.
State Highway 58 Interchange	• High profile and publicly visible. • Close to residential areas and the Pauatahanui Substation. • Proposed location of main site compound and concrete batching plant. • Presence of low level contamination. • Potential for downstream flooding issues.
Waitangirua	• PCC is the requiring authority. • Construction noise management and visual mitigation is likely to be required in order to minimise construction efforts on the Maraeroa Marae, Tokelau Church and associated buildings. • Community traffic safety issues at the tie-in, including pedestrian and cycling movements.
Duck Creek	• Complex bridge construction and ecological issues. • Affected by both the NZTA and PCC projects.
Kenepuru Interchange	• Complex traffic management including raising of State Highway 1, interaction with existing through traffic and railway. • Traffic management including regional cycling route, and keeping SH1 traffic moving. • Close to residential properties and schools – close interface with the community. • Noise barriers required to be constructed early for construction noise management.

160. Horokiri Stream is listed in Appendix 2, Part B of the Regional Freshwater Plan for Wellington.

Step 3 - Targeted workshops

Two facilitated workshops were held in order to discuss, firstly, the purpose and selection of the SSEMPs. Then key construction issues for each SSEMP were discussed in order to develop principles for managing construction activities given known environmental and construction issues. Ideas were captured on large flip charts and maps. The following invited parties attended:

- local authority regulatory planning officers[161];
- the Department of Conservation;
- Ngati Toa;
- specialist staff from GWRC;
- consultant technical advisors to the local authorities (appointed as advisors to all the Councils through the RATAG group) in ecology, water, visual and landscape disciplines;
- NZTA personnel and the NZTA's consultant experts.

Step 4 – Integrated approach to development

The outputs from the workshops were worked into the reports and plans through further integrated design sessions involving key technical experts.

28.3.4 SSEMP relationship to the AEE and conditions

The draft SSEMPs form part of the application documentation and demonstrate a higher level of detail for key areas, along with environmental management principles that have been developed specifically for the unique issues present at the chosen sites.

28.3.5 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 "second tier" construction management plans.

161. All five local authorities were represented.

Table 28.1: Proposed management of environmental effects via management plans

Environmental effect (Construction)		Management of effect	Relevant management plan
Designations			
Noise	Noise	• Implementation of construction in accordance with Construction Noise & Vibration Management Plan. • Maintenance of complaints register.	CNVMP
Vibration	Vibration effects on heritage structures	• Implementation of construction in accordance with Construction Noise & Vibration Management Plan. • Maintenance of complaints register.	CNVMP
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 and communications plan CNVMP CTMP
Culture and heritage	Archaeological, built heritage, tangata whenua	• Archaeologist to be identified as part of the construction team. • Works to be in accordance with NoR and any HPT approvals.	CEMP Archaeological protocols ArchMP CNVMP LMP
Site operation	Site facilities	• To be managed in accordance with the CEMP. • Landscape and visual effects management applies.	CEMP
Traffic	Construction traffic	• Construction traffic to be managed as per the CTMP and site specific management plans	CTMP CEMP
Visual and landscape effects	Construction site facilities, yards and buildings	• Landscape mitigation planting applies where practicable. Lanes Flat compound planting becomes permanent upon completion.	LMP CEMP
	Visual mitigation	• Landscape mitigation plan sets out staged planting plans for management of effects during construction, as well as mitigation for permanent works.	LMP

Environmental effect (Construction)		Management of effect	Relevant management plan
Resource consents			
Land	Stability Erosion and sediment control Stormwater management	• Development and implementation of erosion and sediment management procedures. • Sediment ponds. • Stabilisation of inactive worked areas. • Diversion of clean water. • Proactive weather forecasting, monitoring and risk management.	ESCP and SSEMPs
Water resources			
Ecology	Planting and habitat management / replacement	• Species / habitat translocation. • Enrichment planting. • Freshwater habitat restoration. • Landscaping.	EMMP LMP
Spill response and contamination	Contamination	• Development and implementation of CLMP.	CEMP Asbestos management Plan CLMP
	Hazardous substances	• Storage and use in accordance with Dangerous Goods 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 to be developed as part of CEMP and implemented by construction team; use and maintenance of spill kit; spills to be cleaned up and recorded as per CEMP.	
Site operation	Site facilities	• To be managed in accordance with the CEMP. • Contingency measures.	CEMP

28.4 Summary of mitigation, monitoring and other measures to manage adverse effects

A range of mitigation, remediation, management and monitoring measures has therefore been developed for the Project, in order to avoid, remedy or mitigate potential adverse effects. These measures are summarised in Table 28.2. Where relevant, a reference is provided to proposed condition(s).

Table 28.2: 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				
Increased construction traffic movements of both light vehicles and heavy vehicles are likely to have adverse amenity and safety effects on local roads.	Use CTMP to control construction vehicle movements and routes; Special controls for traffic movements around shift start/finish to avoid intensive traffic movement periods; Minor safety improvements/upgrades to local roads in key locations (in consultation with territorial authorities).	Yes – as set out in the CTMP	Designation: • Subject to requirements of the CTMP • Future SSTMPs required to set out detailed requirements	• Assessment of Traffic & Transportation Effects • CTMP
Construction traffic may cause damage to local roads.	Condition survey of the local roads which are proposed to be used as access roads during and after construction activity and make any necessary repairs. Condition survey and hand over on completion.	Yes – review road condition at regular intervals during construction	Designation: • condition survey requirement	• Assessment of Traffic & Transportation Effects

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Dirt (silt & sediment etc) tracked onto roads from construction vehicles	Managed under provisions of CEMP	Regular visual inspections by site personnel	Designation and resource consent: • CEMP	• CEMP
Disruption to regional cycle and pedestrian networks during construction, including at MacKays Crossing, SH58 and Kenepuru Drive.	CTMP to include requirement to provide temporary, safe and convenient alternatives for cyclists and pedestrians.	N/A	Designation: • CTMP	• CTMP • NZTA requirement (COPTTM)
Potential for disruption to pedestrian movements along Warspite Avenue	Requirement to provide temporary, safe and convenient alternative route for Warspite Avenue pedestrians.	N/A	Designation: • CTMP	• CTMP • NZTA & PCC requirement (COPTTM)
Significant increase in traffic volumes using Kenepuru Drive (between Kenepuru Link Rd and Raiha St) which may result in adverse safety and access effects and potential effects on travel times.	Specialist detailed design for this location to address safety and access issues. This may include modifications to the intersection and road layout to better accommodate pedestrians and cyclists, improve access and visibility.	N/A	Designation: • Process for designing and agreeing an appropriate solution with PCC (as Road Controlling Authority)	• Assessment of Traffic & Transportation Effects
Reduced safety and amenity of the regional cycle network and for pedestrians around the tie-ins/intersections at SH 58, James Cook Drive, Waitangirua and Kenepuru Drive.	Further design prior to commencement of construction including methods for providing safe pedestrian and cycle movements at SH58, James Cook Drive, Waitangirua and at Kenepuru Drive.	N/A	Designation: • Process for achieving appropriate solutions	• Assessment of Traffic & Transportation Effects
The ability to cycle on SH1 at MacKays Crossing is disrupted by the new route	Further design prior to commencement of construction including methods for providing a safe and clearly signed posted alternative for cyclists to get back onto another route	N/A	Designation: • Requirement to provide an appropriate design solution	• Assessment of Social Effects

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Reduced pedestrian connectivity and safety along Warspite Avenue	Provide signalised junction with pedestrian phase at Warspite Avenue junction with Porirua Link Road.	N/A	Designation: • Develop a solution in consultation with PCC (as Road Controlling Authority)	• Urban Design and Landscape Framework
Land use and property				
Some properties will be temporarily occupied because they are required for temporary construction purposes.	Condition to require uplifting of the old designation as soon as it is no longer required; Requirement to consider uplift of parts of (i.e. surplus) designation upon completion. Note: acquisition and compensation is arranged through the Public Works Act	N/A	Designation: • Require uplift of old designation. • Consider uplift of parts of new designation.	• Consultation Summary Report • Assessment of Social Effects
Access to water supply for some parties / properties will be adversely affected by the construction of the new route.	Where water access arrangements are not otherwise protected through an existing legal mechanism, NZTA will undertake to make alternative arrangements on a case by case basis.	N/A	Designation: • Alternative access arrangements to be determined on a case by case basis through consultation	• NZTA requirements
Access to some properties will be adversely affected by the new route.	• Provision of alternative access	N/A	No condition (NZTA is required under Government Roading Powers Act to provide an alternative access)	• Assessment of Environmental Effects

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Porirua Gun Club will not be able to continue to operate from its current site and is required to be relocated and accommodated elsewhere.	• Find alternative location	N/A	No condition Addressed through an existing agreement between NZTA and Porirua Gun Club	• Assessment of Environmental Effects
Network utilities				
Dust from construction activities has the potential to adversely affect Transpower assets	Some assets may need to be cleaned during construction.	Yes – in communication with Transpower, dust effects on assets will be monitored during construction	Designation: • NUMP	• Agreement between NZTA and Transpower • Consultation Summary Report
Permanent relocation of some utilities, and their maintenance access routes, is required to make way for construction of the road	Close liaison with utility provider to manage continuity of supply.	No	Designation: • NUMP • Separate agreements have been made in some cases	• Consultation Summary Report
Potential for physical damage to network utility assets.	Careful on-site management processes to accurately locate and protect assets prior to the commencement of construction.	Yes – ongoing as required during construction	Designation • CEMP • NUMP	• Consultation Summary Report • CEMP
The Project has the potential to change maintenance regime(s) for network utility operators.	N/A	N/A	No condition: • Separate agreements to maintain appropriate access for maintenance	• Consultation Summary Report

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Noise and vibration				
Construction noise and vibration has potential to cause disturbance to close neighbours.	Comply with construction noise standard – e.g.: Restricted use of local roads by construction traffic; Restricted night working; Restricted use of pile driving; Noise barriers installed early.	• No monitoring except as required by standards or CNVMP	Designation: • CNVMP	• Acoustics Assessment Report (Section 5.4) • CNVMP
Construction vibration has potential to cause damage to brick fuel tank.	Detailed assessment of vibration sources within 20 m of brick fuel tank;	Building condition survey pre-construction Visual inspection Vibration monitoring of works within 20 m Set appropriate standards in CNVMP.	KCDP Designation: • Condition survey • CNVMP • Provision to alter work practices if damage is detected through monitoring	• Acoustics Assessment Report (Section 5.4.4) • CNVMP • Assessment of Built Heritage Effects
Construction vibration may cause damage to St Joseph's Church.	Nil – the site is too far away for construction-related vibration to have an effect.	Building condition survey pre-construction	PCDP Designation: • Condition survey	• Acoustics Assessment Report (Section 5.4.4) • CNVMP • Assessment of Built Heritage Effects

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Road-traffic noise may cause disturbance to neighbours.	Noise barriers (e.g. bunds and walls); Building-modification if necessary (determined at commencement of construction).	N/A	Designation: • Noise barriers to be constructed in specified locations • Requirement for low noise surfaces in specified locations	• Assessment of Acoustics Effects (Tables 5-1, 5-2 & 5-3)
There will be adverse operational noise effects from Waitangirua Link Road on Maraeroa Marae.	Requirement to for permanent noise barrier adjacent to Maraeroa Marae as early as possible (prior to commencement of construction), with the design developed in consultation with the Marae committee.	N/A	Designation: • Early construction of noise barrier	• Assessment of Acoustic Effects • Waitangirua SSEMP
Air quality				
Potential for dust nuisance effects at nearby sensitive receptors. Those most likely to be affected include residents near the Kenepuru and Waitangirua Link Roads, and Linden interchange.	Dust management during construction; Responsiveness to complaints.	Visual monitoring; Instrumental TSP monitoring near potentially affected residents in the Linden area.	Designation: • CAQMP • Complaints register (part of CEMP)	• Assessment of Air Quality Effects • CAQMP
Rural residents who are reliant on rain water may be affected by dust (in water supply).	Dust management during construction or alternative water supply; Responsiveness to complaints.	N/A	Designation: • CAQMP • Provision for alternative water supply	• CAQMP
Potential for adverse effects arising from dust settling on Transpower lines and other assets.	Refer above under “Network Utilities”			

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Changes in vehicle related emission levels at locations where higher vehicle volumes are predicted.	No – meets NZ guidelines	No (Background pollutant levels are currently being monitored in Tawa by GWRC, near where peak contribution from the Project is predicted.)	No	• Assessment of Air Quality Effects • Assessment of Traffic and Transportation Effects
Contaminated land[162]				
Presence of contaminants above human health risk-based guideline values may have adverse effects on human health; or above ecological risk-based guideline values may have adverse effects on terrestrial/aquatic life.	Remedial action plan to be approved by GWRC; Proper on-site soil management, with impacted soil placed under clean soil cover or structures. This soil will not be used to construct stormwater management devices.	Health and safety, dust, and sediment and erosion control monitoring; Track and record where soil is placed to verify appropriate location and prevent spread of contamination during future operations (e.g., highway maintenance).	Designation: • CLMP • Recording and verification • Resource Consent (Land Use Consent for Earthworks): • Remedial Action Plan	• Assessment of Contaminated Land Effects (Section 8, Summary recommendations • CSMP
Potential for presence of hazardous materials including asbestos and unexploded ordnance.	Specialist management process for management of hazardous materials.	N/A	KCDP Designation • CLMP	• Assessment of Contaminated Land Effects
Hydrology				
Use of Lanes Flat for construction activities has the potential to adversely affect storage capacity of flood plain resulting in slightly increased flood levels.	• Consultation with property owners to identify concerns and options • Potential for provision of flood level management measures on a case by case basis in consultation with property owners	N/A	Designation: • Consultation with affected property owners	• Assessment of Hydrology and Stormwater Effects • Consultation Summary Report
Also refer to mitigation, monitoring and conditions below under “water quality”				

162. The Contaminated Land Management Plan (CLMP) is also referred to as the Contaminated Soil Management Plan (CSMP).

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Occupation of Lanes Flat for construction activities has the potential to adversely affect storage capacity of flood plain and affect water levels on three properties in an extreme rain event.	Consultation with property owners to identify concerns and options Potential for provision of flood level management measures on a case by case basis in consultation with property owners	N/A	Designation: • Consultation with affected property owners	
Stormwater networks in Waitangirua are under capacity to accept additional flows from surface of PCC link roads.	Upgrade stormwater systems before or during construction	N/A	PCC Designation: • Detailed design condition	• Assessment of Hydrology and Stormwater Effects
Stormwater flows at Linden need to be carefully managed in order to avoid adverse capacity effects on existing WCC network	Detailed design to be required to build in storage capacity or alternative method to manage effects on existing network	N/A	Resource Consent (Land Use Consent for Earthworks): • Detailed design condition	• Assessment of stormwater & hydrology effects
TG Main Alignment increases rate of run off to Duck Creek resulting in downstream inundation / increase in flood flow levels	Detailed design to incorporate upstream storage capacity	N/A	Resource Consent (Land Use Consent for Earthworks): • Detailed design condition	• Assessment of stormwater & hydrology effects
Encroachment into Porirua Stream floodplain results in loss of flood flow capacity	Design incorporates measures to provide floodplain capacity to an existing or greater level than existing	N/A	Resource Consent (Land Use Consent for Earthworks): • Detailed design condition	• Assessment of stormwater & hydrology effects

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Water quality[163]				
Construction works will result in sediment discharge to streams.	Treatment using erosion and sediment control measures; Construction staging to minimise risk during a storm event; Agreed maximum area of open (unstabilised) earthworks within catchments leading to each arm of the Porirua Harbour to minimise risk during a storm event; Early warning system for potential storm events.	Adaptive management of erosion and sediment control measures; Continuous water quality monitoring; Continuous sediment control measure monitoring; Event based aquatic habitat monitoring.	Resource Consent (Land Use Consent for Earthworks): • Performance standards for sediment management • Monitoring conditions	• Assessment of Water Quality Effects • Ecological Impact Assessment • various SSEMPs
Contaminants (other than sediment) from worksite(s) have an adverse effect on, or are transported to, either streams or the Porirua Harbour.	Incident response; Cement works management in close proximity to streams. Truck washes bunded and dirty water captured; Dedicated vehicle service sites and fuel storage areas bunded; Rules regarding concrete truck wash down; Risk management plan and on site pollution kits and training.	N/A	Designation and Resource Consent (Land Use Consent for Earthworks): • CEMP	• CEMP
Contaminants in stormwater from road surfaces are transported to streams and Porirua Harbour.	Treatment of all road run off prior to discharge.	N/A	Part of the design and required by to be in accordance with documents submitted. Required to meet permitted activity standards.	• Assessment of Water Quality Effects

163. Some of the mitigation and monitoring that relates to water quality is also related to marine ecology.

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Terrestrial ecology				
Terrestrial vegetation will be lost as a result of enabling works and construction works.	Use BPO to avoid identified sites within designation during detailed design; 250ha of revegetation as mitigation for loss of 120 ha of native vegetation (sites identified & include existing and total 426ha of which 270 ha of revegetation – includes overlap w. freshwater stream mitigation); Mitigation sites to be legally protected through covenants or similar mechanism. Note: mitigation may not be in the same catchment	Specialist ecological advice during detailed design; Landscape and restoration plan for each mitigation site; Monitoring of planting for 3 years with quarterly report year 1, annually thereafter.	Resource Consent (Land Use Consent for Earthworks & Discharge permit): • Condition to specify amount of land to be covenanted (or similar mechanism) based on a ratio that corresponds to the amount lost	• Ecological Impact Assessment • SSEMP (identify issue & locations)
Wetland construction within Upper Horokiri Stream catchment may result in rare plant species loss.	Requirement for stormwater treatment pond development to provide habitat for rare plants	Additional rare plant monitoring and pest management for 3 years with quarterly report year 1, annually thereafter.	Resource Consent (Land Use Consent for Earthworks): • Detailed design to achieve habitat specification • Monitoring plan to be prepared	• EIA • SSEMP (identify issue & locations), Detailed Design for Stormwater Ponds provide detail.
Potential for loss of individual bugs and lizards particularly in scree slope habitats and stonefield habitats of Horokiri and Te Puka catchments.	Capture and translocation prior to earthworks where habitat found; Re-create scree / stonefield habitat at toe of fill batters for lizards.	Monitoring of populations for a fixed period; Monitoring of formed scree for a fixed period to confirm it is able to be used by target species; Specialist ecological advice during detailed design and construction in key locations.	Resource Consent (Land Use Consent for Earthworks): • Capture and translocation • Monitoring plan to be prepared • SSEMP	• Ecological Impact Assessment

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Construction may cause disturbance to avifauna – falcon / kaka / pied shag / black shag.	N/A	N/A	No	Nil
Construction may cause disturbance to bats.	N/A	Additional study required to confirm presence, species and population characteristics.	Designation: • Requirement to carry out bat study	• Ecological Impact Assessment • EMMP
Potential for bat mortality (hit by vehicles).	Adaptive management	Monitoring is required (on the assumption that bats are present).	Designation: • Requirement to carry out bat study	• Ecological Impact Assessment • EMMP
Freshwater ecology				
Construction will result in freshwater habitat loss and modification.	Use BPO to avoid streams not directly affected by stream works; Temporary culverts or fords installed, where practicable, on temporary construction access tracks to minimise effects on stream beds; Protection and restoration of 26km of stream as mitigation for loss or modification of 10.5 km of stream bed; Replacement of perched culverts in Duck creek will provide additional benefit (8.5 km that is currently cut off will be accessible to fish); Capture and release fish before and during construction.	Specialist ecological advice during detailed design and installation of culverts; Monitoring of diversions to achieve acceptable velocities and appropriate habitat mix; Monitoring to maintain fish passage in culverts; Monitoring of ecological enhancement, revegetation, land retirement to confirm benefits achieved are as expected; Monitoring of upper Duck Creek fish passage to confirm benefits achieved are as required.	Resource Consent (Land Use Consent for Earthworks & Discharge permit): • Methodology for temporary works in streams to be submitted to GWRC • Monitoring plan to be prepared • condition to specify amount of land to be covenanted (or similar mechanism) based on a ratio that corresponds to the amount lost • Detailed	• Ecological Impact Assessment • Diversion Design Guide including ecological design principles • Culvert Design Guide including ecological design principles • SSEMPs

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
			construction and staging plan for each diversion to be submitted to GWRC	
Construction activities may result in species loss within streams as a result of creating diversions, reclamations and culverting.	Capture and translocation of fish prior to diversion or culverting Note: DOC Permit required. Timing of works in the bed of streams to avoid peak fish migrations (1 Oct to 30 Dec, & 1 Apr to 30 May);	Monitoring of diversions for at least two spring migrations following completion of works for re-establishment of communities of fish and macro-invertebrates.	Resource Consent (Land Use Consent for Earthworks & Discharge permit): • Methodology and design for permanent structures in streams to be submitted to GWRC • Monitoring plan to be prepared	• Ecological Impact Assessment • SSEMPs
Marine ecology				
In an extreme weather event there is potential for sediment transport from construction areas to the Porirua Harbour resulting in loss of marine ecology.	Limitations on earthworks open areas; Performance based operation for erosion and sediment control; Wet weather shutdown procedures; Weather forecasting daily; Funding for a community project in the event of a notable event occurring.	Yes, key performance indicators; Essential component for controlling effects and managing the ESC devices.	Resource Consent (Land Use Consent for Earthworks & Discharge permit): • CEMP • Monitoring plan to be prepared • Off-set mitigation of specialist funding in the case of a significant event	• CEMP • Assessment of Water Quality Effects • SSEMP's

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Tangata whenua				
Potential for reduction/loss of fishery for eels, shellfish, freshwater mussels etc as a result of construction effects (sediment discharge from earthworks).	Performance based operation for erosion and sediment control. Note: Controls as set out above under ecology and water quality	Key performance indicators as specified by Ngati Toa	Resource Consent (Land Use Consent for Earthworks & Discharge permit): • Monitoring plan to be developed in consultation with Ngati Toa	• Assessment of Water Quality Effects • Assessment of Cultural Effects • CEMP
Landscape and visual				
Adverse effects on the outlook from rural-lifestyle properties during construction including associated bulk earthworks fill sites and enabling works – including the effects of a continually changing visual environment.	Where visual mitigation planting is proposed to mitigate permanent effects, consider early implementation to manage visual effects from construction; Early planting of fill batters and stream margins where practicable; Locally sourced plants where available and consistent with general Ecological Region principles.	Monitor planting and replacement of dead plants where necessary	Designation: • Addressed by a LMP as part of Outline Plan or CEMP. • Private property planting by agreement on a case by case basis.	• Landscape and Visual Assessment • Urban Design and Landscape Framework • Assessment of Social Effects.
Construction yards and compounds will have effects on visual amenity during construction.	Planting around Lanes Flat compound for screening purposes and/or fencing Localised planting in and around other site compounds to screen buildings and industrial plant where practicable; Construction lighting should seek to reduce effects of night time glare/ vertical spill; Manage sites in a tidy manner.	N/A	Designation: • Addressed by a LMP as part of Outline Plan or CEMP.	• Landscape and Visual Assessment • CEMP • Assessment of Social Effects.

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Adverse visual effects arising from the presence of the road	Location of signs (gantries in particular) should be considered in terms of proximity to adjacent dwellings and key views from properties and the road; Visual mitigation planting within the proposed designations and on private property is required where effects cannot be avoided through design refinement; Planting on private property to be subject to individual agreement and implemented as soon as possible to ensure adequate mitigation; Development and planting of Lanes Flat as a 'wetland' area to mitigate visual effects on Lanes Flat arising from the construction of the road.	Monitoring of planting, and maintenance for a specified period	Designation: • Addressed by a LMP as part of outline plan or CEMP.	• Landscape and Visual Assessment • Urban and Landscape Design Framework • Assessment of Social Effects.
Adverse landscape effects arising from the construction of the road – in particular effects on the landforms of the northern part of the route which are considered to be a ONL	Detailed design process to demonstrate consideration of further minimising: Size and scale of cut batters Overall road footprint Demonstrate that form, location and design of road furniture has given consideration to the landscape in which it sits Engagement of an appropriately qualified landscape professional to inform the detailed design process.		Designation: • Detailed design process to demonstrate consideration has been given to minimising landscape effects • LMP as part of Outline Plan or CEMP. • Engagement of a suitably qualified professional	• Landscape and Visual Assessment • Urban Design and Landscape Framework • Assessment of Social Effects.

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Potential for adverse visual effects of noise barriers and bunds on surrounding communities.	Requirement for noise barriers to have high levels of visual quality and /or have associated landscape planting.	N/A	Designation: • LMP as part of Outline Plan or CEMP.	• Landscape and Visual Assessment • Urban Design and Landscape Framework
At Flightys Road, the proposed noise bunds have the potential to dominate outlooks from private properties.	Requirement to design landscape bunds to be consistent with adjoining earthworks and landscape treatments.	N/A	Designation: • LMP as part of outline plan or CEMP.	• Landscape and Visual Assessment • Urban Design and Landscape Framework
Archaeology and built heritage				
Construction vibration may cause damage to St Joseph's Church or brick fuel tank.	Refer above under "Noise and Vibration"			
Potential for adverse dust effects on glacier windows at St Joseph's Church.	Dust management during construction; Protective cover to be offered if monitoring indicates a problem; or Remove and store glacier windows off-site during construction.	Monitoring during works to confirm effects (or otherwise) on glacier windows.	PCDP Designation: • Consideration of options to protect windows from construction effects • ArchMP	• Assessment of Built Heritage Effects • CAQMP

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Potential for discovery of artefacts during construction.	N/A	All site personnel to be given an induction; Archaeologist to be involved with monitoring site works.	Designation and Resource Consents (Land use consent for Earthworks & Discharge permit): • Accidental discovery protocol • Nominated archaeologist • ArchMP	• Assessment of Archaeological Effects • Cultural Heritage Assessment • CEMP
Effects on ambience and pleasantness within the grounds of St Joseph's Church as a result of the new interchange.	Landscaping to be offered to the Church to screen the new SH58 interchange from view from within Church grounds.	N/A	PCDP Designation: • Landscaping to be offered to church owners • ArchMP	• Assessment of Built Heritage Effects • Landscape and Visual Assessment
Social effects				
Potential for noise effects on surrounding communities during construction.	Refer to "Noise and Vibration" above			
Disruption to local communities will occur during construction, as a result of traffic, noise, and large crews of construction workers.	Refer to "Traffic and Transport" and "Noise and Vibration" above			
Potential for dust nuisance effects at nearby sensitive receptors – most likely to include residents near the Kenepuru and Waitangirua Link Roads, and Linden Interchange.	Refer to "Air Quality" above			

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Potential adverse effects on connectivity (pedestrian, cycle, horse riders and vehicles) through regional parks during construction – for public safety reasons.	Provide safe and convenient access across the alignment for all park users during the construction period.	N/A	Designation: • CEMP • CTMP	• Assessment of Social Effects • CEMP • CTMP
Potential for reduction/loss of fishery for coastal species as a result of construction effects.	Refer to "Marine Ecology" above			
Potential for amenity effects for contact recreation (e.g. water becomes cloudy and less desirable for swimming) in streams and/or Porirua Harbour.	Refer to "Water Quality" above			
Change in amenity for community facilities at the tie-in with the Whitby and Waitangirua Link Roads.	Involvement of relevant community facility personnel in development of design treatments.	N/A	Designation: • Urban design condition to require working party in relation to specific design elements	• Assessment of Social Effects • Urban Design and Landscape Framework • Waitangirua SSEMP
Change in amenity for local residents, particularly those with a view of the Main Alignment.	Refer to "Visual and Landscape", "Noise and Vibration", "Air Quality" and "Traffic and Transport" above			

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Loss of amenity and tranquillity, and land area, in BHFFP and Belmont Regional Park; Loss of public recreational land as a result of designating parts of regional parks.	Development and planting of Lanes Flat as 'wetland' recreational area; Construction of a new track to be made available for recreational users, linking QE Park to BHFFP; Flightys Road extension underpass to provide reasonable amenity and safety for pedestrians and horse riders; Redirect or reconnect severed paths in Belmont Regional Park; Provision of alternative recreational facility/ies where appropriate and in consultation with the relevant Council.	N/A	Designation: • Development of a public access plan in consultation with GWRC Note: Public Works Act process also applies	• Landscape and Visual Assessment • Urban Design and Landscape Framework • Assessment of Social Effects
Loss of pedestrian connectivity, and reduced safety and amenity of regional cycle network around SH58 Interchange.	Also refer to "Traffic and Transport" above Requirement to provide a shared pedestrian and cycle path under the Main Alignment and along Pauatahanui Stream; Pauatahanui Stream underpass to have high levels of amenity and Crime Prevention Through Environmental Design (CPTED) principles applied.	N/A	Designation: • Detailed design to incorporate safe pedestrian and cycle path	• Assessment of Social Effects • Assessment of Traffic and Transport Effects • Urban Design and Landscape Framework
Potential for adverse noise, visual, amenity effects on Linden Primary school.	Widening of SH1 near school to be fully on the eastern side; Noise barrier to be designed, in consultation with the school.	N/A	Designation: • Consultation to be undertaken with school to inform detailed design	• Assessment of Social Effects • Urban Design and Landscape Framework

Actual or potential environmental effect identified	Mitigation recommended	Monitoring recommended	Condition proposed	Report name(s)/ reference(s)
Specialist or site specific construction management measures				
Potential to introduce new weeds to the site that are not already there for example with topsoil, aggregate and freshwater in a currently relatively weed free environment.	Part of Construction Environmental Management Plan; Vehicle washing; Controls on sourcing of aggregate and topsoil.	Weed monitoring during works and at the completion of construction	Designation and Resource Consent (Land Use consent for Earthworks): • CEMP	• CEMP
There is potential for fires to be caused as a result of construction works such as hot works, exhaust sparks, cigarettes etc.	Comprehensive fire plan – which will include (for example) special controls during high risk seasons, no smoking work sites, exhaust controls; No smoking work site; Controls or halt on hot works during high risk periods, monitoring of vehicle / equipment exhausts; Relationship with Rural Fire including on-site training.	Monitoring of fire risk as part of fire plan	Designation and Resource Consent (Land Use consent for Earthworks): • CEMP	• CEMP

28.5 Proposed conditions

Based on the mitigation and monitoring measures summarised in Table 28.2, 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.

Some conditions will appear in both the designation and regional resource consent conditions, but 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. Porirua City Council has similar measures in place. Maintenance measures include, for example:

- landscape maintenance;
- road surface maintenance;
- stormwater management; and
- graffiti removal.