URBAN AND LANDSCAPE DESIGN FRAMEWORK

Technical Report 5

MacKays to Peka Peka Expressway

NZ TRANSPORT AGENCY WAKA KOTAHI

Mackays to Peka Peka

REVISION HISTORY

revision 0	Marc Baily (Boffa Miskell)	draft for peer review	8 August 2011
revision 1	Marc Baily (Boffa Miskell)	revised from comments	31 November 2011
revision 2	Marc Baily (Boffa Miskell)	revised from comments	22 December 2011
revision 3	Marc Baily (Boffa Miskell)	revised from EPA comments	16 February 2012

DOCUMENT ACCEPTANCE

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reviewed by	Kevin Brewer (Brewer Davidson) Urban Design	15 August 2011
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reviewed by	Lucie Derosiers (NZTA) Urban Design	26 August 2011
reviewed by	Jim Ebenhoh (KCDC)	29 August 2011
reviewed by	Chapman Tripp Legal	2 November 2011

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01|introduction

1.1 project overview

The project (MacKays to Peka Peka or the Expressway) which is the subject of this Urban and Landscape Design Framework (ULDF) is to design and construct a new section of road and associated infrastructure for New Zealand's state highway network. The project will be delivered by the New Zealand government through the NZ Transport Agency (NZTA) as part if its programmed upgrades for Roads of National Significance (RoNS).

The Wellington Northern Corridor RoNs has a total length of about 110km running from north of Levin to Wellington Airport (refer RoNS diagram).

MacKays to Peka Peka is an 16km section of the RoNs extending from MacKays Crossing to Peka Peka Road within the Kāpiti Coast District.

The objectives of the Wellington Northern Corridor RoNS 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 the existing SH1 between Levin and the Wellington airport; and
- To improve the safety of travel on State Highways.

1.2 purpose + structure of the ULDF

The Urban and Landscape Design Framework (ULDF) is a Technical Report prepared to demonstrate how the MacKays to Peka Peka project fulfils NZTA's Urban Design policy requirements (refer to section 2).

The ULDF's overall purpose is to ensure that the urban and landscape design concepts of the Project are appropriately defined, developed and implemented.

As the Project has not yet progressed to a detailed design phase, this ULDF will provide direction in relation to its design that will need to be addressed in the future.

The ULDF is not an assessment of the effects of MacKays to Peka Peka to satisfy the requirements of the Resource Management Act (1991) (RMA). Although the ULDF is cognisant of RMA requirements a separate Assessment of Urban Planning and Design Efects (Technical Report 6, Volume 3)has been prepared to address the specific matters relevant to RMA consideration.

A separate Assessment of Landscape and Visual Effects (Technical Report 7, Volume 3) has also been carried out for RMA purposes.

The methodology for the ULDF (refer to section 1.3) notes the interdisciplinary nature of the design process. There are multiple connections between the ULDF and the other disciplines involved in this project.

In particular, although a description of relevant elements of MacKays to Peka Peka has been provided in the ULDF, this is to provide background to the urban and landscape setting for it. However, it is noted that many of these elements will be covered in significantly more detail by other specialists.

It is intended that the ULDF be used in the following way, by:

- the NZTA using it in various fora to demonstrate that its policy has been met.
- consent agencies (EPA and others) to gain an understanding of the urban and landscape issues , evidence base and methodologies used in design decision making.
- the Kāpiti community to get an appreciation of the way aspects of the Project of specific interest locally are going to be delivered.
- designers in the next phases of the Project to reference to the Project design objectives, evidence base and design directions contained within it.

The ULDF is structured to provide an understanding to the user of the:

- project and background [1:INTRODUCTION]
- national, regional and local policy context relevant to the Project's design [2: POLICY CONTEXT]
- environment and the dynamics within it currently in the context of the Project [3:CONTEXT]
- design principles that have been used [4:PROJECT DESIGN PRINCIPLES]
- design outcomes for each of the four sectors of the route [5: PROJECT URBAN AND LANDSCAPE DESIGN]

Throughout the ULDF images have been used to assist to communicate the design features of the Project. It is noted that these are typically diagrammatic or conceptual when associated with text pages.

RoNS diagram (source NZTA)

1.3 Methodology

The broad methodological approach taken to urban design of the Project has been to:

- Provide an urban and landscape design presence throughout the Project's design development (urban designer and landscape architect at all options reviews, coordination meetings, value improvement meetings, freethinking sessions) to ensure urban and landscape design perspectives have been advocated for and incorporated into decision making processes.
- Gather and map information about the function and form of the existing environment to provide an understanding of use patterns and key attributes to be considered during the design process.
- Establish a set of design objectives for the Project in conjunction with the wider Wellington RoNs team and NZTA as a basis for what is expected to be achieved in urban and landscape design terms across all the Wellington RoNs.
- Communicate project urban and landscape design objectives to the public through the Design Philosophy Statement Report (Technical Report 1, Volume 3), Legacy Statements, Alternative Options Report, Multi-Criteria Analysis, Expo and consultation material to assist community engagement.
- Distill the Project design objectives to the Multi-Criteria Analysis as a basis by which to assist the evaluation and refinement of the many project design options.
- Review of consultation feedback and respond with design refinements in conjunction with other disciplines.
- Recording in the ULDF the urban and landscape design considerations and directing the way in which the design should evolve to address any issues in the next phases of the Project.

The application of this methodological approach is represented throughout the sections of the ULDF. The components of activity that were involved in this approach are described further below.

Existing Environment Investigations

To determine an understanding of the Project's existing environment, the following work as undertaken:

- reviewing existing documents and mapping to identify constraint areas
- application of local knowledge
- liaison with KCDC officers and other specialist groups (eg Kāpiti Cycling, Walking and Bridleway Reference Group) to supplement existing local knowledge
- mapping of constraints by GIS to enable their overlay to define option preferences
- field work to confirm any areas that were unclear
- ground and aerial oblique photography to record environment conditions and features
- production of a working mapping base utilising GIS to enable topography, urban areas, lands uses and other aspects of the environment to be visualised
- undertaking of movement surveys and other counts to capture walking and cycling and horseriding movements and route use frequency

The understanding of the environment has been continuously refined throughout the Project.

Establish Project and Urban and Landscape Design Objectives

Project objectives were set by the Project Alliance Board at the outset as were the objectives agreed with KCDC on its joining the Alliance. These are described in the AEE, Part A, Chapter 2, Volume 2. More specific Project objectives for urban design were further developed by the Wellington RoNs team and NZTA. These are:

Environment

1. To design the highway including its horizontal and vertical alignments, cross section, structures and interchanges in response to the environment it traverses whether rural or urban.

2. To design the highway so as to retain key landscape, built, heritage and / or ecology key features along the route.

3. To design the highway with interchanges in locations that enable regional, interregional and local transport movements that can support and encourage economic development from urban and business growth.

4. To optimise the opportunities for future land uses around the highway corridor to either reinstate prior uses or develop in new ways such that the district's urban and business growth can benefit.

5. To design the highway with consideration to the needs and amenity of the local community including maintaining or enhancing the usability and amenity of public open spaces.

6. To design the highway to respond to the local drainage patterns and maximise the opportunities for improving stormwater discharge quality.

7. To design the highway to contribute to ecological sustainability and biodiversity.

8. To design the highway so as to maintain heritage and cultural elements that provide historic significance, to ensure the relevance of heritage elements through access and/ or interpretation, and to promote historical and cultural narratives through the detailed design.

9. To be cognisant of resource efficiency and sustainability opportunities and innovations in the design, construction, operation and/or maintenance phases of the highway.

Accessibility

10. To design the highway so as to maintain or enhance the connectivity, usability and amenity of pedestrian, cycle and vehicles links which adjoin or cross the road corridor.

11. To design the highway with retention of all existing local roads and provide where practicable opportunities for increased accessibility through additional local connections and/or improved accessibility to public transport, cycle and walking networks.

12. Where appropriate, to design the new highway with consideration of the role of the old highway corridor in contributing to local accessibility for public transport, cycle and walking networks.

13. To design the highway to minimise social severance, community disruption and loss of amenity.

14. To design the highway to maintain or enhance access to waterways, the coast, open spaces and recreational activities.

15. To design the highway to avoid the creation of isolated pockets of land and not preclude use or development of sites in the future.

Legibility

16. To design the highway to create legible entry and exit points to and from urban areas with consideration of driver experience across the whole Wellington RoNS corridor.

17. To design the highway to provide road users with a coherent, interesting and pleasant experience.

18. To design the highway to assist safe driver behaviour with designed-in speed management and safety measures.

19. To design the highway to preserve distinctive local and distant views to aid orientation and enhance sense of place.

The application of these objectives to the ULDF is set out in section 5 and 6.

Multi-Criteria Analysis Technique

The multi-criteria analysis (MCA) tool was the Project's main vehicle for design option decision making. For the elements of direct relevance to urban and landscape subjects, these came under the headings of Built Environment and Natural Environment. These were distilled from the Project urban and landscape design objectives. For urban and landscape design the primary headings are outlined below.

Other subject headings covered other aspects of the urban and landscape design objectives including under Movement, Cultural/Heritage, Social and Economic elements - the crossover between all these factors is recognised.

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 the urban form and features are no more than minor.

Visual Impact

Visual relationship to the local environment. The extent of the visual impact of structures and earthworks, landscape in relation to context including urban villages, residential areas, Waikanae River corridor and other public amenity locations.

Built Form

Relationship and integration with urban form and town centres, including responding to the individual urban identities of Raumati Beach, Raumati, Paraparaumu, Paraparaumu Beach and Waikanae. Includes the potential for built form improvements.

Public Areas/Parks/Recreational Areas

Significance of impact on public open space areas

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.

Land and Vegetation

Extent of environmental impact on land and vegetation

Natural Landscape and Features

Extent of environmental impact on natural landscapes and features identified as requiring protection by the local and regional plans.

The MCA process utilised a scoring system (-3 to +3) as indicators to the relative merits of the options. The significance of this process was not the score itself, but the relative performance among the options. The various criteria (of which built and natural environment were only two) were also able to be sensitivity tested to establish the extent to which an emphasis on one criteria or another would affect the outcome of a combined assessment.

Typically the MCA process was conducted in workshop settings to enable all the specialists to present their findings and for these to be tested by the group. Records of the scores and the notes were taken and the results circulated to the assessment team as a record of decisions made.

Refine options

Throughout the design process the MCA tool has been used to consider options with respect to the following aspects of the Expressway:

- Interchange locations
- Alignment within the route
- Over or under local roads

This has included the use of constraints mapping and visual simulations to understand the way they impact on the environment. This was combined with the use of Google Earth and other inputs such as traffic modelling to understand the performance of the options and impacts on constraints and features (refer sections 5.2 to 5.4).

A series of workshops occurred at which urban and landscape design inputs were made and options either discarded or refined. Further modelling and design work was then undertaken on preferred options and then further workshops conducted to evaluate the refinements. This design process has seen significant decisions made about the way in which the Expressway responds to the urban and landscape design objectives.

Consultation

The expo consultations were attended by the urban designers and landscape designers and the submissions considered and responded to in design refinement. The key design issues were extracted from the consultation responses (refer to section 4). Two design workshops (Waikanae and Walking, Cycling and Bridleway workshops) were conducted and one-on-one meetings with specific interested parties were also attended.

02|policy context

2.1 Policy Introduction

The project design has been informed by a wide range of policy documents. These policy documents are sumarised in this chapter, and the design implications from these referenced with respect to the sector design in section 6.

2.2 External and NZTA Internal Policy

The key policy requirements in respect of urban and landscape design for all NZTA projects are:

- Land Transport Management Act (2008)
- New Zealand Urban Design Protocol (MFE 2005)
- NZTA Environmental and Social Responsibility Policy (2011)
- Urban and Landscape Frameworks - Highways and Network Operations Guideline (2009)
- Transit Urban Design Policy (2007)
- Transit Environmental Plan (2008)

These are described further in turn below:

Land Transport Management Act (2008)

Requires NZTA to "exhibit a sense of social and environmental responsibility" in meeting the statutory objective of operating a state highway network that contributes to an integrated, safe, responsive and sustainable transport system.

New Zealand Urban Design Protocol (MFE 2005)

NZTA is a signatory to the protocol which aims to ensure that New Zealand's towns and cities are successful places for people to work live and play. The protocol has seven core principles which cover: connection, context, collaboration, creativity, choice, character and custodianship. NZTA (then Transit) was one of the first organisations to become a signatory of the Protocol in 2005.

NZTA Environmental and Social Responsibility Policy (2011)

NZTA promotes an accessible and safe transport system that contributes positively to New Zealand's economic, social and environmental welfare. The NZTA is committed to acting in an environmentally and socially responsible manner. This policy states that it will:

1. promote the safe and efficient movement of goods and people in a manner that avoids, to the extent reasonable in the circumstances, adverse environmental and social impacts
2. continuously improve performance in the management of environmental and social impacts;
3. integrate good urban design into all our activities;
4. work to improve our knowledge and understanding of the extent and condition of New Zealand's environmental and cultural heritage assets;
5. maintain and improve opportunities for Māori to contribute to our decision-making processes;
6. actively and meaningfully engage with affected and interested persons and organisations;
7. identify and comply with all relevant environmental and social legislation and regulations;
8. Seek whole-of-life value for money by taking into account environmental and social costs and benefits when procuring goods and services; and
9. provide our employees with the skills, awareness and leadership to achieve environmental and social objectives.

Urban and Landscape Frameworks - Highways and Network Operations Guideline (2009)

The guideline sets out the requirement, purpose and content of Urban Landscape Design Frameworks and Urban Design and Landscape Design Masterplans.

Transit Urban Design Policy (2007)

References the Urban Design Protocol and the commitment of NZTA to urban design with the aim to:

- ensure state highways contribute to vibrant, attractive and safe urban and rural areas; and
- achieve integration between state highways, local roads, public transport, cycling and walking networks and the land uses they serve.

More specifically, this is a commitment by NZTA to ensure that:

- roads fit in sensitively with the landform and the built, natural and community environments through which they pass;
- all systems of movement along and across the corridor are integrated into the design of projects with good connections and access to communities; and
- the design contributes to the quality of public space and road user's experience.

2.3 Regional Policy

Wellington Regional Strategy (2007)

The Wellington Regional Strategy (WRS) is a sustainable growth strategy. The aim of the WRS is to make Greater Wellington 'internationally competitive' - a region which offers a great lifestyle and job opportunities, supported by a strong economy.

The WRS highlights the importance of a secure and efficient route along Wellington's western corridor. The WRS notes that providing secure and reliable transport connections to the rest of the country is a key ingredient in regional economic development.

Of particular relevance to the Project is the focus on Good Regional Form and the 'change areas', including:

- Paraparaumu to Paraparaumu Beach: The WRS notes that the area is bisected by the existing and proposed road routes and a bus/rail transport hub, and notes that careful planning will be required integrate current and potential uses with the overall objectives of the area.
- Northern Waikanae edge: There is potential for continued northern spread of development at Waikanae North. Kāpiti Coast District Council proposes a northern extent urban edge at Waikanae. The WRS supports the development of this concept.

Regional Policy Design Implications

1. Aim to ensure the location and design of any interchange at Kāpiti Road enables continued growth in this 'change area'.
2. Aim to ensure the location and design of any interchange / tie-in at the northern end of the route does not facilitate urban sprawl beyond the identified urban edge.

Proposed Wellington Regional Policy Statement (2009)

Of specific relevance to the ULDF for the Project are the sections and objectives and outcomes of the Regional Policy Statement (RPS) that relate to:

- Landscape

There is reference to the distinctive character of local landscapes and natural features, and their importance to quality of life. However, the RPS acknowledges that landscape change is inevitable, even without human action.

The regionally significant issue for landscape is identified as "inappropriate modification and destruction of outstanding natural features and landscapes, and significant amenity landscapes".

- Regional form, design and function

In respect of form the RPS recognises that the region has a strong corridor pattern that reinforces local centres, supports passenger transport, reduces energy use and makes services more accessible. The importance of the role of State Highway 1 is recognised, and this section of the RPS includes objectives related to transport outcomes across the region.

The regionally significant resource management issues for regional form, design and function are identified as:

> Poor quality urban design

> Sporadic and uncoordinated development

> Integration of land use and transportation

Regionally significant centres that are an important part of the region's form are noted and includes Paraparaumu. The RPS identifies opportunities for these centres such as intensification of housing, commercial activity and local employment.

Eight areas are predicted to come under significant development pressure in the future and the two relevant to this project are North Waikanae edge and Paraparaumu to Paraparaumu Beach.

Regional Policy Design Implications

3. Aim to avoid inappropriate modification and destruction of outstanding natural features and landscapes. It is noted that the Waikanae River is identified in the RPS Appendix 1, Table 15, as a river with significant amenity and recreational values. It is also identified in the Regional Freshwater Plan.
4. Aim to integrate land use and transportation to achieve good urban form. The location and design of interchanges will be particularly relevant to such integration.
5. Aim to facilitate intensification and improved urban form at Paraparaumu.

2.4 District Policy

Kāpiti Coast District Plan (1999)

Land use is managed by Kāpiti Coast District Council (KCDC) under the Kāpiti Coast District Plan. The route traverses a number of zones in the Plan (refer Figure 1) - these are outlined below with a focus on urban and landscape design relevance.

Open Space Zone

A small part of the route is in the Open Space Zone in the north-eastern corner of Queen Elizabeth (QE) Park. The main objective of this zone (summarised) is to:

- maintain and enhance open space and recreation resources to ensure that recreational needs can be catered for now and into the future, while safeguarding the associated natural environments. The amenity value of reserves in terms of the character of the district is also recognized.

QE Park is a regional recreational asset, and is designated as a recreation reserve. The Park also has its own primary objective, which is :

- *"To recognise that Queen Elizabeth Park provides for outdoor recreational use, while protecting a representative example of the natural landscape of the Kāpiti coastal plain."*

Heritage values within QE Park are also recognized and provided for.

The Plan provisions relate to managing adverse effects, particularly in relation to the District's outstanding landscape(s). The entire foredune and consolidated sand dunes are identified as an outstanding landscape, as is the river landscape of the Waikanae River. Where MacKays to Peka Peka crosses the river the outstanding landscape area is affected.

Residential Zone

The urban areas comprise a series of small beach and inland settlements which have, over time, expanded and become interlinked, particularly on an east-west road network. The layout and features of the residential environments vary from those that have retained qualities that are reminiscent of small communities (eg older beach areas like Raumati south) to newer developments of a relatively generic and suburban form (eg newer parts of Paraparaumu). The objective for most of the Residential Zone is to:

"Ensure that the low density, quiet character of the district's residential environments is maintained and that adverse effects on the amenity values that constitute this character and make the residential environments safe, pleasant and healthy places for residents are avoided, remedied or mitigated."

The Plan allows for a small amount of medium-density housing near to Paraparaumu Town Centre. Such development would be required to meet design guidelines to ensure good design outcomes. The other planned change area is north of Waikanae (refer to Plan Changes below).

Town Centre Zone

The Paraparaumu Town Centre Zone is to give effect to KCDC's vision for the town centre, which is intended to serve as a focal point for both the local community and the district as a whole. KCDC has identified amenity values which it seeks to establish and/or protect and/or enhance in respect of the town centre. These include:

- *developing and enhancing a 'sense of place' or character for the town centre which reflects the natural and physical characteristics of the locality, if not the district;*
- *developing and enhancing the natural and physical environment and landscape by recognising the relationships between existing landscape features including stream, wetlands, sand dunes and the back-drop of Kāpiti Island;*
- *integration of community (cultural and recreational) and civic amenities and facilities in a town centre core to reinforce the 'sense of place';*
- *development of the community and civic open spaces, amenities and facilities at a human/residential scale to a high standard of design and appearance.*

The plan also identifies that town centre activities should be visually and physically linked to the retail core east of Rimu Road. Medium density housing is encouraged in specific areas. The need to take flood protection into account in this area is also required.

Rural Zone

Most of the northern end of the alignment passes over Rural Zone land. The zone is further divided into three policy areas, and the Project alignment crosses the 'Coastal Dune' environment.

The 'Coastal Dune' environment comprises the sand hill country, including the coastal foredune, consolidated sand dune, interdune sand plains and wetlands. The Rural Zone provisions address subdivision for residential and other development in these policy areas.

The Rural Zone also contains the Tourist Activity Precinct adjacent to the existing State Highway 1 to the north of Paraparaumu which is relevant to the extent that the existing SH1 will become a local arterial after the Expressway is commissioned.

River Corridor Zone

The proposed alignment crosses the Waikanae River. The River Corridor Zone includes the riverbed and the adjacent floodway and is an area which, if only partially blocked, would cause a significant redistribution of flood flow with potential adverse effects on other areas.

Design Implications

6. Aim to protect outstanding landscapes (Waikanae River, dunes and foredunes) and ecological areas.
7. Aim to enable Paraparaumu town centre to intensify and develop as a focal point for the whole District.

Plan Changes

The District Plan has been subject to a number of plan changes relevant to the Project - several of these overlap:

- Plan Change 69 — Waikanae North Development Zone (operative 19/03/09)

This was a private plan change to rezone 69 hectares of land north of the existing residential area of Waikanae from Rural zoning to a Waikanae North Development Zone. Approximately 2400 people are projected to live in the development, in about 700-800 households.

- Plan Change 79 — Waikanae North Urban Edge (operative 26/03/10)

The Plan Change for this area manages the expansion of residential development in an area north of Waikanae. Three hundred hectares immediately to the north of the existing urban area have been identified as suitable for low impact urban development, with overall average densities similar to urban densities. North of this an eco-hamlet area is proposed (approx. 340 hectares), which would have rural-type densities. Within both of these areas structure plans would be used to ensure (amongst other things) that development would be dictated by landform and that large areas of open space would be retained.

- Plan Change 80 — Ngarara Farm (operative 15/07/10)

Plan Change 80 was privately initiated in 2008. The plan change rezones approximately 280 hectares of land located within the Waikanae North Area, to Ngarara Zone and Ngarara Precinct in the Rural Zone, with a structure plan, objectives, rules and detailed provisions to enable development of the land into 11 neighbourhoods.

- Plan Change 82 — Bunnings Paraparaumu

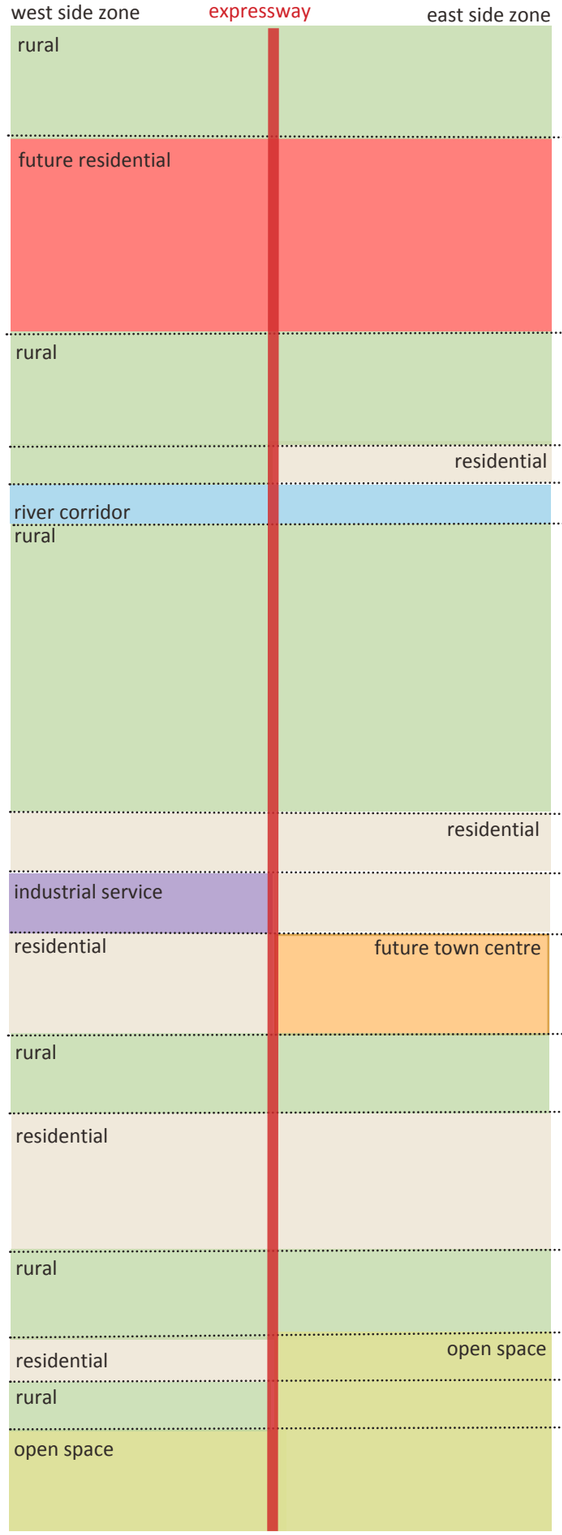
Rezoning of the site from Open Space to Industrial/Service (about two thirds of the site) and Residential (the remaining one-third), changes to the rules and standards to allow the development of a Bunnings store, and a structure plan which includes a number of "no build" areas to achieve a physical separation from both residential areas and the adjoining Andrews Pond Reserve.

- Plan Change 83 — Meadows Precinct

Changes six hectares of residential land at Mazengarb Road, Realm Drive and Sovereign Way to a mix of Commercial/ Retail zone (approximately 3ha) and Residential zone.

Design Implications

8. Aim to minimise disruption to planned growth areas and maintain or enhance current levels of access to these sites from Te Moana and Ngarara Roads.
9. Aim to facilitate employment and residential developments growth in targeted areas. The design of the Expressway needs to take into consideration the vehicular access and amenity levels of these sites.



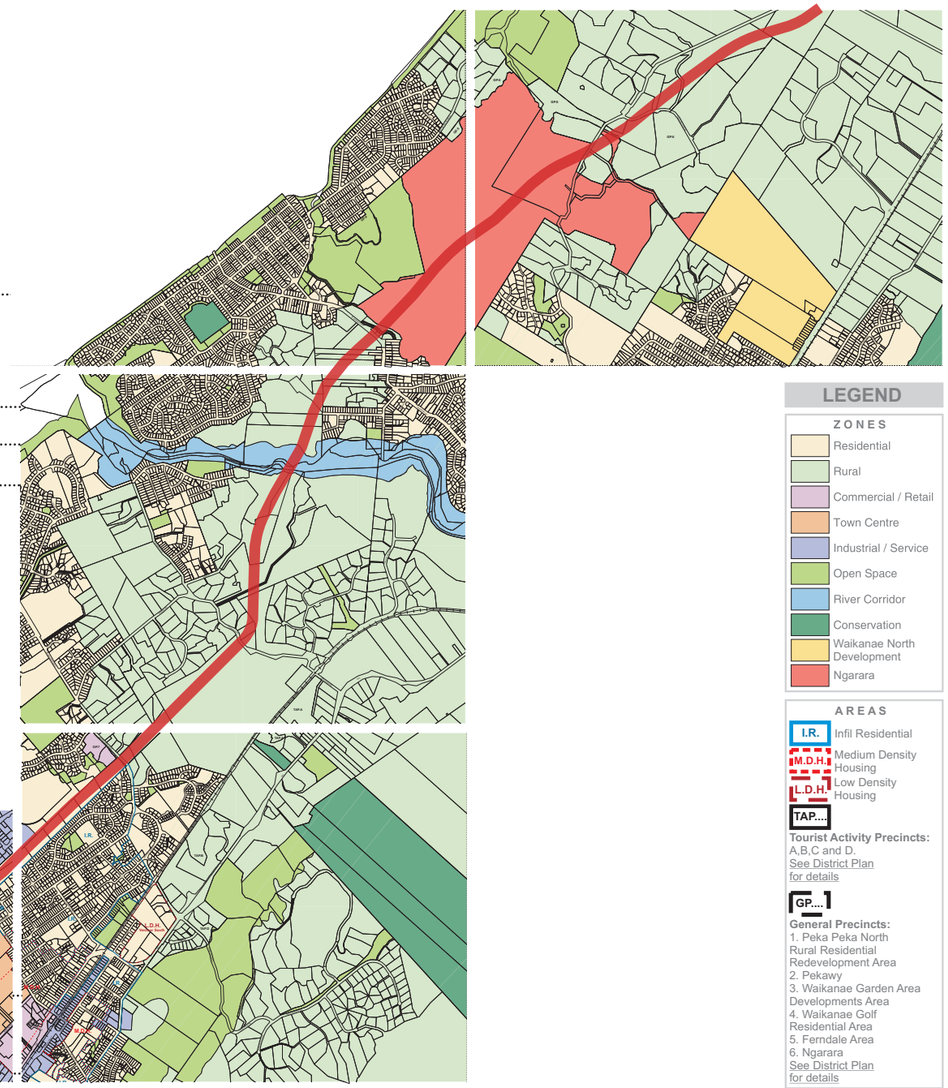


Figure 1 KCDC District Plan Zones Map

2.5 Transport Policy

Regional Land Transport Strategy 2007-2016

The Regional land Transport Strategy (RLTS) guides the development of the region's transport system including public transport, roads, walking, cycling and freight for the next ten years and beyond. It has a close link with the Wellington Regional Strategy due to the connections between transport and economic development.

Key issues and pressures faced by the region include:

- Access to goods and services, employment and amenities
- Transport related greenhouse gas emissions
- Public transport capacity and mode share
- Reliability of the transport network
- Severe traffic congestion, particularly at peak times
- East-west connections between key transport corridors and regional centres.

The role of the north-south route as a primary access route into the region and to Wellington City from the north is recognised. Safety and reliability are significant issues for this corridor. An increase in road freight movement is likely to further increase peak period congestion.

The RLTS recognises the Kāpiti Coast as being an area of growth for both population and long-distance commuters, with resultant pressures on the regional transport network. The importance of freight transport through this area, and the link between this and economic growth for the region, is outlined.

A review of the RLTS is underway to enable the Wellington Regional Transport Committee to take account of several changes that have occurred since the current strategy was adopted in 2007. This includes the Government's decision to invest over $2 billion dollars in the Wellington Northern Corridor RoNS, including MacKays to Peka Peka .

Design Implications

1. Aim to provide for increasing road freight movement and likely increase in peak traffic congestion. The location of Expressway interchanges has the potential to help relieve traffic congestion and remove freight vehicles from the existing State Highway.
2. Aim to take advantage of opportunities for improved public transport connections, walking, cycling and local movements along the existing State Highway as a result of the Expressway development.

Regional Cycling Plan (GWRC 2008)

The Regional Cycling Plan responds to the policy framework for cycling set out in the RLTS. The NZTA's role is to carry out improvements to the cycling network on or across the highway network and to assist local authorities to make improvements broadly parallel to state highways.

In addition, it is expected that each local authority in the region will identify their important cycle routes through development of their local cycling strategies.

Design Implications

3. Aim to enhance the regional cycle route along the existing SH1 and/or provide a new commuter cycle route along the Expressway alignment.

Cycleways, Walkways and Bridleways Strategy (KCDC 2009)

The purpose of the Strategy is to:

- Put in place a strategic direction for the future planning of cycling, walking and horse riding in Kāpiti
- Provide a strong foundation for the implementation of a cycleways, walkways and bridleways network that will enhance the experience of users with a variety of abilities.

The vision statement of the strategy is "The Kāpiti Coast is renowned for walking, cycling and horse riding." The three objectives that will realise this vision are:

- To promote walking, cycling and horse riding as safe, everyday modes of transport and recreation.
- To develop safe networks that improve walking, cycling and horse riding access and linkages throughout Kāpiti .
- To encourage and improve local, regional and nations co-ordination, co-operation and collaboration in the planning and provision of safe walking, cycling and horse riding opportunities.

The strategy takes a broad view of walking so that people with physical or cognitive disabilities, limited or no vision or hearing and those in wheelchairs or on mobility scooters are included. In the vicinity of the Mackays to Peka Peka route, the strategy actions include developing:

- A coastal walkway, cycleway and bridleway from Paekākāriki to Ōtaki;
- Extensive linkages to schools, town centres, community facilities, public transport and key natural features;
- Safe access within and across the State Highway and Western Link corridors;
- Good access up into the back country.

Design Implications

4. Aim to incorporate strategy actions in the Expressway design which includes linkages to important amenities and services and access across and along the Expressway corridor.

Towards a Sustainable Transport System – A Strategy for Managing Transport on the Kāpiti Coast (KCDC 2008)

This document provides a long-term strategy for transport by all modes. Within the overall District vision, the primary transport objective for the Kāpiti Coast is to:

- *"create a physical transport system that is attractive, affordable, connected, responsive, safe and offers effective mode choice so that it enables people to act in a sustainable way."*

It has a broad focus on creating increased local jobs and on the district to moving away from being an 'edge community,' dependent on commuting to work, to becoming a place that has extensive local opportunities for work and business development. **Outcome 1** underpinning the Transport Vision is:

- *"That Kāpiti Coast becomes nationally famous for an extensive walkway, cycleway and bridleway system that has [amongst others] the following features:*
  - > *A coastal walkway and cycleway from Paekākāriki to Ōtaki;*
  - > *Safe cycling commuter links between communities, from Paekākāriki in the south to Ōtaki in the north, and a clear focus on improved safe east-west cycling and pedestrian linkages;*
  - > *Particular regard needs to be had for safety for old and young users;*
  - > *Extensive linkages through the built-up areas to key natural features such as rivers and areas of bush;*
  - > *Improved linkages between residential areas, schools, shopping and workplaces;*
  - > *Good linkages between schools and centres"*

Outcome 2 focuses on quality of access:

That the level and quality of access within and between communities is improved, including:

- provision of more road linkages and multiple bridge crossings between Paraparaumu and Waikanae;
- provision of a passenger rail service to Ōtaki;
- improved night-time bus services;
- improved internal north/south and east/west linkages within Paraparaumu;
- all communities have safe and interesting pedestrian links (with good signage) that encourage use of local areas;
- that there is easier and safer pedestrian and safer road access to the town centres – especially the Waikanae and Paraparaumu Town Centres;
- that the District's main east/west roads, especially Kāpiti Road and the road to Ōtaki Beach, are developed as beautiful boulevards.

Outcome 3 highlights the issues of local links, requiring linkages between Waikanae and Paraparaumu to be improved to reduce energy use and travel time.

Outcome 4 raises the issue of freight transport, seeking that the District develops a role as a transport hub, including the distribution of freight.

Outcomes 5, 6 and 7 recognise the need to provide for local movement across the district including better public transport and an extensive walkway, bridleway and cycleway system.

Design Implications

5. Aim for safe commuter cycling links between communities. The Expressway offers opportunities for improved commuter cycle route(s).
6. Aim to provide an additional river crossing. The location and design of interchanges in Paraparaumu and Waikanae should improve connectivity between the two communities.
7. Aim to supplement walking, cycling and horse riding routes.

2.6 Parks Policy

Parks Network Plan (GWRC 2011)

GWRC is in the process of finalising the Greater Wellington Parks Network Plan. This is the first-ever consolidated plan for managing regional parks and forests. Once approved, the Parks Network Plan will replace the management plans for Battle Hill Farm Forest Park (2008), Belmont Regional Park (1996), Queen Elizabeth Park (2006), and also the Regional Forest Lands Management Plan (2006) and the Regional Park Network Management Plan (2003).

The over-arching vision of the Parks Network Plan is:

"To enrich lives by connecting people with healthy natural places."

The Plan contains 18 'Guiding principles for management' and a number of general management objectives and policies covering biodiversity and ecosystems, landscape and geological features, cultural heritage, land management, visitor services, park infrastructure, partnership in parks, research and monitoring, and land tenure, acquisition and disposal.

The Plan also contains specific objectives for each of the regional parks covered by the plan. Only the Queen Elizabeth Park section (refer Figure 2) is relevant to the MacKays to Peka Peka project.

The management focus for Queen Elizabeth Park is to:

1. Preserve the coastal ecosystems, dunes, wetlands and bush remnant
2. Implement a sustainable farm management plan and continue farming operations to manage open space where appropriate
3. Provide family recreation opportunities
4. Develop and maintain a heritage precinct and associated visitor attractions
5. Recognise the historical occupation of the area by both European settlers and Māori
6. Re-evaluate future land management of the north eastern area of the park that may be affected by any Expressway development

The Plan also identifies that MacKays Crossing and Wellington Road (Paekākāriki) will be the primary park entrances.

The following matters are included amongst the projected changes identified for the park and relevant to this project:

- Develop Wainui, Whareroa and particularly MacKays as the main focal points for visitor activity and key development nodes for locating facilities and activities that are family friendly and focused on heritage.
- Work with community groups and other agencies to implement a cycle plan to link Raumati South and Paekākāriki with better opportunities both for commuter and recreation cycling.
- Work with NZTA and other agencies to maximise recreational opportunities from any proposed roading developments by NZTA.

Te Araroa – The Long Pathway

The Te Araroa Trust was formed in 1994 with the aim of creating a "walkway the length of New Zealand for all to enjoy". Te Araroa, The Long Pathway, is to be a 3,000 km walking track from Cape Reinga to Bluff, connecting various settlements, towns and cities en route. The Trust's goal is to get the New Zealand walking trail in place by the end of 2010.

All sections of the route on the Kāpiti Coast are now open. The 'South of the North Island" section of Te Araroa intersects with the Project at the Waikanae River. The walkway follows the north bank of the river from State Highway 1 until Otaihanga, where a footbridge is used to cross the river, and continues mainly along the coast.

The section of the route through the Kāpiti District is described as:

"An easy day's walking after the rigours of Tararua tramping! The trail is virtually level walking for the whole 22kms, taking in some of the Kāpiti District's icons – the Waikanae River, estuary and scientific reserve, Kāpiti Island in full view from the beach, Queen Elizabeth Park, and the distinctive cafes and local art outlets in Paraparaumu, Raumati and Paekākāriki ."

Design Implications

1. Aim to minimise visual, landscape, noise, land take and other potentially adverse effects on QE park.
2. Aim for the design of the bridge over the Waikanae River to provide good amenity for pedestrians below.

Figure 2 Aerial oblique view south across QE Park - the existing SH1 is on the east edge

2.7 Other Policy, Strategy and Studies

Waikanae River Floodplain Management Plan (GWRC 1997)

This Floodplain Management Plan contains information about the Waikanae River and floodplain, the risk of flooding, what has been done to minimise its impact and what is intended to be done in the future. It is a blueprint for the management of the river and floodplain during the next 40 years.
The Plan includes a set of 'outcomes' as a result of examining various options for dealing with the flood problem.

The Expressway crosses the Waikanae River (refer Figure 3) in the vicinity of Makora Road (Otaihanga) and Kauri Road (Waikanae). Within this area a wide river corridor is identified, as well as areas of ponding. Considering the impact of structures in a flood is identified as an issue within the river corridor area, as are recreation, cultural and ecological issues.

The Plan has no statutory status, instead the Regional Plans (such as the Regional Freshwater, Soil, Coastal, Discharges to Land, Landscape and Air Quality Plans) and the Kāpiti Coast District Plan will be used to implement the objectives of the Floodplain Management Plan.

Design Implications

1. Aim for any structures in the river corridor and floodplain to have a neutral influence on flood risk
2. Aim to integrate bridge and other structure's design with the recreation, cultural and ecological context

Figure 3 Aerial oblique view west along Waikanae River

Kāpiti Coast: Choosing Futures - Development Management Strategy (KCDC 2007)

This document sets out KCDC's strategy for the management of development and settlement on the Kāpiti Coast. It is written within the context of Kāpiti Coast: Choosing Futures – Community Outcomes and also takes into account the growth framework emerging from the Wellington Regional Strategy process. The strategy is divided into four parts: Context, District Form, Urban Structure, and Design and Processes.

Part 1: Context

The links between the strategy and other KCDC publications are outlined, including the Community Vision (Kāpiti Coast: Choosing Futures), and the outcomes of consultation that indicate the desires of the district's communities in terms of growth and development. It also refers to the 14 sustainable development principles adopted by the Council.

Part 2: District Form

Deals with 'macro form' which shapes the broad feel and structure of settlement across the whole District. Part 2 covers landforms, rivers and green corridors, the coast, natural hazards, urban development areas, rural lands, major transport and access linkages, and wāhi tapu, culture and heritage sites. The Strategy recognises that the Kāpiti Coast is defined by five very strong natural features:

- the coastal edge;
- a coastal plain made up of dunes and inter-dune wetlands and peat areas, in some cases overlaid with river gravels, and with areas of remnant vegetation;
- the southern coastal escarpment and coastal hills rising sharply from the coastal plain;
- swift-flowing rivers and streams, with remnant riparian vegetation and in some cases major estuaries;
- the bush clad Tararua and associated ranges.

There is a strong emphasis on the form of development being fundamentally shaped by natural features, rather than simply taking account of individual effects on these.

This part of the Strategy also outlines the KCDC position on urban growth and urban consolidation. The form of growth in the district is proposed to include a growth area at Waikanae North, developed within an explicit sustainable urban form framework and including a defined 'urban edge' as a limit to expansion. The role of the Western Link Road in ensuring connectivity for this area is stated.

The Strategy also deals with major transport systems and access linkages. Connectivity is at the forefront of the approach, with a desire to increase the range of transport mode choices and provide alternatives to both fossil fuel use and State Highway 1 use. The document considers extension of the passenger rail system as the most pressing issue for the Western Corridor, with supporting bus, pedestrian and cycling access. The desire for a passenger rail station at Raumati is highlighted, and the need for a north-south connection through the district (Western Link Road) is highlighted. There is detailed information about the Western Link Road in this strategy.

An indicative network for cycling, walking and bridleways is outlined in the strategy. The links between this and management of development and the open space network in the district are highlighted. Fifteen priority routes are outlined, with several of these in the vicinity of the Project.

Part 3: Urban Structure

Part 3 is concerned with the strategic approach to urban structure in terms of the more detailed form of the urban parts of the District. There is specific focus on the uniqueness and cohesion of settlements, the role and location of major activities in the centres, and the management of urban densities and industrial areas.

The nature of each of the district's five communities is summarised, with the need to carefully integrate any planned new major road (in this case, the Western Link Road) carefully into these communities. The characteristics of these communities that need to be protected is considered in some detail. The Strategy discusses development of higher-density areas, and states that :

- *"The encouragement of intensification of residential activities around centres and public transport nodes is a key aspect of managing urban growth and creating vibrant centres".*

In terms of industrial land, the strategy highlights the preferred approaches for the Matai Street, Ihakara/the existing SH1/Railway area, Te Roto Drive/Kāpiti Road in Paraparaumu (including the airport), and Waikanae. The extension of industrial land and business parks is also considered.

Part 4: Design and Processes

Part 4 outlines the processes and design principles that will be used to deliver the strategy's outcomes.

Design Implications

3. Aim for internal connectivity within the district to support access to local centres
4. Enable Waikanae North to accommodate urban growth in the future, and for access to this area to be factored into the design
5. Ensure that the safety and reliability of the new route will address the problems of the existing State Highway
6. Aim to not preclude the potential for a passenger rail station (with park and ride facilities) at Raumati
7. Seek to improve a network of cycling, walking and horse riding routes
8. Recognise the individual characteristics of each of the district's communities

Kāpiti Coast Choosing Futures Community Plan (KCDC 2009)

The LTCCP is an umbrella document and has two parts which include a context description (wellbeing concepts, sustainable development principles, summary of Community Outcomes, tāngata whenua message and vision, the regional direction, significant issues risks and uncertainties). It sets out detailed activities to be undertaken and a summary of funding and rating policies. Part two contains financial and funding policy and how performance on all the activities and their levels of service will be measured.

Additional monitoring requirements are also to come from the District Plan review which is currently in train.

Design Implications

9. Align monitoring requirements for the Project with KCDC monitoring outcomes to ensure useful and comparable results.

Kāpiti Coast District Open Space Strategy (Draft 2011)

The draft Open Space Strategy sets a vision for the provision and management of open space in the District. The strategy provides a vision:

The open space vision for the Kāpiti Coastal District Council is to develop a rich and diverse network of open spaces that protect the region's ecology and support the identity, health, cohesion and resilience of the District's communities. This vision applies to both public and private land.

The strategy identifies a range of gaps between what exists now and what is desired in terms of open space. It then provide objectives and actions to achieve those. Of relevance to the ULDF are:

- To protect areas of high natural character and amenity value
- To develop a coordinated, clearly defined and where possible, linked system of public and private land of an open, cultural or natural character that together can provide:
  - > a buffer of visual contrast to the built environment;
  - > ecological corridors for improved ecological resilience;
  - > an alternative access link between communities;
  - > increased movement choices between public open space.
- To develop a network of open spaces which support Kāpiti's distinct community identity and relaxed lifestyle values.

Kāpiti Coast District Coastal Environment Study (Draft Aug 2011)

This draft study has been undertaken to support the KCDC District Plan review process and to assist with Council's other initiatives in managing the natural character of the coastal environment. It describes the identification methodology for, and maps of, the extent of the coastal environment and the areas of high natural character within it. This study is at a draft stage and has had no review or consultation inputs (at the time of ULDF) writing. It has no statutory recognition under the RMA.

It is noted that the Coastal Environment Study identifies almost all of the flat plains of Kāpiti from the coast to the foothills as "Coastal Environment". According to this study all of MacKays to Peka Peka would thus be within the Coastal Environment, but none of the areas of high natural character are affected by the Project.

Kāpiti Coast District Landscape Study (Draft July 2011)

This draft study has been undertaken to support the District Plan review process. It describes the landscape and identifies the natural features and landscapes considered outstanding. This study is at a draft stage and has had no review or consultation inputs (at the time of ULDF) writing. It has no statutory recognition under the RMA.

It is noted that in relation to this study MacKays to Peka Peka affects:

- The Lower Waikanae River (in the District Plan as an outstanding landscape) which is described as a *significant amenity* feature/landscape.
- The Ngarara Dunes which are described as an *outstanding natural* feature/landscape

Design Implications

10. Aim for the design to enhance linkages within and across the Expressway corridor to provide connections for people moving between communities and for the ecological benefits.
11. Recognise that in the future the Landscape and Coastal Environment management in the District Plan could change, although at this early stage in study process it is too early to prospect any implications for MacKays to Peka Peka.

03|physical context

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3.1 Physical Context Introduction

The context section of the ULDF describes the existing context of the district as it relates to the Expressway. In some instances the context description is wide scale and regional in nature and in others is more site specfic.

There are eight aspects of context that are described here which are:

- landform
- hydrology
- vegetation
- ecology
- landuse and built environment
- heritage
- movement
- State Highway 1

Following these eight aspects of context the character of the landscape is described to facilitate a combined understanding of the existing environment the Expressway is to be located in.

3.2 Landform

The Expressway route is located within the relatively narrow coastal plain defined by the Tararua Ranges and the Tasman Sea (refer Figure 4). West of the coastline Kāpiti Island rises from the sea. The ranges, coastal plain and island are distinctive landform elements in the district.

The Tararua Ranges feature due to their relative proximity, height (350m- 540m above mean sea level [amsl]), mass and contrast to the flatness of the coastal plain. The ranges are an ever present backdrop to the area.

Kāpiti Island rises to 125m amsl and lies 5.5 km off the coast. Its height and linear form give it a distinctive outline when viewed from the mainland. The island is a contemporary and culturally significant feature in the identity of the Kāpiti Coast District.

The Tararua Ranges and foothills are comprised of old sedimentary rock - greywacke. The ranges formed by the same uplifting and faulting processes that generated the southern part of the North Island. In contrast, the coastal plains are geologically much younger having resulted from the deposition of rock eroded from the ranges. The eroded rock material from the ranges is carried to the coast by streams and rivers. This process further breaks the rock material down to smaller and smaller pieces. Ultimately as sand the material moves east and southward along the coast where it is deposited by onshore wind and wave action.

From the coastal beach the prevailing westerly winds have blown sand inland, forming an extensive network of dunes (refer Figure 6) aligned in a west-northeast to east-southeast direction (approximately parallel to the coast). The continual process of dune formation has tended to extend the land mass seaward. As each new line of dunes is formed on the coastal edge (foredunes) the overtaken dunes become more stable back-dunes.

The successive rows of interdunal hollows are damp and form wetlands that filter, collect and transport water, soil and silt, and vegetative material. Over time these areas form peat and eventually rich organic soil. Consequently, a complex system of duneland has formed along the coastal plain with roughly regular rows of stable dunes separated by low lying hollows containing, wetlands and peatlands (refer Figure 8).

Typically, the dunes are composed of sand with varying depths of top soil cover. The lower land and inter-dunal hollows consist of rich organic soils and peat up to 6.0m deep in places.

With the exception of the alluvial deposits of the Waikanae River flood plain, all of the Expressway route from MacKays Crossing to Peka Peka is situated in sand country - much of it remnant dune landforms. The peaty soils are prevalent both beneath and between dunes, as well as where the landforms have been regraded for urban uses.

The elevation of the landform varies between 3m amsl and 20m amsl, with the highest dunes being those situated the furthest inland. The Expressway traverses the full range of elevation, from low points at watercourse crossings (eg Wharemauku Stream and the Waikanae River), to the highest dunes.

Large areas of the original dune landforms of the Kāpiti Coast have been modified to facilitate farming and urban development - much of it occurring since the 1950's. The wet areas have been drained and filled over. The remnants of these wet areas and the systems that support these are drainage channels, some recreated wetlands and low-lying flood-prone land. In the north part of the District the less urbanised areas retain some highly valued less modified wetland areas.

The little that remains of the original and unmodified dunes in the more urban part of the District is within the Expressway corridor (refer Figure 7) . The road corridor designation (applied more than 50 years ago) has 'frozen' this land and prevented its development.

As the area has been settled, movement paths through the district have followed the toe of the line of the escarpment to the east. Local roads that connect across the plain east to west to the beach areas have typically cut through the dunes and these cuttings are prevalent in places such as Raumati and Mazengarb Roads.

The east-west local roads also provide corridors from which views of the landforms of Kāpiti Island (if moving west) or the hills (if moving east) can be had.

Design Implications

1. Guide the design of the Expressway within the nominated corridor with the aim of minimising earthworks by:
   - > forming an alignment that runs between large dunes rather than removing them
   - > forming its vertical and horizontal extent in response to natural levels
2. Recognise that some dune loss or modification will be inevitable given the confined corridor and consider approaches to address this such as:
   - > Minimising the vertical profile of the Expressway to recognise that the coastal plain is relatively flat (even with the dune forms) - aim for an Expressway 'in' the landscape rather than 'on' the landscape.
   - > Carry out earthworks so that final landforms reflect natural shapes and patterns of the existing dunes. The prevailing alignment of the dunes runs roughly parallel to the coast therefore the design or modification of landforms should acknowledge and reflect this pattern. Leaving dune edges and expressing dune cuttings in places to reveal the dune shape as a cross-section.
3. Avoid creating and reshaping "dunes" as uniform bunds as they will appear unnatural and contrived.
4. Consider the way in which the peat material that will need to be removed in large quantities can be utilised within the District -such as mixing with other material to use for planting and to shape disturbed sand areas.
5. Utilise references to the rock and process of its breaking down in the structures and landscape of the Expressway rather than non-local materials
6. Recognise the views to the Tararua Ranges and Kāpiti Island as prominent and important landforms and features in the design of east/west local road crossings.
7. Provide for views from the Expressway to features such as the coast, Kāpiti Island and Tararuas, although this should not be at the expense of causing adverse effects on the local communities.
8. Recognise that the Waikanae River area is an alluvial flood plain and different from the dune area; it is an important and defining feature creating a physical and visual linkage between mountains and the coast.
9. Recognise that the sand will be vulnerable to wind and water erosion if not managed, and that peat ground or extracted peat will require conditioning before planting.

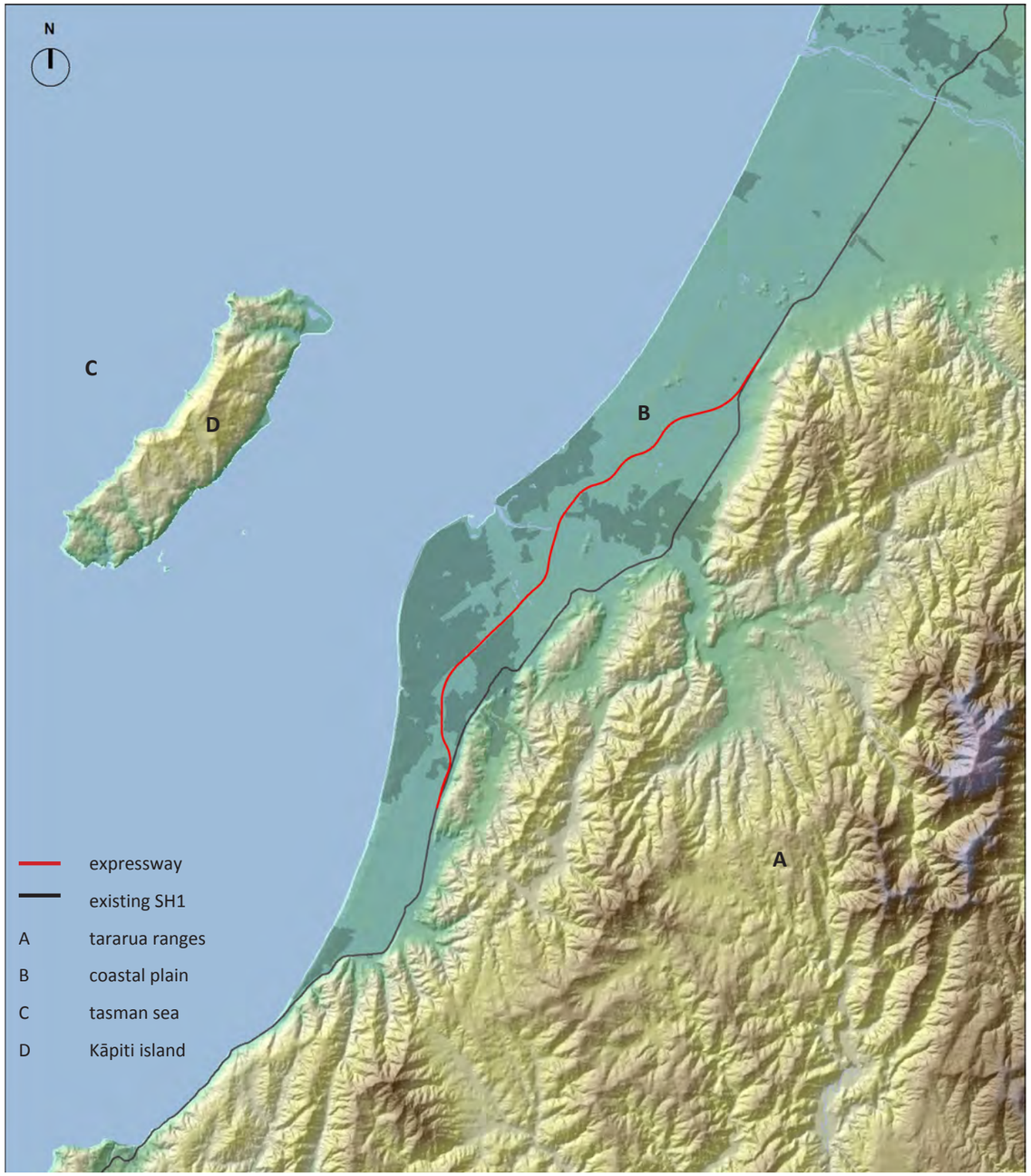

Figure 4 Broad Landform Context

c 1920-1950 looking north from Paekākāriki [ATL 1/4-019755-F]

1972 Paraparaumu Beach looking east -the large open area in immediate foreground is the golf course [ATL 1/4-020515-F]

1951 Waikanae looking south - the river can be seen mid ground [ATL WA -68437-F]

Legend

- High : 1280
- Low : 0
- Centreline (Option E6)
- railway

A mackays crossing

B raumati beach

C raumati

D paraparaumu

E paraparaumu beach

F waikanae

G waikanae beach

H waikanae river

I peka peka beach

J peka peka

Figure 6 Within QE Park the dune system close to the coast is still intact. Prior to the park's establishment, the flatter areas were historically developed for farming and would have previously been extensive wetlands.

Figure 7 Remnants of the once extensive dune system remain in the Project corridor protected from development by historical road designation

Figure 8 Dunes and wetlands north of Te Moana Road

Figure 5 Landform

0 0.5 1 2km

3.3 Hydrology

Prior to European settlement the Kāpiti coastal plains were a complex network of dunes, wetlands and streams. These networks sustained an ecological system inextricably linked to the natural hydrological processes.

Since the early 1900s the plains have been drained, at first to facilitate pastoral farming and then further drainage has occurred to enable urbanisation and reduce flood risk (refer Figures 9 and 10). The area remains visibly wet in places as, despite the surface hydrological modification, there is a relatively high water table which accompanies the low lying coastal plains. As noted in the landform section of this ULDF, the sub-surface hydrology maintains the conditions that continue to support saturated peat soils.

The drainage of the subject area today comprises rivers, streams (often channelised), wetlands, flood plains, ponding areas, constructed drains and high groundwater. Figure 13 describes the relatively large area identified as flood-prone or with permanent water bodies. It also describes the recognised wetland areas which are now very rare on the coast and in the region generally.

The drainage pattern of the land follows the natural east west gradient inclining from the hills toward the sea. The Expressway corridor runs north-south and consequently crosses numerous waterbodies - now variously modified as drains and rivers.

Potential for surface flooding is high throughout the district because of the relatively flat gradient across the coastal plain and the high water table. Many of the larger, low lying areas are identified as flood water storage areas (they hold water in high rainfall events before it discharges to the constrained drains) and secondary flow paths (they channel water to the coast if rivers overtop), especially in the vicinity of the Waikanae River and Wharemauku Stream.

Urban development has occurred on the higher drier land and the flooding potential of the low lying areas constrains further development on parts of the coastal plain. In some places features have been made of wetlands (refer Figure 12)

The Waikanae River (refer Figure 11) is the largest water body in the area between MacKays Crossing and Peka Peka. Its catchment is the foothills of the Tararua Ranges and it is a distinctive feature of the area. The river has recreational and natural values and is identified in the Kāpiti Coast District Plan as an Outstanding Landscape.

Alluvial material deposited by the river has created a flood plain between the hills and the sea. On the upper plain near the hills, the river cuts through alluvial gravels before flowing through the coastal dunes at Otaihanga and then to the estuary and the sea . Flooding of the river poses a significant natural hazard in the local area. A flood control scheme including stop banks was first established in 1956-1964. However, even medium sized floods (20 year return period floods) continue to cause damage.

The Wharemauku, Mazengarb, Muaupoko and Waimeha Streams are smaller than the Waikanae River, but similarly drain local catchments at the foot of the Tararua Ranges.

Design Implications

1. Maintain and enhance the watercourses that remain with a view to reduced channelisation and more natural forms which can enhance the natural habitat for fish and other animals as well as improved visual amenity.
2. Integrate planning and design with GWRC and KCDC to link in the affected sections for the Expressway with the broader community watercourse network aspirations.
3. Consider the bridging of multiple stream and other watercourse crossings with long spans to keep crossing corridors wide and able to incorporate additional east west walking and cycling Expressway crossing links.
4. Integrate planning and design for flood storage associated with the Expressway in conjunction with other urban development needs and functions, such as at the Paraparaumu Town Centre where open space values can be incorporated and other places as appropriate.
5. Identify and protect the existing natural wetlands from stormwater runoff associated with the Expressway.
6. Replace any existing natural wetland area losses with new contiguous or linked wetland areas.
7. Add new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff.
8. Expand and extend the wetland network utilising the Expressway corridor to link the numerous water bodies utilising the high water table.
9. Design any new wetlands with an appropriate maintenance regime that recognises its function as either natural, or for some form of stormwater management or flood detention.
10. Recognise in the design of the bridge structure the significance of the Waikanae River corridor as a ‘mountains to sea’ physical, ecological, landscape and recreational link and other features of the corridor including ox-bow and Muaupoko Stream.

Figure 9 Channelised watercourses - such as the Wharemauku Stream have reduced natural values, but provide valued east-west linkages across the coastal plain.

Figure 10 Large areas of damp ground and swampland has been drained for farming

Figure 11 The Waikanae River is the largest watercourse in the Project area

Figure 12 Natural and constructed wetlands are a common feature of the area.

Legend

- Wetlands
- Lakes and rivers
- flooding
- Expressway
- Railway
- State Highway 1
- Local roads
- A Wharemauku Stream
- B Mazengarb Stream
- C Waikanae River
- D Waimeha Stream

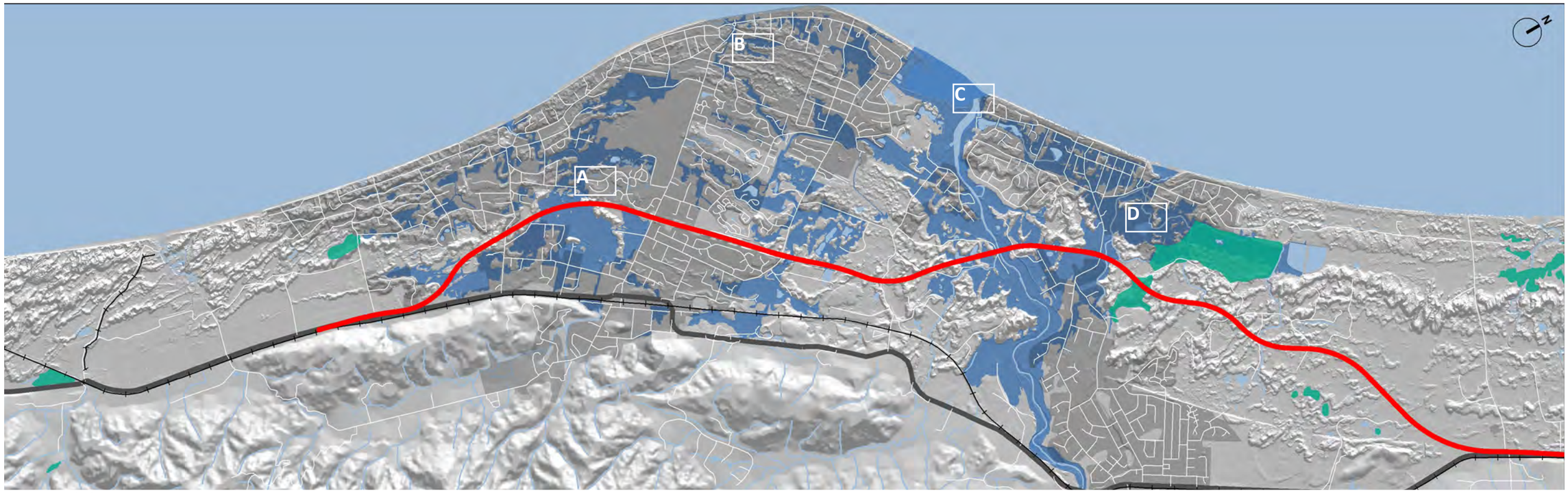

Figure 13 Hydrology

3.4 Vegetation

Prior to human occupation, the Kāpiti coastal plain was covered with a diverse mix of vegetation types. Predominant among these were the areas of lowland podocarp forest. This was interspersed with areas of swamp forest (kahikatea, pukatea, hinau, tawa, swamp maire, titoki and puka), areas of raupo reedland, flaxland, cabbage tree and coprosma, as well as sedgeland.

Most of these vegetation types and combinations have now been removed (refer Figure 19) to facilitate farming (refer Figure 14) and more latterly urbanisation (refer Figure 15). The original forests and dune wetlands now occur as isolated fragments and pasture is the dominant vegetation cover (refer Figure 16).

Several small remnants of lowland forest and scattered groups of trees persist; some of them have protection. Most remnants are located north of the Waikanae River 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 Expressway corridor, and groups and small of kanuka at various other locations. The lack of connectivity between the fragmented indigenous plant communities reduces the potential to prolong and enhance their overall ecological health and biodiversity.

Mature exotic trees feature in places. Typically these are grouped around rural dwellings as shelterbelts, or erosion control planting in the river corridors, or amenity planting in rural and urban areas. In places, there are individual mature amenity trees that were once part of a larger group of trees or a shelterbelt when the area was farmed but with closer subdivision the rest of the stand or shelterbelt was removed. These trees, while not significant in terms of type or stature, still contribute to the overall landscape character of the area.

At Waikanae (refer Figure 17) there has been a strong tradition of tree planting and gardening and it is well known for this today. The sandy soils on the coastal plain make the sustainability of exotic vegetation challenging. It is in the areas north of Waikanae where some of the more natural vegetation and wetland areas remain (refer Figure 18).

Design Implications

1. Reinforce and supplement existing forest remnants where they can be extended into the Expressway designation corridor.
2. Recognise the value of all woody vegetation in terms of integration of the Expressway into the landscape; retention of existing amenity trees and shelterbelts can assist with landscape integration and mitigation.
3. Reflect existing vegetation patterns and species mix in mitigation planting, using both exotic and native plant species, but with a predominance of native species.
4. Avoid the same vegetation treatment along all of the route and use site specific plant options and layouts that reflect the varying contexts.
5. Consider maintaining the open aspect to the rural areas and integrating the farming practice into the corridor.
6. Provide for local biodiversity through establishment of locally sourced indigenous species along much of the Expressway corridor.
7. Carefully select plant species that will be sustainable within the corridor, recognising the climatic conditions and soil types there and use types that require minimal maintenance after establishment.
8. Aim to utilise alternatives to willows along waterways in consultation with GWRC.
9. Utilise existing scrub vegetation in undisturbed areas and where practicable as a nursery for new plantings.
10. Include provision for monitoring and maintenance of new plantings, ecological and landscape treatment.

Figure 14 Rural scale vegetation typically consists of exotic species such as pine and willow.

Figure 15 The vegetation amongst the residential and rural areas in combination with wetlands provides an eclectic mix

Figure 16 Remnants of indigenous vegetation remain in places, typically on steep ground and damper areas

Figure 17 Waikanae 1947 A tradition of amenity planting contributes to its 'garden suburb' identity [ATL WA-08815-F]

Figure 18 The area north of Waikanae today where, although much of the original vegetation has been removed, natural landforms and remnants of wetland areas are most intact.

Figure 19 Vegetation

3.5 Ecology

The Expressway is within the southern end of the Foxton Ecological District which extends along the coastal margin between Paekākāriki and Hawera in Taranaki. The Foxton Ecological District comprises one extensive land system; referred to as 'sand country'.

Most of the ecological district, including Kāpiti, has been highly modified by over a century of vegetation clearance and swamp drainage.

The Wellington region overall has lost approximately 97.5% of the wetlands that existed prior to 1840. As wetlands are now so poorly represented in this region most of those remaining, irrespective of the state of modification, are generally considered to be ecologically significant. A desktop ecological assessment identifies 39 distinct areas of identified ecological significance, almost all comprising wetlands or water bodies.

The historical nature of the Expressway corridor's wide reservation for a road purpose combined with subsequent land purchases by NZTA and KCDC has left many of these ecological features relatively unmodified.

The hydrological systems of the coast are fundamental to the sustainability of the wetlands and these will be susceptable to damage from soil compaction, filling with impervious materials, or changed drainage connections.

Many of the existing wetlands are under pressure from invasive weeds and long-term management (including hydrology), need to be taken into account in planning for any enhancement or supplementation with new wetland areas associated with the Expressway.

Water bodies such as drains, streams and rivers located along the Kāpiti Coast are recognised as providing habitat for rare or threatened freshwater fish species (refer Figure 20), including giant kokopu, brown mudfish and long-finned eel. These will be susceptible to road run-off and stormwater contaminants.

The Kāpiti coastal area is also home to a number of indigenous bird species, some of which are nationally threatened. The nature of the fragmented ecological areas along the Kāpiti Coast, combined with the presence of Kāpiti Island and the large Hemi Matenga Scenic Reserve and Tararua Range, means that the continued east-west movement of bird species between these fragments is important to their sustainability.

In addition to providing habitat for birds, the isolated stands (Figure 21) of regenerating manuka, kanuka and mahoe along the Kāpiti Coast may provide habitat for lizards.

Design Implications

1. Replace any existing natural wetland area losses with new contiguous or linked wetland areas.
2. Add new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff.
3. Expand and extend the wetland network utilising the Expressway corridor to link the numerous water bodies utilising the high water table.
4. Design any new wetlands with an appropriate maintenance regime that recognises its function as either natural, or for some form of stormwater management or flood detention.
5. Utilise and enhance existing wet depressions as components in the stromwater and flood detention design.
6. Utilise east west hydrological connections as habitat corridors across the Expressway in suitable locations.
7. Develop planting and stormwater treatment wetlands to reflect existing vegetation patterns and provide additional habitat to freshwater fish and bird species.
8. Enhance the local biodiversity through establishment of locally sourced indigenous species along much of the Expressway corridor.
9. Ensure stormwater is sufficiently treated within filtration areas such as swales and wetland areas prior to entering water bodies.

Figure 20 Numerous wetlands and streams provide a range of fish and invertebrate habitat.

Figure 21 Small remnants of indigenous lowland forest in the vicinity of Ngarara provide the basis of a wildlife corridor linking the ecologies of the coast and mountains.

Legend

- Areas identified as having high ecological value
- Expressway
- Railway
- Local roads
- State Highway

Figure 22 Ecology

0 0.5 1 2km

3.6 Heritage

The Kāpiti coast has always been a highly desirable place to live - radiocarbon dating suggest people were present there in the 14th century. This long history of use over time has generated many places of cultural heritage interest. A detailed description of the history of the use and occupation of the area is provided in the Archeology and Cultural Heritage Technical Reports (Technical Reports 10 & 11 Volume 3).

Archaeology on the coast can be divided into three broad areas:

- Pre-European Māori occupation

The predominant site types on the coast are middens and ovens, with the shell middens reflecting the high reliance on the sea for subsistence. Burials also occur moderately frequently in the shifting sands.

Māori were utilising the rich resources of the sea and coast, seen in the high number of middens. They were also utilising the resources of the numerous wetlands, including flax, eels and birds. Areas of stable soils were gardened.

- Post contact Māori occupation

Post contact Māori occupation is marked by the continuation of existing subsistence activities and adoption of new ones. Grown crops included wheat and white potatoes, and steel fishhooks were utilised. Māori worked on the whaling stations that sprung up along the coast, and in new industries including flax milling.

- Early European occupation

Early European archaeology includes both commercial and residential sites. Remains of houses and farms, including the buildings themselves survive on the coast, as do remains of early churches such as Hadfield's church at Kena Kena. The railway line built in 1889 is an archaeological site in its own right.

In general there is a prevalence of known archaeological sites across the subject area (refer Figure 23), but with an emphasis on coastal locations and areas north of Waikanae River.

Specifically and in relation to the Expressway route 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, continued use and occupation (Takamore) as well as strong associations with the place.

More recent European historic heritage values coexist in this location with the Greenaway Homestead (corner of Kauri and Pururi Roads) being the most well known. There is no other recognised European historic heritage within the route area.

Design Implications

1. Engage with iwi in the Project design to identify how the route alignment options and the landscape of the Expressway can best be designed to provided for Māori cultural values.
2. Consider the known sites, identify the significance of these, and aim to avoid these as far as possible. However, recognise the avoidance of all sites will not be likely given the many known and still unknown sites.
3. Consider the opportunities to enhance the awareness of the heritage in the way the Expressway and associated structures, pathways and other elements are designed.

Figure 21 Urupā (burial ground) is a significant site and is in continued use

Figure 22 Maketu tree is a significant site - there is a grave within the tree

Figure 23 Aerial oblique which shows the hill with the urupā grassed area and maketu tree in the distance

Legend

- Archaeological Sites
- Buildings
- Wāhi Tapu
- Trees
- Expressway
- Railway
- Local Roads
- State Highway 1

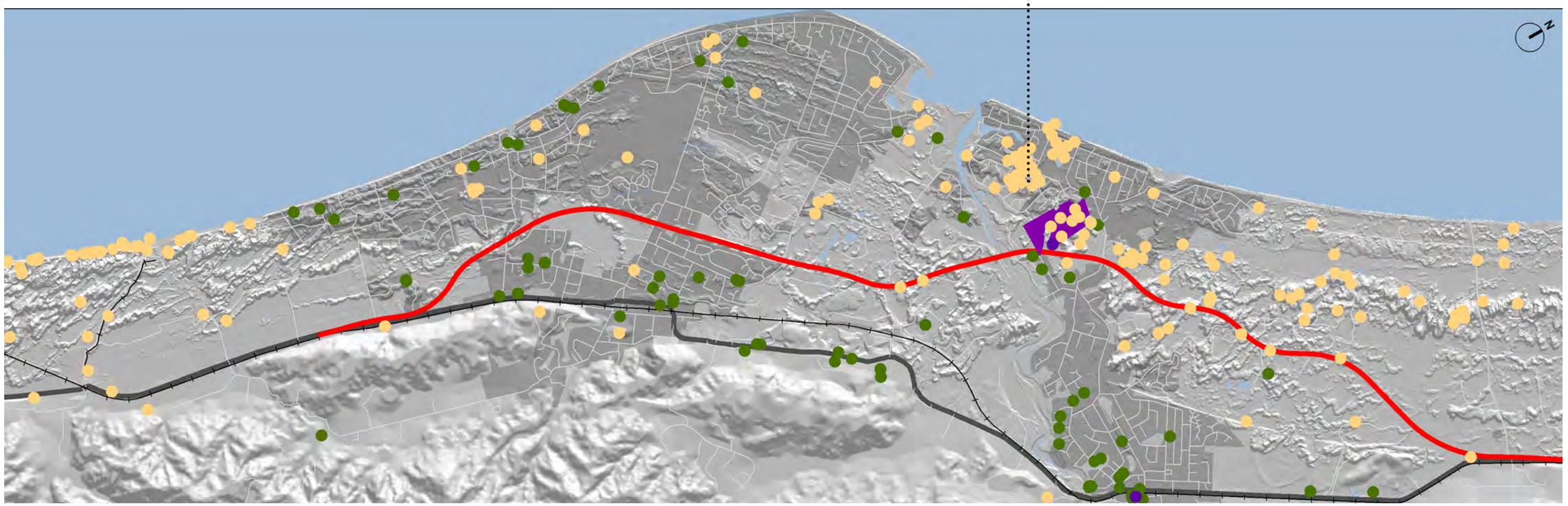

Figure 23 Known Historic Heritage Sites

3.7 Land Use and Built Environment

The area of the District through which the Expressway passes has a range of land uses (refer to Figures 29 and 30 Landuse Plan) and densities of use typical of a New Zealand urban area. The Kāpiti area started its urban life as a series of beach communities and the lateral connections from the existing SH1 leading to the beach places are evident (refer to Figure 24). The existing beach settlement at Peka Peka is typical of the settlement form that would have existed at Raumati, Paraparaumu and Waikanae Beaches at one time.

There are some sections where there are wide gaps between east/west links from the existing SH1. There is also a gap between north and south communities at Waikanae and Paraparaumu because of the intervening Waikanae River.

The older parts of the District's urban areas retain some of the beach settlement character. This is particularly evident at Raumati and Waikanae Beach where smaller scale buildings were constructed within the dune forms.

With improved access to transport since the 1950's the coast developed rapidly and with a more suburban character. The original designation for the "Sandhills Motorway" (MacKays to Peka Peka Expressway broadly follows) occurred at this time.

Much of the former dune landscape has been subsumed by development. Typically this more recent development has filled in around the beach settlements and spread back to and out from the main centres at Waikanae and Paraparaumu.

Notable in the District is the 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 with a share of local employment and commuting to larger centres for work.

The identity and naming conventions of the District's urban areas continues to follow the pattern established historically - a string of 'beach' communities (Raumati Beach, Paraparaumu Beach, Waikanae Beach, Peka Peka Beach); and the inland communities (Raumati, Paraparaumu, Otaihanga, Waikanae).

The point at which these communities become 'beach' or inland places is typically at or west of the Expressway designation. This is a function of the age of the highway designation and its width which provides a relatively wide corridor break and includes within it remnant dune landforms.

The development of the town centres at Waikanae and Paraparaumu is relatively recent. At the largest and regional centre of Paraparaumu the centre is based around a mall with civic facilities separated away. Plans for a town centre with a higher level of public amenity have been in train for some time.

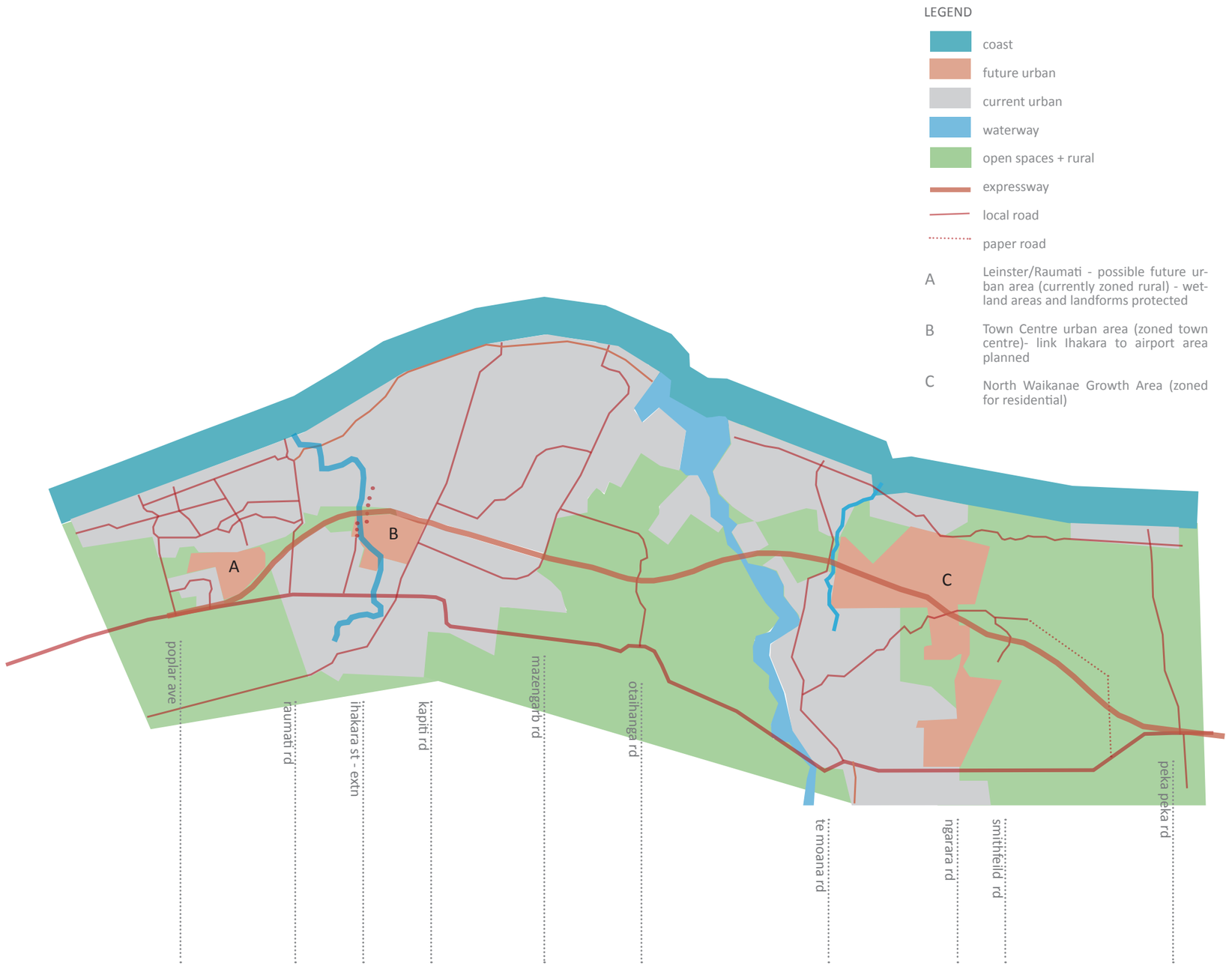

Figure 24 [diagrammatic only] Urban areas and east west connections

Residential

Raumati South, Raumati Beach and Paraparaumu Beach are old established neighbourhoods located close to the coast. These residential areas have good access to local centres - speciality shops, schools, entertainment, community facilities and parks - within 1km to 2km for the majority of residents. The land use, street pattern and pedestrian links enable a movement between residential areas and local centres and community uses either by vehicles, pedestrians or bicycles. The older areas have a more organic and informal street character which appears to be popular for walking (refer to Movement Network section 3.9).

In the section from Poplar Avenue to Raumati Road the adjacent uses to the Expressway are residential and these tend to be suburban type (low to medium) densities and houses of a more recent age.

The exception is in the land at the rear of the Main Road properties where the sites are larger and reflect the pocket of rural zoning. There are opportunities for this area to change in due course, subject to appropriate Plan Changes, to enable residential use and protect natural values there.

Many of the properties in this section around Leinster Avenue and off Matai Road are in elevated locations reflecting the dune system here. From Raumati Road to Ihakara Street area most of the residential areas have wide separation distances from the Expressway, and much of this land is open - much of it is being leased for use as a pony club north of Raumati Road.

The residential areas between Kāpiti and Mazengarb Roads have parks, schools and community uses in the vicinity. The sub-regional centre - Paraparaumu town centre - is within 1 to 3kms from these residential areas but the street pattern, streetscape, built form and land use do not create a pedestrian and cycle friendly environment. The relationship of residential properties to the Expressway corridor is very marked, as subdivision and development has occurred up to the edge of the existing designation.

The residential areas between Mazengarb Road and Waikanae River are relatively isolated and disconnected from the other areas and main centres. They are typically rural residential in density. Access from and to these areas is mainly by car. The areas have no local centres or community amenities, streets are generally disconnected and land use is generally residential in nature.

The residential areas of Waikanae, in the vicinity of the Expressway corridor, are a mix of older and newer houses. Some of the properties are relatively large.

At Pururi Road the suburban street sits proximate to the Waikanae River - between this area and Te Moana Road the properties tend to be larger with extensive gardens or grazing space - a market garden operation utilises part of the designated land here.

Waikanae Beach and Peka Peka Beach have an informal beach character. Streets are generally low speed environments and conducive to safe walking and cycling activities. However, the predominantly residential use of this area (only a few shops and cafe) and the lack of community facilities and schools make the area dependant on driving trips to the Waikanae Town Centre area.

The residential areas close to the Waikanae Town Centre (residential areas to the east of the proposed SH1 re-alignment) are within 5km of the Town Centre. The area is well serviced with recreational activities, schools and community amenities. The street pattern is not well interconnected, which may compromise the accessibility to centres and community uses.

In general, many of the senior living areas are enclosed retirement village precincts located adjacent to industrial land and/or on areas with poor street connectivity and distant to local shops and community facilities.

The District Plan has been changed [refer to District Policy] to enable urban growth with the principal area for this being Waikanae North Low-Impact Urban Area. The north Waikanae area is currently used for rural activities but has been rezoned to allow a range of residential densities, and commercial and community uses in the future [refer to Figure 30].

The growth plan is also to retain the rural gap [Otaihanga] between Waikanae and Paraparaumu town centre and again north of Waikanae towards Peka Peka beyond the growth area described above.

Figure 25 Above: Raumati area looking south - the pony club is in the foreground - the roughly north south streets are Kiwi Road and Matai Road

Figure 26 Right: Kāpiti to Mazengarb Road section with the clearly delineated designation and relatively new houses built up to it

Figure 27 Above: Mazengarb to Otaihanga Road section - the pine forest is where the Expressway designation runs and the properties are at rural residential densities

Figure 28 Above: Te Moana Road area - a mix of larger properties and suburban densities - the ploughed paddock is where the Expressway runs. Closer to the river is where the Kauri and Puriri Road properties are located.

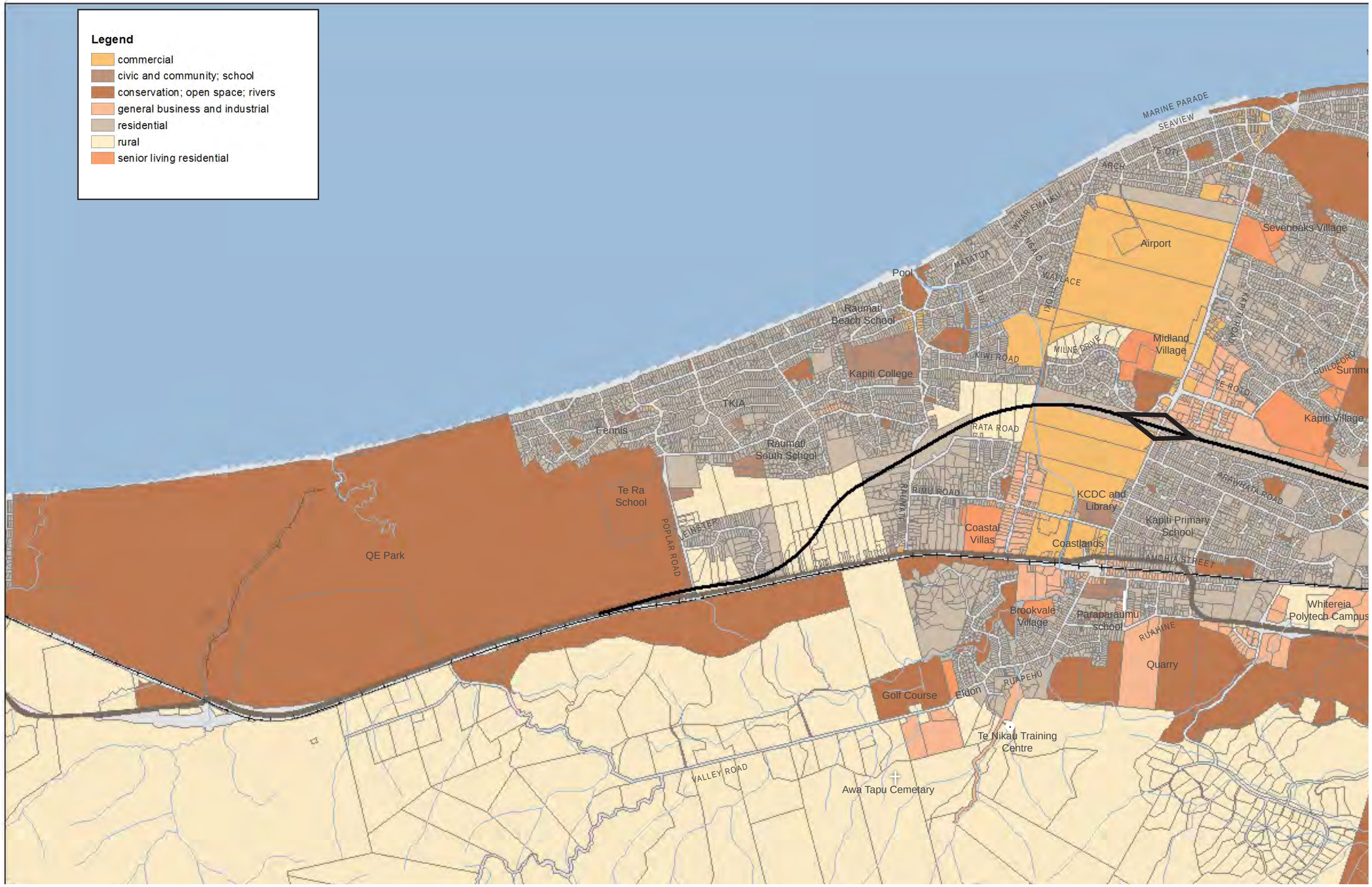

Figure 29 Landuses - south end - Note landuse generally based on District Plan zone types - some items will have an underlying zoning different than the land use

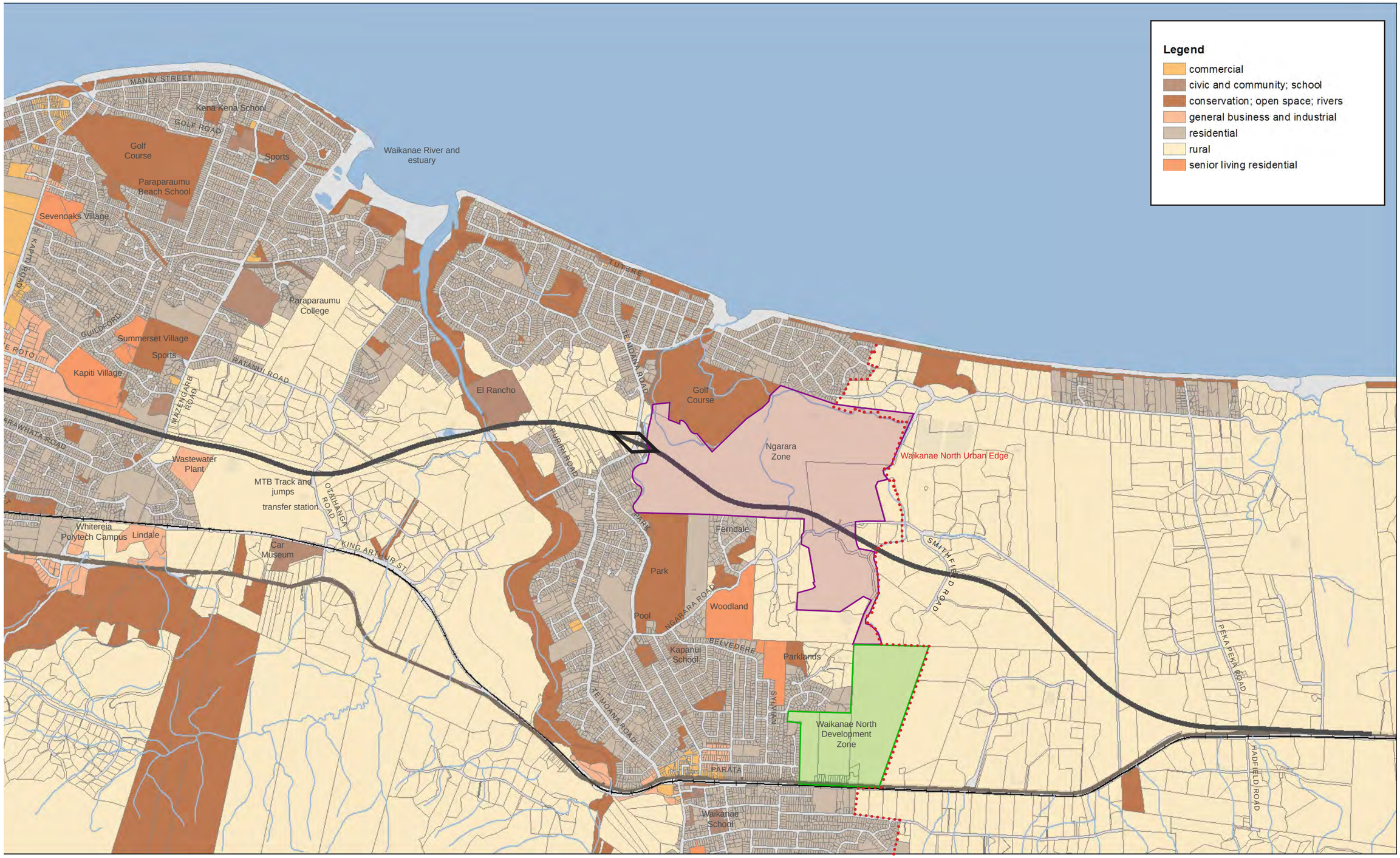

Figure 30 Landuses - north end Note landuse generally based on District Plan zone types - some items will have an underlying zoning different than the land use

Rural

South of Raumati the Queen Elizabeth Park is rural in nature and provides an open landscape between Paekākāriki and Raumati. From Raumati north and through Paraparumu the land is generally urban or zoned for urban uses. Because the Expressway corridor of currently designated land is relatively wide and, especially when considered in the context of large vacant areas of land, such as at Paraparaumu Town Centre, there is an impression of ruralness which belies its zone as urban.

At Otaihanga between the urban areas of Paraparaumu and Waikanae there is a large area of rural zoned land. This area provides a planned open space break between the towns. North of Waikanae the land uses are again more rural in nature, but with the areas contigous to Waikanae's north edge being planned as urban. However, the form of this development to urban north of Waikanae has been carefully planned as linked but discrete areas of development within an an open space context.

The existing SH1 traverses rural land north of Paraparaumu (Otaihanga) and this has been purposefully maintained as rural in reflection of the KCDC growth plan. There is an increased risk of pressure to urbanise this rural land should the highway 'limited access' status be uplifted. For the purposes of maintaining the KCDC growth plan, strategies to discourage urbanisation will need to be applied to the areas where urban growth is not considered desirable.

Industry and General Business

Light industry and general business are generally located near the Paraparaumu and Waikanae Town Centres and along Kāpiti Road. This visual amenity of Kāpiti Road is poor. There are a few sites, generally located to the east of the existing SH1, which carry out primary industrial activities.

Airport

The airport at Paraparaumu has recently undergone a change of zone to allow for commercial business development in conjunction with its upgrade as a regional airport. It is anticipated that this change will generate more options for national air travel to other major centres. It is also expected to generate increased business and employment opportunities locally and along with additional traffic (freight and private vehicles) movements on local roads - particularly Kāpiti Road and a future Ihakara Street extension.

Local Centres - small shops / services / entertainment

The smaller beach centres range in scale and character but can be classified as local centres. These centres are easily accessible by the local residents. Buildings are predominantly single or two storey, except at Paraparaumu Beach where there are taller buildings that include residential apartments. There are no local centres on or adjacent to the Expressway route.

Regional Centres

Paraparaumu Town Centre and commerial area is bounded by Kāpiti Road to the north, the railway line to the east, residential areas to the south and the Expressway corridor to the west. It is the main centre for Kāpiti Coast and contains a range of large format retail, light industry, general businesses and civic and community activities. Some of these are located in Industrial/Service areas across the railway line to the east.

The built form, site planning and type of activities promote a vehicle oriented environment, with high traffic volumes on the nearby roads. There is a large portion of commercial vacant land to the west of Rimu Road which is currently zoned for future "Town Centre".

The Kāpiti Road business area has a mix of light industry, general business and large format retail activities. The Expressway corridor runs to the immediate east of this business area. The built form and traffic/parking system favours vehicle movements to the detriment of visual and pedestrians use. Kāpiti Road has high traffic volumes.

There is a rail line to the east of the town centre and adjacent to the existing SH1. This station provides access to passenger transport services into Wellington as well as north to Waikanae. The line has undergone recent upgrades to provide a more reliable service.

Waikanae Town Centre has a mix of small commercial activities in the centre of the block between Te Moana Road and Ngaio Road. The small shops are planned around an internal public square. A strip of some 15 shops front the west side of the existing SH1 and sections of this have parallel parking that .

The pedestrian street and square have established planting and a number of public art works. Large format activities, general business and light industry are located at the edge of the block, and between Ngaio and Kapanui Roads.

At Waikanae the older part of the centre is to the east of the existing SH1 and is where a burial ground, parks, church, and hall are located. Waikanae also has a rail station on the main line with passenger transport services south to Paraparaumu and Wellington.

The existing SH1 has generated large traffic volumes and crossing restrictions at both of the town centres. The build up over time of the highway's traffic volumes and the fitting of this level of traffic into centres which were not planned to provide for this use has seen some poor urban conditions result.

These results include seperation between the east and west parts of these centres and the residential areas on either side, as well as between rail stations and the commercial centres on the west. The highway has also generated limitations to the access across and uses that are possible along it as well as inhibiting the development options for both of these town centres.

Schools

There are schools either near to the proposed Expressway or with a sub-regional function that need to be considered in terms of accessibility (refer to School Accessibility Plans in Movement Network section 3.9).

- **Te Ra Waldorf School** (Raumati South) is a Steiner school with a sub- regional catchment located on Poplar Avenue. It would have had to be relocated if the currently designated route was proceeded with. The proposed route allows the school to remain.
- **Raumati South School** (Matai Road) is a state primary school with a local catchment. It is adjacent to the current designation and would have been affected if that route was proceeded with.
- **Kāpiti College** and **Paraparaumu College** are state secondary schools that, while not physically close to the alignment, draw pupils from a regional catchment (including Waikanae).

Early Childhood Education Centres are scattered across the district. Children often attend crèche facilities based on the availability of places rather than proximity to their homes, but kindergartens and play centres tend to draw a local roll.

Whitireia Polytechnic has a campus at Lindale. Kāpiti Air Academy (run by the Kāpiti Aero Club and Whitireia Polytechnic) at Paraparaumu airport is a regional facility for professional pilot training.

Health and Emergency Facilities

There is a concentration of medical facilities around Coastlands and Kāpiti Road. The Paraparaumu Medical Centre (92 Kāpiti Road) is directly adjacent to the existing designation on Kāpiti Road.

The Kāpiti Health Centre in Warrimoo Street in Paraparaumu is a regional facility that provides a comprehensive range of medical services, including outpatient clinics, maternity services, community health and community mental health services for the people of the Kāpiti Coast. There are maternity beds at the centre along with a birthing suite and delivery room. Multidisciplinary assessment and treatment programmes for the community's elderly are also based there. There is a health centre is located on Mazengarb Road and medical centre at Waikanae. Emergency and surgical patients are treated at hospitals outside the Kāpiti District. This facility is located away from the designated route.

The Paraparaumu Police Station is on the corner of Rimu Road and Kāpiti Road, and there is a community constable based in the Waikanae town centre at Mahara Place in Waikanae. There is a volunteer fire station at Te Moana Road. The fire station in Paraparaumu is on Te Roto Drive and there is a small ambulance base at the medical centre.

Design Implications

1. Maintaining wide corridors within the designation extent will be important to buffer the Expressway from adjacent residential uses.
2. Destination activities - eg airport, town centres and schools - will benefit from connections to the interchanges provided those connections are readily accessible from local road networks.
3. Freeing up the existing SH1 from highway traffic enables the design of the town centres to be designed to function more positively and with higher amenity, including better connections between the centres and railway stations.
4. Options for the Expressway should be designed to avoid effects on schools and to encourage the safety and directness for walking and cycling access.
5. Beach community residents and visitors will need to pass across the Expressway regularly and this movement needs to be visually, functionally and safely provided for. This includes interchange design to facilitate local road movements by pedestrians and cyclists.
6. The opportunity should be taken with the Expressway interchange design at Paraparaumu to set a positive precedent for the quality of the of whole of Kāpiti Road.
7. Design approaches should discourage urban growth at Otaihanga, Te Moana Road and Peka Peka.
8. The future development of residual areas of the Expressway designation (such as at Raumati) and at planned growth areas needs to be considered in the design especially in terms of connections, to, from and within these areas, as well as the protection of recognised features.

3.8 State Highway 1 Design

The 14.4 km of the existing State Highway 1 (SH1) will be handed over to KCDC by NZTA when the Expressway becomes operational.

The process of design for the Expressway has included consideration of the existing SH1 context and has identified opportunities for what its future condition may best be to serve the needs of the community and in accordance with the Project Objectives including:

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).

This process has included discussions with KCDC and NZTA as well consultation in the wider community (see Consultation section 4). It is important to note that although the future for the existing SH1 is being considered, the funding of any revitalisation or changes will need to be determined by NZTA and KCDC. Much of the description of the existing environment above (and below) relates to the existing SH1 also. Specific points particular to the the existing SH1 context are provided below.

Land Uses

As described in Figure 31 the existing SH1 has a series of rural, suburban and urban (town centre) uses along its length. Of particular note is that Paraparaumu and Waikanae are currently bisected by the existing SH1. Over time the centres have developed with most of the retail and civic activities away from the existing SH1 - a response to limited access opportunities, parking and amenity constraints as well as to provide for retail growth (refer Figures 33 and 34) . The growth has been in a westerly direction which mirrors residential urban development.

Large sections of the highway are rural and the rail line is approximately parallel for much of the length. The two rail stops at the town centres are adjacent and east of the highway. The suburban (residential and other commercial) uses around Paraparaumu typically gain access from the existing SH1.

Edge Condition and Connections

From the existing SH1 most of the connections are towards the coast and the main population areas. There are only three places where significant local road connections extend east. The edges of the existing SH1 have for some time been controlled by the limited access status that applies to state highways. This has actively discouraged uses that front and gain access from it. However, historically the highway facilitated connections to the properties along its length and through the older urban sections of the route such as south and north of Paraparaumu there are many residential and commercial property connections.

At Waikanae the west side of the highway accommodates some retail activity and parking is provided in short sections. Most of Waikanae's town centre activities occurs from access via a mall to the west with access from back streets.

Road Environment

The road width varies from four lanes to two operational lanes with turning lanes and flush medians at some places. Through rural areas the highway is typically two lanes with passing lanes in some sections. There are two bridge locations (Waikanae River and the Paraparaumu rail over bridge) where the highway is at two lanes. The Waikanae Bridge and Paraparaumu Bridge would require upgrading were the highway to remain and both have poor cycle/ walking facility currently given their narrow width. There are many places where local road intersections exist and some of these are known safety issues.

The road carries a significant traffic load (26,900 vpd at Kāpiti Road) and is frequently congested at peak times and holidays as its carries much of the traffic in and out of the region. This volume of traffic will significantly decrease when the Expressway becomes operational.

There is some limited amenity in the form of footpaths through parts of the urban areas. The sealed road cross section varies from 11m to 28m in width. Stormwater runoff typically drains to pipe networks or to adjacent land for natural soakage.

Design Implications

1. Consider the future speed environment desired and the changes in the road widths, intersections and edge conditions needed to encourage that speed
2. Look to enhance the connections across the road between town centres and the rail stations opposite.
3. Consider the use of former highway seal width for walking and cycling paths
4. Consider intersections improvements using roundabouts or signals to facilitate easier use of the former highway by local traffic.
5. Look for opportunities to improve stormwater quality by filtering by swales prior to soakage or discharge to the reticulated network
6. Look to improve visual amenity by tree planting and to enhance the identity as a local arterial road

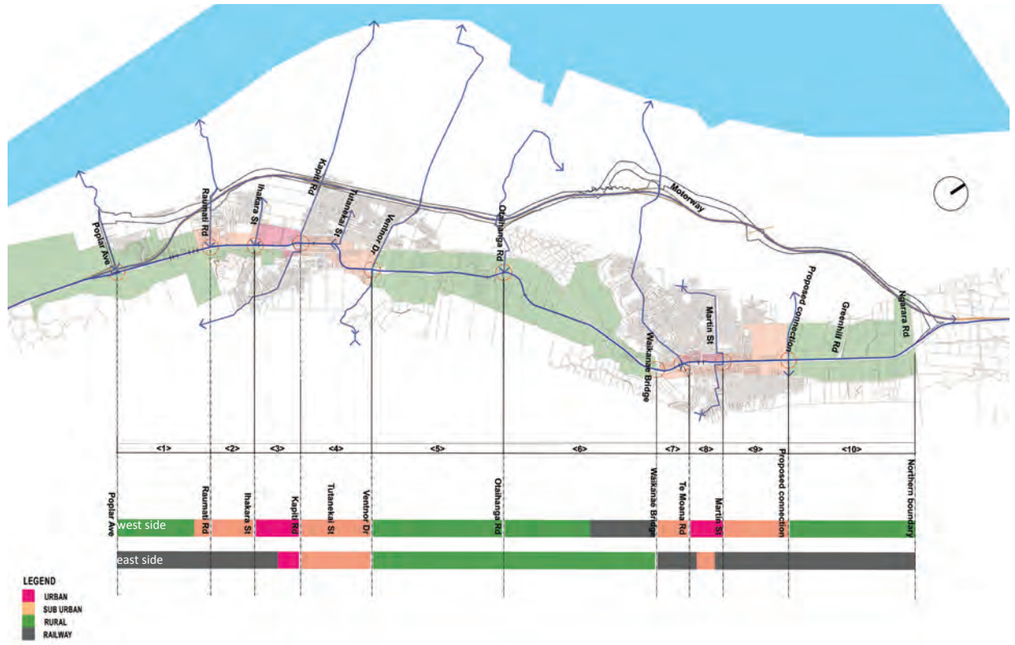

Figure 31 Land uses along SH1 (source: Kevin Brewer)

Figure 32 SH1 looking south of Paraparaumu - residential property access driveways are visible to the right

Figure 34 SH1 looking down at Paraparaumu town centre - carparking and large format retail is dominant - the rail station is on the right

Figure 33 SH1 at Waikanae - the rail station is on the left and a few shops fronting the highway are visible on the right

Figure 35 SH1 looking south towards Waikanae and Peka Peka Road in foreground -rural context

3.9 Movement Networks

The movement network within the Kāpiti District is provided by a combination of a hierarchy of roads and streets as well as pathways and other non-vehicular linkages. This network is used by vehicles, walkers and cyclists as well as recreational users such as horse riders. There is a public transport system in the form of a bus service as well as inter-regional trains with stops at Waikanae and Paraparaumu. There is also an airport at Paraparaumu on Kāpiti Road which began a regional service of flights in late 2011.

KCDC expresses its aspirations and supporting policy [refer to Policy section] towards developing a movement network that enables and encourages walking and cycling activities as well as horse riding. Walking and cycling is promoted as both a commuting and recreational mode of movement for people and can utilise both on road and off road facilities.

This section of the ULDF describes key attributes and functions of the movement network and concludes with key considerations for the design for the Expressway. These are in turn addressed in section 6 of the ULDF. The movement networks are of interest to urban design (as different to traffic planning which maybe more focussed on efficiency of movement) because:

- movement is also an experiential aspect of life that means the quality of that experience is influential to the quality of life. The visual sequential experience and views, ease of use, and clarity of routes are all of interest to urban design.
- movement choice is an aspect of social equity and accessibility that means alternatives to vehicular modes and making an urban area permeable to easy movement for non-vehicular modes, need recognition in the design of movement infrastructure projects such as MacKays to Peka Peka .
- connections to and within the movement network are influential on urban form and land use development and the pattern of that network can either promote or inhibit certain types and qualities of urban form.

Highways, Roads and Streets

State Highway 1 (SH1) is currently the busiest vehicular route and conducts traffic both within the district (i.e. between the towns and communities) as well as regionally and nationally within the North Island (see Table 2). It is identified as a National / Major District Arterial in KCDC's District Plan (refer to Movement Network Hierarchy Plan Figure 38).

The highway is a combination of two lanes and four lanes where space has allowed.

The Expressway will replace the current highway and it will revert to an arterial level road with a consequent reduction in traffic volumes. The existing SH1 presents opportunities for revitalisation as a local arterial.

The position of the existing SH1 within the district is such that it was developed along a line which follows the base of the sloping hills that runs approximately north south.

Most of the communities within the area of the proposed expressway route have developed from lateral roads extending west to the coast from the existing SH1. These roads typically have extended in relatively straight lines across the flatter coastal plain south of Paraparaumu and sometimes cut through (eg Poplar Ave, Raumati Road, Mazengarb Road) the roughly north south oriented dune system. The roads have then wound around these dune forms where they are more complex closer to the coast. They have various levels of traffic use (refer to Table 1).

Only at Paraparaumu and Waikanae have the communities been able to extend a street pattern and urban areas east of the existing SH1 to any significant extent. This has been enabled by the flatter openings in the hills generated by stream valley erosion creating flatter land in their base.

North of Paraparaumu and at Waikanae the laterals (eg Otaihanga and Te Moana Roads) are less linear - a function of dunes closer to the existing SH1 at Otaihanga and the Waikanae River shape at Waikanae.

The local roads and streets are typically one lane in each direction (Kāpiti Road is wider in its mid section). The local roads are constrained in some places by the topography and although many have footpaths, the development of on road and some off road cycle paths is a work in progress (refer to Cycling and Walking section).

It is noted also that there are residential areas where there is only one point of access which is to the current highway. At places - such as Hadfield Road - where these relate to potential expressway/existing highway interfaces these need to be integrated into the design of new Expressway intersections/interchanges. Where these areas - such as at Elizabeth Street - will continue to connect to the former highway the accessibility can be expected to improve as a result of lowering traffic volumes and opportunities to recalibrate the intersections to provide better vehicle as well as walking and cycling function.

The various communities of the district are accessed by a combination of the current highway and/or via secondary roads as follows:

- **Raumati South** is accessed by the existing SH1 via Poplar Avenue and connected to Raumati Beach via Rosetta Road and Matai Road/ Hillcrest Road / Hillcrest Road North. These three road corridors are classified as Secondary Arterials in the District Plan. The residential enclave around Leinster Avenue is accessed 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.
- **Paraparaumu** straddles the existing SH1 and is accessed from local road connections with the highway. The main intersections are at Ihakara Street, Coastlands Parade, and Kāpiti Road which has traffic signals. Unsignalised connections are at Kāpiti Lights, Amohia Street, Hinemoa Street , Buckley Grove, Rimutaka Street and Ruahine Street. The principal connection to the east of the highway is Ruapehu Street. Some properties have direct access to and from the existing SH1. An important connection to Paraparaumu is also provided by Te Roto Drive and Arawhata Road which connect through to Otaihanga and via the existing SH1 to Waikanae to the north.
- **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 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.
- **Otaihanga** is accessed off the existing SH1 via Otaihanga Road and links to Paraparaumu via Ratanui Road and Mazengarb Road. 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, straddles the existing SH1 and is served by a number of local road connections and by direct access for those properties on the existing SH1. The location of the railway parallel to the highway limits access to the east of Waikanae to a single crossing point at Elizabeth Street. On the western side, the main intersection with the existing SH1 is Te Moana Road which has traffic signals. The only road connection between Waikanae and Paraparaumu is along SH1. There are significant levels of vehicular traffic movement between the community of Waikanae and Paraparaumu given the relative location of schools, services and retail facilities.
- **Reikorangi** is a rural residential area to the south-east of Waikanae. It is accessed off the existing SH1 via Elizabeth Street which becomes Reikorangi Road, a Secondary Arterial in the District Plan.
- **Waikanae Beach** is accessed via Te Moana Road and connects to Peka Peka 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 road connections between Waikanae Beach and Paraparaumu Beach or Otaihanga.
- **Peka Peka** is accessed off the existing SH1 via Peka Peka Road. As mentioned above, it is also linked to Waikanae Beach via a rural road. Hadfield Road provides access to a small rural community on the hillside to the east.
- **Waikanae North** is the area where future communities are proposed (refer to Land Use section). There are few roads in this area currently, with Ngarara Road being the main route from Te Moana Road. The proposed Expressway traverses this future growth area and it is anticipated that at such time as the urban growth occurs new roads will be required and some level of connectivity across the Expressway will be desirable to connect from this area to central Waikanae and the ultimately the beach.

Figures 36 and 37 Poplar Avenue above and Raumati Road - photos show how these roads were developed as cuts through dunes - the roads extend from the existing SH1 in straight lines to these inland dune points

Legend

- National / Major District Arterials
- Secondary Arterials
- Collector Road
- Local Road
- Public Transport Routes
- Expressway
- Railway

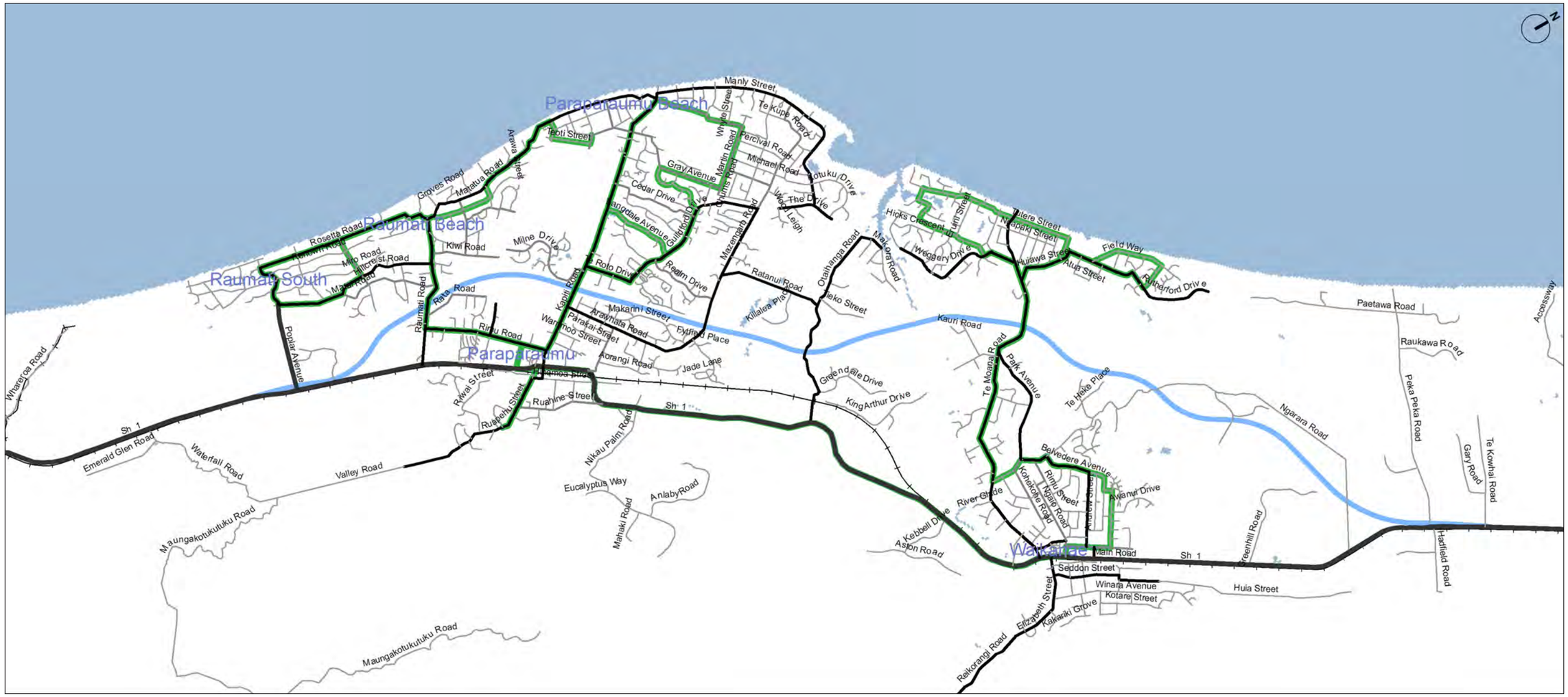

Figure 38 Roading Hierarchy Plan - source KCDC District Plan

Traffic Movement

The Assessment of Transport Effects (Technical Report 32, Volume 3) provides details of the current traffic movement figures for the roading network.

These are summarised in Tables 1 and 2 to provide a sense of the relative scale of use of the road network by vehicles and therefore the type of environment that exists currently. This information focuses on the arterial roads which are where the Expressway typically intersects or interacts.

Table 1 Local Road Vehicle Traffic Figures - 2010

location	daily flow
poplar ave - east of matai road	2,600
raumati road - west of SH1	12,900
kāpiti road - west of arawhata road	24,900
mazengarb road - east of guildford dr	5,300
otaihanga road - west of SH1	6,500
te moana road - west of SH1	10,700
peka peka road - west of SH1	1,100

The traffic movement figures for the existing SH1 are provided in Table 1 below.

Table 2 Existing SH1 Vehicle Traffic Figures - 2010

location	daily flow
south of poplar ave	22,700
south of Kāpiti road	26,900
south of otaihanga road	22,400
south of te moana road	26,900
north of peka peka road	15,900

Figure 39 Raumati Road - suburban in context and key connection between the existing SH1 and beach community at Raumati South

Figure 40 Kāpiti Road - urban in context and busy as key connection to town centre and between inland and beach communities

Figure 41 Otaihanga Road - rural in context, but key connection between the existing SH1 and Paraparaumu Beach and parts northwest

Public Transport

The two principal public transport systems provided for in the district are rail and by buses on the local roads. As noted previously there is also an airport at Paraparaumu and it will be upgraded form a local airfield to provide regional services by Air New Zealand later in 2011.

Rail

The North Island Main Trunk Line roughly follows the existing SH1 through the district.

The line supports the MetLink Kāpiti passenger line providing commuter services with stations at Waikanae and Paraparaumu and frequent stations between Kāpiti and Wellington station. The line also support the Capital Connection commuter passenger train which runs between Palmerston North and Wellington on week days. The Capital Connection service stops at Waikanae and Paraparaumu and provides a non-stop service between Paraparaumu and Wellington station.

There has been consideration of the need for a train station at Raumati. This station is currently part of GWRC's *Wellington Regional Rail Plan 2010 – 2035* (July 2009). This document states that:

- *"That the design of the double tracking and electrification between MacKays Crossing and Waikanae will not preclude the construction of a Raumati railway station*
- *That the Greater Wellington owned land at Raumati will be retained as a potential carpark and not be sold to developers for other activities*
- *That the future programme of work on the Kāpiti line will be reviewed once the electrification and double tracking work is complete."*

Buses

Metlink operates a number of bus services in the study area, as follows:

- Bus route 250 "Raumati South" serves Paraparaumu train station, Coastlands, Kāpiti College, Raumati Beach and Raumati South via Rimu Road, Raumati Road and Rosetta Road. It then loops around part of Poplar Avenue, Matai Road and Menin Road.
- Bus route 260 "Raumati Beach" serves Paraparaumu train station, Coastlands, Kāpiti Village, Paraparaumu Beach and Raumati Beach via Kāpiti Road.
- Bus route 261 "Paraparaumu Beach" circulates via Paraparaumu train station, Coastlands, the airport and Paraparaumu Beach via Guildford Drive.
- Bus route 262 "Paraparaumu Beach" circulates via Paraparaumu train station, Coastlands, Arawhata Road, Mazengarb Road, Paraparaumu College, Kotuku Park, Manly Street and Paraparaumu Beach.
- Bus route 270 "Paraparaumu East" circulates via Paraparaumu train station and Ruapehu Street.
- Bus route 271 "Lindale Tourist centre" links the train station to Lindale.
- Bus route 280 "Waikanae Beach" circulates via Paraparaumu train station, Waikanae train station and town centre, the pool, the golf course and Waikanae Beach via Parata Street, Sylvian Avenue, Belvedere Avenue, part of Ngarara Road, Te Moana Road and a loop through the Waikanae Beach area.
- Bus route 290 "Otāki Beach" provides limited service (less than hourly) between Paraparaumu train station / town centre, Peka Peka, Otāki station / town centre and Otāki Beach. This route runs along the existing SH1 between Paraparaumu and Otāki.

Walking and Cycling

In the context of movement KCDC promotes walking and cycling as alternatives to movement by vehicle to provide choices to its residents. This is in line with Regional policy (refer to Regional and Transport Policy sections) such as represented in the RLTP. The objectives with respect to walking and cycling are also featured in the Expressway project objectives which "recognise the need to provide for modal and route choice opportunities".

It is also noted that horse riding is considered a key part of the movements within the district - this is typically for recreational rather than commuting or destination trips.

The current provision for commuting and recreational walking, cycling and horse riding 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 alleys.

The on-road facilities are typically footpaths a marked lane or a separate path off to one side (eg at Kāpiti Road). The off-road cycle and walking paths are typically unsealed and range in width. The surface is a consolidated chip known locally as "Kāpiti Blue".

The Local Area Movement Surveys and other data gathering methods show very strong use of the river/stream corridors as well as the many crossing points where people are walking and cycling on local roads moving east west.

Local Commuting and Recreational Network

Due to the relatively flat topography, cycling is popular across the district for both commuter transport and recreation. A 16km Coastal Cycle route runs from Paekākāriki to Peka Peka and is sealed for almost that entire length. This is mainly promoted as a recreational route. The district advocates strongly for walking and cycling and has an aspirational network plan of new links (refer to Figure 46) for commuting and recreational use.

The local cycling advocacy group, Kāpiti Cycling Inc., in conjunction with KCDC, has produced a local cycling map. It identifies local commuting routes as:

- Raumati/Paraparaumu
  - > Poplar Ave
  - > Matai Road
  - > Rosetta Road
  - > Raumati Road
  - > Tui Road/Kiwi Road/Wharemauku Stream to town centre
  - > Rata Road/Manawa Ave
  - > Ihakara Street
  - > Milne Road
  - > Kāpiti Road
  - > Arawhata Road
  - > Tutanekai Street/Warrimoo Street
  - > Mazengarb Road/Te Kupe Street/Ngapotiki Street
  - > Te Roto Drive/Guildford Drive
  - > Ratanui Road
- Waikanae/Otaihanga
  - > Otaihanga Road
  - > Weggery Drive
  - > Te Moana Road
  - > Park Avenue
  - > Huiawa Street
  - > Ngarara Road
  - > Belvedere Road/Kapanui Road/Martin Road

Twenty four cycle lockers are provided at the Paraparaumu Train Station, encouraging 'park and ride' cycle commuting, and six local schools have school travel plans that encourage students to cycle to school.

Figures 42 - 44 show that in some places that people are travelling by bike or walking relatively long distances between homes and school. This is especially noticeable at Waikanae where there is no school at Waikanae Beach and students cycle or walk up to Waikanae to attend the schools there. There are also some longer distance cycle movements to the two colleges at Paraparaumu by students living in Waikanae.

To understand the levels of walking, cycling and horse riding in the area traversed by the Expressway several sources of information have been used. These are shown in Figures 42-44 and Table 3.

Regional Cycle Network

Between Paekākāriki and Waikanae, GWRC's Regional Cycling Plan identifies both the existing SH1 and the coastal route as part of a regional cycling network. Through Waikanae and northwards, the existing SH1 provides the only regional cycle route.

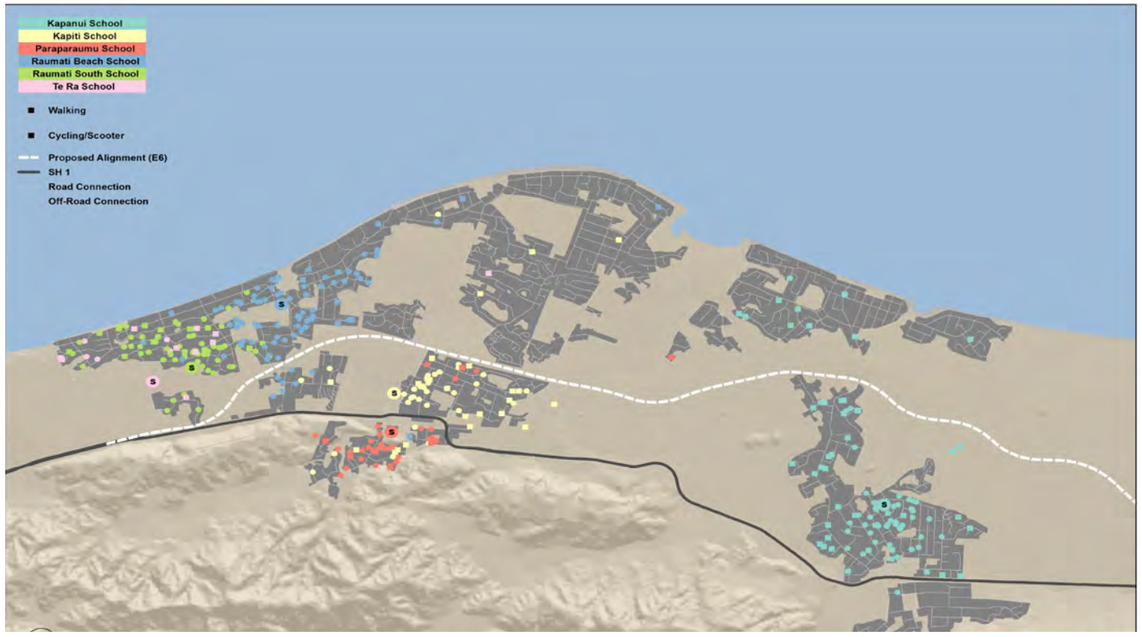

Figure 42 above shows the distribution of primary school students relative to their schools mapped from information provided by school accessibility plans

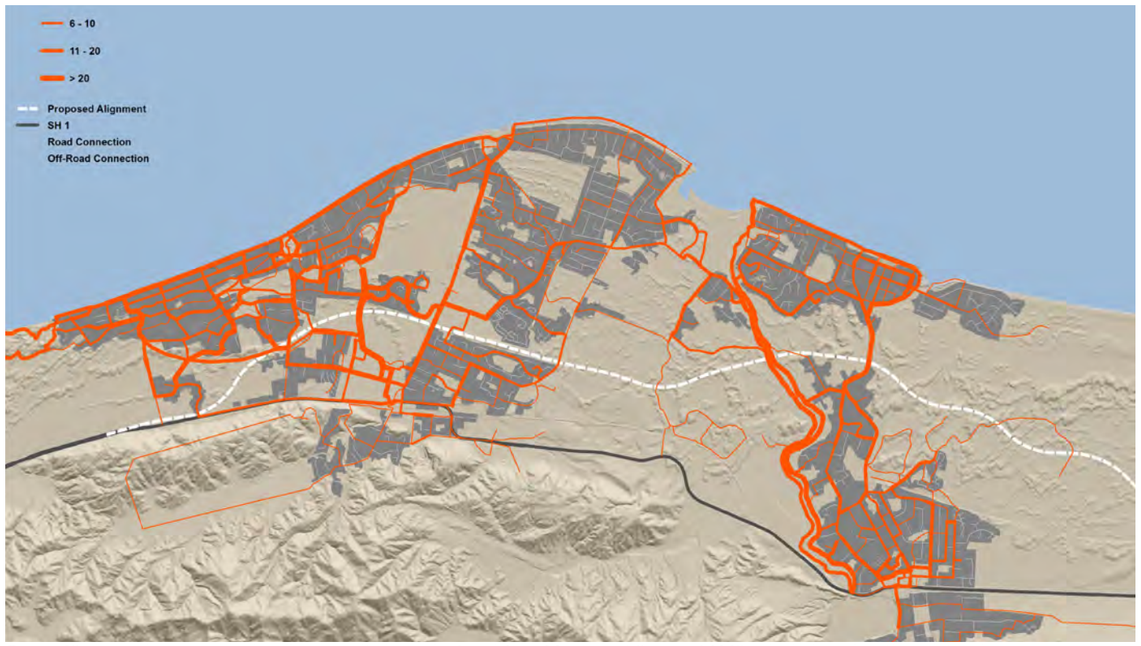

Figure 43 above shows mapped walking results from the Local Area Movement Survey (LAMS) which describes the relative frequency with which people walk along either streets or other paths. The figures are derived from the survey and show the number of respondents that used the route in a week. Notable is the heavy use of Waikanae River paths, Wharemauku path and the local streets in Raumati Beach. Also of note are movements across the Expressway route (dashed white line).

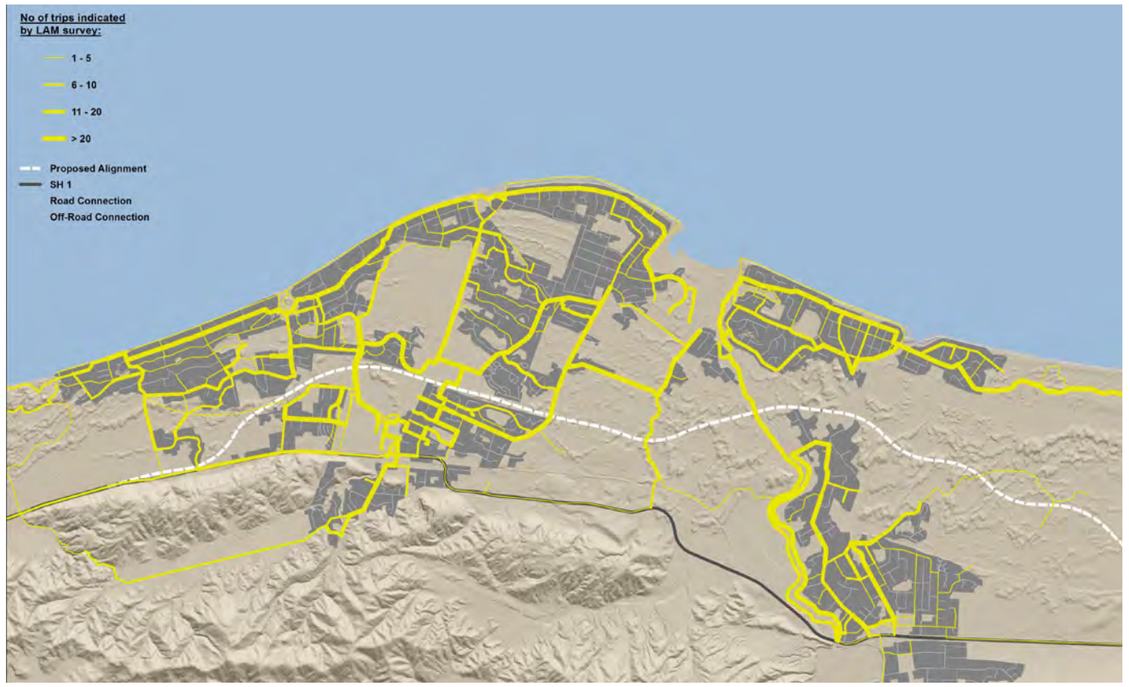

Figure 44 above shows mapped cycling results from the Local Area Movement Survey (LAMS) which describes the relative frequency with which people cycled along either streets or other paths. The figures are derived from the survey and show the number of respondents that used the route in a week. Notable (like the walking results) is the heavy use of Waikanae River paths, Wharemauku Stream path as well as the movement between Waikanae and Paraparaumu utilising the Waikanae River walking bridge. Also of note are movements across the Expressway route (dashed white line).

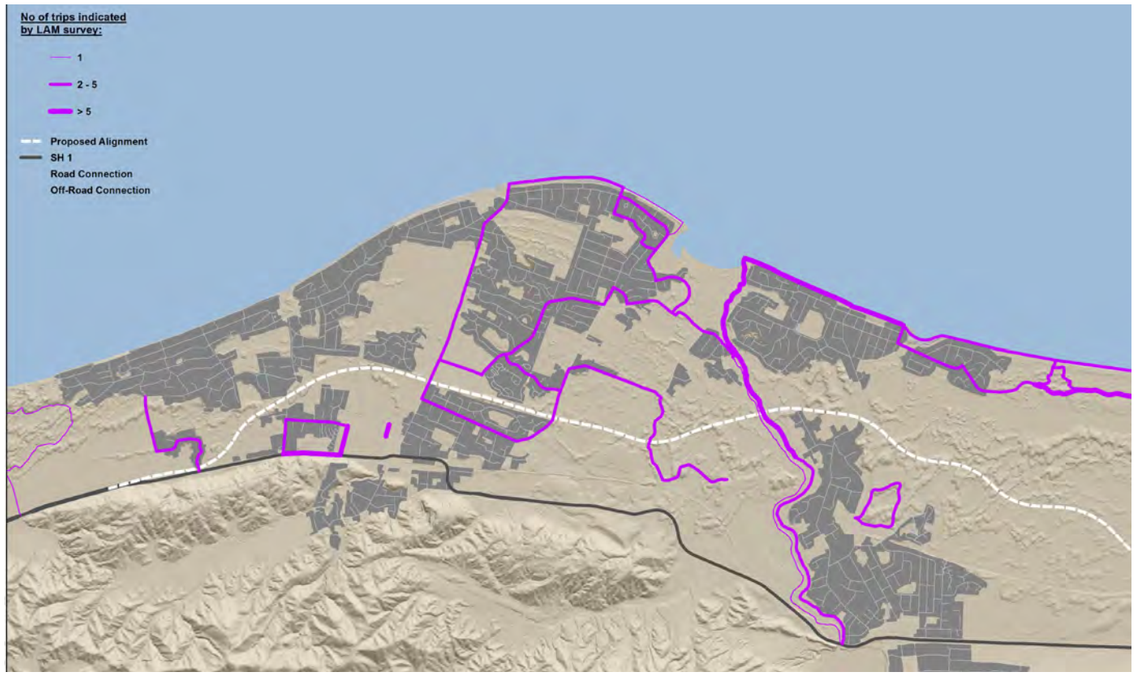

Figure 45 above shows mapped horse riding results from the Local Area Movement Survey (LAMS) which describes the relative frequency with which people rode along either streets or other paths. The figures are derived from the survey and show the number of respondents that used the route in a week. Notable (like the walking results) is the heavy use of Waikanae River paths as well as the movement between Waikanae and Paraparaumu utilising the Waikanae River walking bridge. Also of note are movements across the Expressway route (dashed white line).

Different sources of information have been used to derive an understanding of the use levels of the local road networks and off road paths. These include the Local Area Movement Surveys (LAMS) (shown graphically) and observational counts in the table below.

Table 3 Walking and Cycling Figures - Current

location	count 1 - week day all day		count 2 - weekend day part day	
	walking	cycling	walking	cycling
wharemauku stream	66	26	32	11
kāpiti road	111	44		
waikanae river (at pedestrian bridge)	80	197	152	57
te moana road	31	72		

count 1: Thursday 14 July 2011 - over period from 7.30 am to 4.30 pm - counted both east and west movements - summed

count 2: Sunday 28th November 2010 various times - Waikanae River at domain bridge from 3pm-5pm and Wharemauku Stream - Sunday 28th November 11.15am-1.15pm

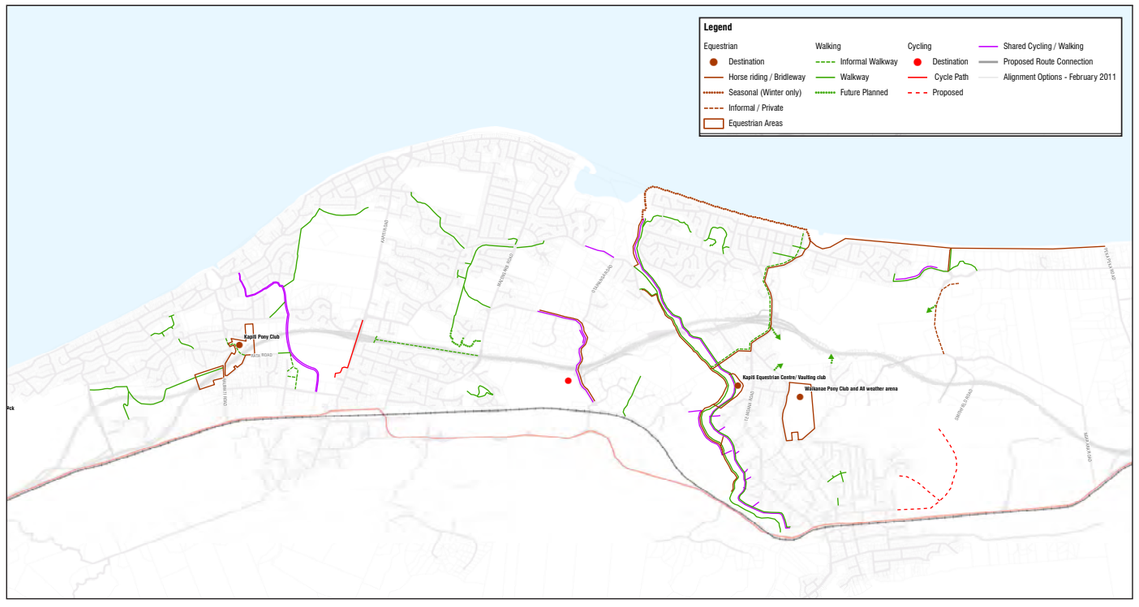

Figure 46 above shows the existing as well as aspirational walking cycling and horse path network - derived from KCDC information.

Design Implications

1. The Expressway crosses a number of east west oriented local roads linking the beach communities on the coastal side with those inland. These connections need to be maintained to provide for the interaction between these communities. This includes through construction period.
2. The Expressway is to provide a consistent highway speed (100kmh) route through the district. The local road crossings will accordingly be grade separated and take the form of a bridge over or road under the Expressway. Walking and cycling movements will be most sensitive to the condition and quality of the crossing - be that having to move under a bridge or on an over-bridge.
3. The communities at Waikanae and Paraparaumu interact constantly for a range of economic and social reasons. The Expressway can be designed to enhance the function of the district and its economic performance and social condition by providing connectivity to the Expressway at Waikanae and Paraparaumu.
4. The Waikanae River and Wharemauku Streams provide highly used corridors for recreation and commuting movements. They also have other amenity values. The sensitivity with which the Expressway crosses these waterways will be important to the continuance of the movements and enjoyment of these places.
5. The existing SH1 is part of the regional cycle network. Consideration needs to be given to it relationship to a new cycle route along the Expressway, as well as how they connect at either end to the wider network. In either case, the safety, convenience and amenity of cycling must be a primary consideration to satisfy transport policy and project objectives.
6. The Expressway enables the existing SH1 to take on a new character including revitalised town centres at Waikanae and Paraparaumu. The design for the condition of the existing SH1 is of interest to KCDC and the community generally, given that it will pass to KCDC once the Expressway is operational as the new SH1. Of interest will be:

> the ability to enhance connections across the former highway to railway stations and bus interchanges from the town centres

> the potential to reduce the width of asphalt to improve visual amenity by the planting of trees for example

> the potential for a lower speed environment that may encourage a quieter and more comfortable route option for some drivers

> the utilisation of some of the current width for walking and cycling facilities

> the ability to introduce traffic controls at some local road connections to make the turning to and from these to the former highway easier and safer

> the relative extent to which any changes to the existing SH1 are to prioritised as well as funded.

7. There will be an interaction between the existing SH1 and Expressway at the points where interchanges are provided for. The implications for the design of the local roads that connect the two need to be considered in terms of impacts on existing land uses and the quality of the road as a walking and cycling route.
8. At interchanges the effect on the safety and comfort with which pedestrians and cyclists (as well as horse riders) can cross through the interchange will require careful design.
9. The location of interchanges and the level of connectivity these provide will influence the use of land around them. Where there is good connectivity to the local network there is likely to be pressure for land development by urban land uses. Although this connectivity can be positive, KCDC's objectives are to limit urban growth outside of the existing towns and nominated growth areas.
10. The interaction between the existing SH1 and future land uses along its length will need to be considered to ensure that KCDC's urban growth objectives are not put at risk as a result of the change from the current limited access status.
11. The need for future connections across the Expressway in the north Waikanae area should be considered.
12. There is the possibility of a future Raumati railway station - the Expressway design should not preclude this possibility.
13. Raumati Road, Kāpiti Road, Guildford Drive, Mazengarb Road and Te Moana Road form the backbone of the bus network. Good pedestrian access to bus stops on these routes in the vicinity of the Expressway should be provided for.

3.10 Landscape Character

The Expressway passes through areas with different landscape characters and these are identified and described below. It is noted that the landscape character includes all the attributes of the character including the built environment. The intention of this description is to enable key characteristics to be highlighted for the Expressway landscape treatment to respond to.

A **QE Park**

B **Raumati South**

C **Raumati Road**

D **Wharemauku Basin**

E **Kāpiti-Mazengarb**

F **Otaihanga South**

G **Otaihanga North**

H **Waikanae River**

I **Te Moana**

J **Ngarara**

K **Peka Peka South**

L **Peka Peka**

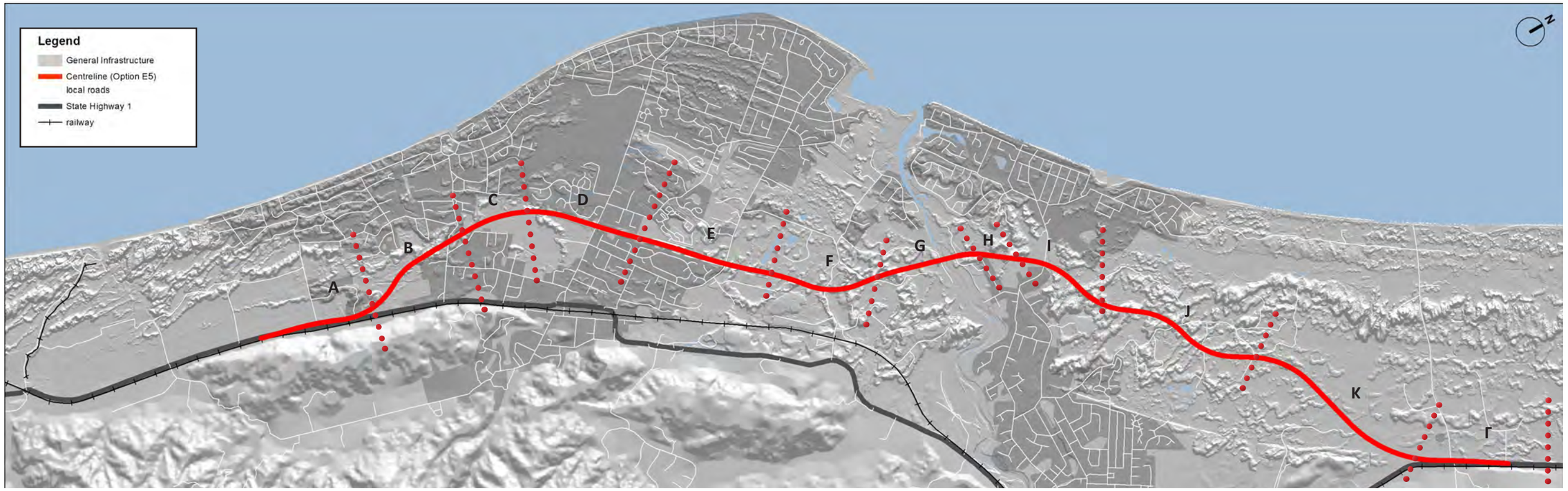

Figure 47 Landscape Character Areas

Figure 48 Raumati Straight looking south

Figure 49 QE Park aerial plan

QE Park

Queen Elizabeth Park occupies the full extent of the coastal plain and thus forms an open space link between the coast and the foothills of the Tararua Range.

The Park is enclosed to the east by the Raumati Escarpment, part of which is included in the Raumati Escarpment Reserve. The existing SH1 and the rail line run in a narrow transport corridor along the toe of the escarpment. The eastern part of the Park is relatively flat, low lying and traversed by several drains.

There are also remnants of low dunes which have been gradually modified by grazing stock and cultivation over many decades. A line of high, relatively intact dunes extends down the centre of the flat land and form the southern extension of the intact dunes north of Poplar Avenue.

To the west, a complex field of intact dunes extend westwards to the coast. An operating clean fill site is located at the northern end of the Park with access off Poplar Avenue.

Within the Park apart from exotic shelterbelts adjacent to the existing SH1 and scattered macrocarpa trees, there is little significant woody vegetation. Pasture is the dominant land cover with large patches of gorse at the northern end. A strip of native planting, dominated by kanuka, extends along the edge of the existing SH1 and the Park.

Key Characteristics

- Open expansive rural/coastal landscape
- Little substantial vegetation, secondary native forest on the Raumati Escarpment
- No urban development

Raumati South

This character area has two distinct rows of dunes, some of which are over 20m high. Several areas of low-lying damp ground and areas of open water are present amongst the dunes, with a major drain running north-south through the area.

There is a distinctive large area of open space enclosed by residential housing on the existing SH1 with Leinster Road to the east and Matai Road to the west. The Leinster Road residential area is located on a third area of dunes. Overall the area has a relatively low density of settlement.

The open space area includes part of the existing designated corridor and provides the adjacent communities and two schools with an informal parkland, albeit that much of it is unmanaged. The area supports a combination of horse grazing land, gorse and broom, scattered groups of mature exotic trees (especially pines) and large stands of tall kanuka at the southern end.

Key Characteristics

- Relatively large area of 'wild-land' open space.
- Combination of medium density residential development and lower density residential on large sites.
- Relatively unmodified dune landforms.
- Significant existing vegetation, particularly kanuka, and groups of pines.

Figure 50 Raumati looking south

Figure 51 Raumati South aerial plan

Figure 52 Raumati looking south

Figure 53 Raumati Road aerial plan

Raumati Road

This area is characterised by the undeveloped corridor of land created by the WLR which has retained a corridor of open space, with residential (or industrial) development on either side.

The height of the dunes varies between 10 and 20m and they are reasonably intact. The open space area is mainly leased for grazing horses. Small scattered groups of mature pine trees are present and small areas of native vegetation occur in places.

The adjoining residential housing is well established with a typical suburban density settlement pattern that has provided space for mature trees within many of the allotments. Consequently, there is a strong vegetation framework comprising mature exotic and native trees and shrubs. The housing areas to the east are typically on flat land north of Raumati Road and on the undulating dunes to the south.

Raumati Road cuts through the dunes in the designation corridor forming a distinctive threshold along the route between the existing SH1 inland and the residential communities to the west on the coast.

Key Characteristics

- Significant existing vegetation; pine, macrocarpa, eucalyptus, kanuka.
- Relatively wide corridor and separation distances to the nearest housing.

Wharemauku Basin

This area is characterised by the large expanse of open undeveloped land in the heart of Paraparumu due to the Town Centre Zone and the existing designation. The large flat basin is fringed by undeveloped dunes and residential development on the west. Midlands subdivision, established adjacent to the designation boundary is the most recent area of residential housing and occupies in part, elevated duneland. The more established residential area of Kiwi Road occupies lower land to the west. Paraparaumu town centre encloses this character area to the east.

Dunes between 10m and 20m are located near the middle of the basin and also on the northern fringe adjacent to Milne Drive and Kāpiti Road.

The Wharemauku Stream, now channelised, drains the basin. A walkway adjacent to the stream is an important pedestrian and cycle link between the town centre and the suburban areas to the west. An area of wetland, often with open water but which fluctuates during the summer, is situated close to the walkway.

There are shelterbelts and streamside plantings of moisture tolerant deciduous trees such as willow, a eucalypt woodlot, large areas of gorse, patches of native grasses, and riparian species on damper ground.

While the middle part of the area is currently open and undeveloped, the underlying Town Centre Zone means that in the medium to long term this area will be subject to urban development.

Key Characteristics

- Proximity to existing town centre (and future expansion of the town centre)
- Large flat basin fringed by dunes to the west
- Wharemauku Stream and walking and cycle links
- Significant existing vegetation with exotic trees such as willow, poplar, eucalypt, and also native riparian species.

Figure 54 Wharemauku looking west

Figure 55 Wharemauku aerial plan

Figure 56 Wharemauku looking south

Figure 57 Mazengarb Road looking south

Figure 58 Kāpiti Mazengarb aerial plan

Kāpiti-Mazengarb

This character area is characterised by residential and industrial development tightly defining the existing WLR designation. This part of the corridor is highly developed with little of the natural landforms or vegetation remaining.

A remnant of the original dune topography of the area remains within the WLR designation; the surrounding dune land having been flattened as part of its development for residential housing. To the west of the designation corridor, there is established industrial development, industrial zoned land, retirement housing and medium density residential development located on relatively flat land. Residential development is also located to the east and to the south end this is relatively flat, but to the northern end is sitting up on higher dune land.

Given the size and scale of the allotments most of the vegetation within this area comprises low stature exotic amenity species.

There is evidence of informal walking tracks across this corridor which assist to overcome the relatively long block length and lack of connectivity from east to west between Kāpiti to Mazengarb Roads.

Within this urban area, there are small pockets of native vegetation associated with natural and also constructed water bodies, and remnant dune landforms.

Key Characteristics

- Suburban and residential development defining the corridor edge.
- Generally flat areas for urban development, but with some housing on rising ground to the north.
- Informal crossing links for walking east to west.
- Absence of any significant vegetation.

Otaihanga South

Extending from Mazengarb Road to Otaihanga Road this landscape character area comprises predominantly rural land with pine plantations, rural residential lots and infrastructure facilities, including the former landfill and waste water treatment plant.

The area occupies a series of medium height intact dunes, and interdunal hollows. Pine plantations along the existing designation obscure the topography of the intact dunes.

Mazengarb Stream and several drains connect with the network of waterbodies in the Killalea enclave, and several wetlands remain in the interdunal hollows amongst the pine plantation

The Killalea Place rural residential enclave (bounded by Mazengarb, Ratanui and Otaihanga Roads), has substantial plantings of exotic and native trees, which provide a relatively strong vegetation framework, and there are also several natural and constructed waterbodies, with generally well vegetated margins.

Key Characteristics

- Peri-urban west of designation, mixed use infrastructure facilities to the east.
- Intact dune landforms with wetlands in the interdunal hollows
- Pine forest, eucalyptus, manuka, lowland native pioneer species.
- Substantial established tree structure.

Figure 59 Pine plantations occupy the WLR designation, with the Killalea rural residential area on right

Figure 60 Otaihanga aerial plan

Figure 61 Pasture covered dunes in the northern part of the character area.

Figure 62 Otaihanga aerial plan

Otaihanga North

Extending from Otaihanga Road to the Waikanae River corridor the character of this area is distinctly rural, with Otaihanga residential area on the western periphery.

The rural residential area accessed from Greendale Drive adjoins the western 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.

Well established trees are found throughout the area, comprising pine shelter belts and woodlots, willow and poplar streamside plantings, and amenity plantings associated with dwellings and farm settlements. Some recent removal of pine trees has opened up the area around the old landfill.

This character area comprises a series of high intact dunes with small areas of permanent and ephemeral wetlands and water bodies in the interdunal hollows. The high dunes are a visually distinctive feature of the locality due to the open nature of the grazed farmland.

Muaupoko Stream at the northern end of the character area drains into the Waikanae River.

Key Characteristics

- Open rural character with some rural residential development.
- Intact dune landforms, and damp interdunal hollows.
- Grazed pasture dominant.
- Tree structure of exotic shelter belts and woodlots and amenity plantings.

Waikanae River

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 foothills of the Tararua Range. The Waikanae River corridor is identified as an outstanding natural landscape in the KCDC District Plan.

The corridor, including the river, its margins, public recreation areas, and walkways/cycleways, is popular and well used for recreational activities and also for commuting locally.

The river is shallow at normal flow, and its gravel bottom combines to make it a safe and inviting place for a wide range of water activities. Mown grass areas at El Rancho and reserve areas along the riverside flood plain areas provide recreational space adjacent to the river.

The vegetation in this part of the river corridor is dominated by willow and poplar trees planted for flood erosion control. However, local residents have over many years been removing and controlling the widespread areas of blackberry, montbretia, wandering willy, and convolvulus along the river margins, and planting and managing a wide range of native riparian species. There are now long continuous stretches of the bank where native species are very well established and significantly influence landscape character .

From many locations on the walkway/cycleway, residential dwellings and other buildings and structures and roads are visible. However, the river corridor overall has a secluded and peaceful character, with high amenity values. The natural character of the river and its margins is moderate/high.

Key Characteristics

- 'Natural' and peaceful river environment
- Willow and poplar trees line the riverbanks
- Intact dune landforms adjoin river corridor
- Areas of well established native riparian species

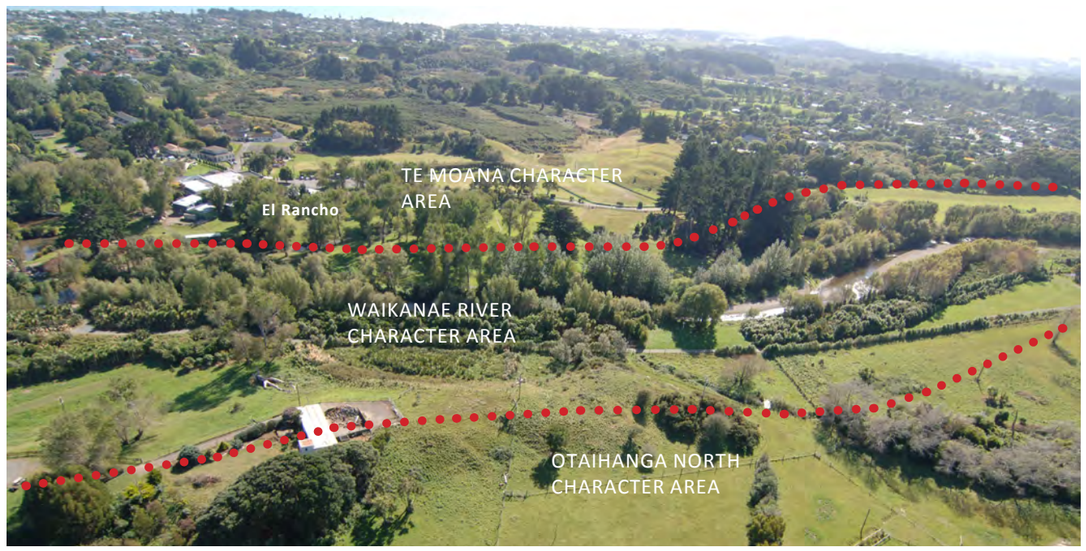

Figure 63 Waikanae River Character Area

Figure 64 Waikanae River Character Area

Figure 65 Waikanae River Character Area

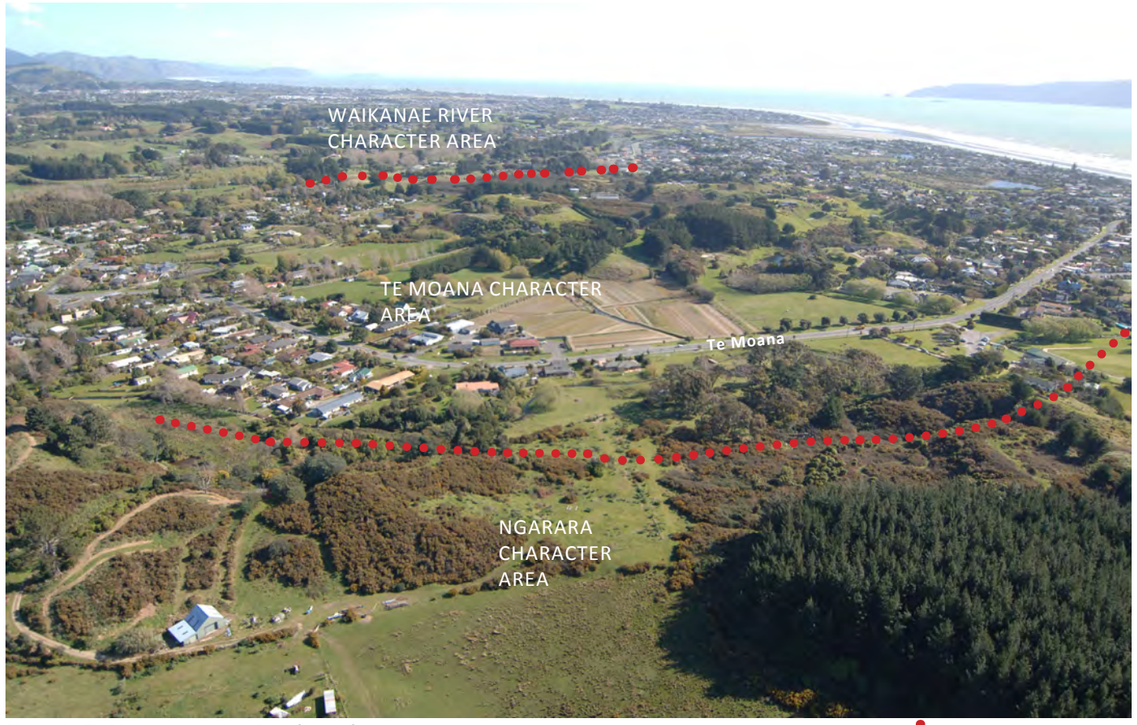

Figure 66 Te Moana Character Area (above)

Figure 67 Te Moana Character Area

Te Moana

North of the Waikanae River, a band of rural land separates the suburban areas of Waikanae and Waikanae Beach. The topography varies with an intact series of dunes, up to 25m asl, to the west and a large low-lying basin to the east at Te Moana Road.

The eastern side of the character area includes the residential areas on the western fringe of Waikanae (Te Moana, Pururi, Kauri, and Greenaway Roads). The rural land on the east comprises rural residential properties, small rural holdings and horticultural production. The Pururi and Kauri Roads provide access to 'fingers' of residential uses. These areas are relatively flat.

The western side of the character area is less intensively developed, comprising intact duneland, occupied by rural residential lots, Waikanae Golf Course, Takamore Trust land and El Rancho Christian Holiday Camp. Large areas of regenerating native vegetation, and several wetland areas with high ecological values, are prominent features of the dunes. The rural and residential areas on the east also have a strong framework of mature native and exotic trees.

Key Characteristics

- Mix of peri-urban rural and residential settlement
- Intact dune landforms with regenerating native vegetation
- Substantial established tree structure — pine, willow, poplar, eucalyptus, manuka, exotic amenity trees

Figure 68 Te Moana Character Area

Ngarara

Extending from Te Moana Road to Smithfield Road this character area includes the most intact and complex dune lands of the Expressway route with dune sequences up to 30m amsl or 20m higher than the surrounding ground in places.

Land use is primarily pastoral farmland with some smaller rural residential and lifestyle blocks, and the yet to be occupied Ferndale residential subdivision. The Ngarara area (generally west of the Expressway route) is also planned as a new residential development location to provide for much of the future growth of the district.

In places, there are tracts of native vegetation, including coastal/lowland forest remnants, regenerating scrub, and large wetland areas to the west. There are also pine plantations and woodlots present throughout the area.

Some of the remnant and regenerating indigenous vegetation have been identified as significant ecological sites and are protected (e.g. by way of QEII National Trust open space covenants, Nga Manu Reserve) . This area has been identified by KCDC as part of an ecological corridor linking the coast and the mountains.

The relatively complex topography and substantial tree structure creates an enclosed landscape that moving through it, gradually unfolds.

Figure 69 Ngarara Character Area

Key Characteristics

- Numerous small areas of indigenous vegetation.
- Intact landforms including large dunes, and wetlands.
- Remnant lowland native forest, semi mature manuka/ kanuka, wetlands, pine/macrocarpa shelterbelts woodlots and individual trees.

Figure 70 Ngarara Character Area

Figure 71 Ngarara Character Area

Figure 72 Peka Peka South Character Area

Figure 73 Peka Peka South Character Area

Peka Peka South

Extending from Smithfield Road to just south of Peka Peka, this character area is very uniform comprising relatively flat open rural land located between the high dunes to the west and the foothills of the Tararua Ranges. Pastoral farming is the predominant landuse and low-lying land has been drained with a series of open drains. There are areas of rural residential development along both Greenhills and Smithfield Roads.

Small patches of remnant native forest remain in the area such as at the end of Smithfield Road. Mature pine and macrocarpa trees scattered throughout the open flats are dominant vertical elements in an otherwise flat and homogenous landscape. A double row of 220KV pylons are a prominent feature.

Key Characteristics

- Open flat landscape with Tararua Ranges a significant feature
- Rural character dominated by grazed farmland
- Mature pine and macrocarpa trees

Figure 74 Peka Peka South Character Area

Peka Peka

This character area encompasses the area in the vicinity of the junctions of Peka Peka Road, Hadfield Road, the existing SH1, and the main trunk rail line at the toe of the Tararua foothills. The Tararua foothills are dominant, providing significant physical and visual enclosure to the east. The existing SH1 and the railway line are located at the base of a small but distinctive coastal escarpment north of Hadfield Road.

Overall, the character is of a working rural landscape 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 utilised as grazing land. Harrison's Garden Centre is located on Peka Peka Road.

The area has substantial numbers of mature exotic trees, established as shelterbelts, woodlots and amenity planting, on the rural lots, including pine, poplar, eucalyptus, willow. This creates a strong vegetation framework. Patches of remnant native forest occur throughout the area, particularly on the foothills east of the existing SH1.

Key Characteristics

- The existing SH1 and Rail corridor
- Mature exotic trees
- Remnants of native lowland forest
- Relatively open rural landscape

Figure 75 Peka Peka Character Area

Figure 76 Peka Peka Character Area

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04|consultation

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4.1 Community Consultation

The process for community consultation has included:

- reviews of previous consultation processes and outcomes - these were notes and reports on alternative route options and designs.
- two 'expo' weeks within which there were events involving displays and experts from the Project team on hand to help with enquiries. These were held at Southwards, Waikanae Memorial Hall, Paraparaumu community centre and Raumati Hall on Tennis Court Road.
- permanant-staffed information centre at Coastlands
- newsletters and media releases which described the process and key points of note
- two design workshops - one on the subject of walking cycling and bridleways and the other in the Waikanae/Te Moana area. Both were invited attendances - the KCDC Cycle, Walking Bridleway reference group firstly and the residents of the Pururi/Kauri Te Moana Road area secondly.
- individual meetings with affected landowners and with interest groups on request

Feedback was gathered from meetings notes as well as written responses after each expo week. The expo weeks netted 1600 feedback responses in the first round and 216 in the second.

A summary of key urban and landscape design points as design implications from the submissions are noted below:

- Community division — some concern that the community is already divided, and some believe this would be a 'third division'. Issues of community identity frequently emerge.
- Environmental effects of road operation – noise, light pollution, air pollution, stormwater/groundwater management.
- Environmental damage - the impact on bird life, dune landscape, wetlands, heritage treasures. However, there are a lot of differing opinions as to what constitutes value of environment, and also value of historic/archaeological and iwi items.
- Traffic noise — request a 'quiet' road surface and peace and quiet/tranquillity and quality of life are noted. There is lots of emphasis on 'recreational/relaxed lifestyle'.
- Proximity of route to homes is often mentioned, and potential loss of residential properties is a concern for both amenity and personal reasons.
- Maintain/preserve/enhance Kāpiti's image as the 'Nature Coast'.
- Walking/cycling - safe and convenient connections to schools, shops and local amenities are key concerns. Children and elderly are often mentioned.
- East-west connections are required, at an appropriate scale for cars, walking and cycling.
- Future of urban form is mentioned, many concerned about either 'ribbon' development or 'inappropriate' development around interchanges, and the security of existing urban limits. There are comments that the road will change the way the district functions.
- Views towards Kāpiti and the Tararuas receive only a handful of mentions – this does not appear to be a key concern of submitters.
- Impacts on town centres are mentioned – some feel both Waikanae and Paraparaumu will benefit from not having heavy traffic through town centres. Others fear loss of business.
- Choices in travel movement is mentioned, not just concentration on cars/trucks. Ensuring good links to public transport interchanges is often mentioned.
- Retention of Wharemauku walkway is noted as important.
- Access to coast and Waikanae River are both noted as important.
- Securing another crossing of the Waikanae River is of high importance to many submitters.
- Future role of the existing SH1 is important to local communities. There were many comments about elderly drivers not wanting to use a high-speed road and requiring an alternative.
- Comments that the scale of the Expressway is at odds with context, and the physical size of interchanges is a concern to many. There are a lot of comments about ensuring a good 'fit' of the new road into the landscape. Many submitters want the road 'sunken' into dunes to mitigate visual and noise effects.

Consultation was also undertaken as part of the process to investigate the reconfiguration of SH1 as part of the revocation of this to KCDC once the Expressway become operational. This consisted of targeted meetings with NZ Rail, Coastlands, bus companies as well as public consultation at two expos. A summary of key urban and landscape design points as design implications from the submissions are noted below. Some of these points conflict with each other.

- Good opportunities to redesign the public transport hubs at the town centres.
- Whole town centre's planning needs to be considered and improved include entrances/exit locations.
- The current amenity is poor and town centres should be pedestrian oriented with footpaths that allow for mobility scooters as well as seating.
- A leafy entrance to Paraparaumu is desirable.
- Connections for pedestrians across the road need to be better provided for at Waikanae - ideas include underpass at Elizabeth Street with a link across to Te Moana Road, as well as overbridges.
- Alternative connection to eastern Waikanae is needed (in addition to the Elizabeth Street crossing over the rail line).
- Boulevards would be good and roundabouts reduce highway feel.
- The success of the Waikanae Railway Station improvements has increased demand for car parking, particularly for commuters. More car parking is required to address this problem.
- No additional parking is required in Paraparaumu and Waikanae, there are already large off-street parking areas available.
- The redesign of the Waikanae village centre needs to be planned with the SH1 modifications. Once the village centre planning has been completed a more suitable main street may present itself.
- KCDC should consider changing the zoning along the existing SH1 to allow denser urban development.
- Changes to SH1 should be consistent with the Waikanae North Development Zone.
- Bus movements and stops not good and should be improved at Waikanae.
- Concern that there will continue to be traffic congestion at the existing SH1 Elizabeth Street intersection unless an alterative provided for.
- Provide community open space where people can relax - keep treatment simple and cost effective.
- Trees and reduced road widths considered desirable by some to reduce speeds and enhance amenity and a concern for others in terms of sightlines being affected and congestion being generated.
- The width of the carriageway should be maintained to allow for future population growth and the road must still accommodate large service vehicles, and the design must reflect this use and not cause more congestion.
- Review the actual volume of traffic on SH1 after the Expressway is built, then plan for modifications.
- Provision for emergency services needs to be provided in stationary traffic so ambulance and fire engines can get through.
- Crime Prevention through Environmental Design (CPTED) design principles should be adopted within future concept development.
- Cycleway should be completely separated from vehicle traffic in both urban and rural areas. Planting between the road and cycleway will assist in providing separation.
- Use the existing road to establish cycleway, this will save money.
- Oppose provision for cycleways citing the high costs of construction and the demand for cycle facilities not being high enough to justify the expense.
- Roundabouts are hazardous for cyclists, further investigation needed - make sure cycle tracks don't disappear at bridges, intersections and roundabouts.
- Outer residential areas should have 70-80kph traffic speed limits, particularly around uncontrolled intersections (i.e Raumati Road/SH1).
- Some support for a 30kph speed limit in the town centres and 80kph in the rural areas to improve road safety.
- A roundabout at Otaihanga Road is supported.

Figure 77 Reviewing options

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05|corridor design

5.1 Design Objectives

The first section of corridor design describes overarching design objectives for the Expressway project. These are based on:

- urban and landscape design inputs into decisions which have been made to date; and
- design principles which have been developed to direct future more developed design for the Expressway

RoNS Objectives

From the outset of the MacKays to Peka Peka project coordination has occurred with the other Wellington RoNS urban and landscape design teams. The coordination has included the definition of some common and general objectives for the urban and landscape design — these are set out below.

Environment

1. To design the highway including its horizontal and vertical alignments, cross section, structures and interchanges in response to the environment it traverses whether rural or urban.
2. To design the highway so as to retain key landscape, built, heritage and / or key ecology features along the route.
3. To design the highway with interchanges in locations that enable regional, interregional and local transport movements that can support and encourage economic development from urban and business growth.
4. To optimise the opportunities for future land uses around the highway corridor to either reinstate prior uses or develop in new ways such that the district's urban and business growth can benefit.
5. To design the highway with consideration to the needs and amenity of the local community including maintaining or enhancing the usability and amenity of public open spaces.
6. To design the highway to respond to the local drainage patterns and maximise the opportunities for improving stormwater discharge quality.
7. To design the highway to contribute to ecological sustainability and biodiversity.
8. To design the highway so as to maintain heritage and cultural elements that provide historic significance, to ensure the relevance of heritage elements through access and/or interpretation, and to promote historical and cultural narratives through the detailed design.
9. To be cognisant of resource efficiency and sustainability opportunities and innovations in the design, construction, operation and/or maintenance phases of the highway.

Accessibility

10. To design the highway so as to maintain or enhance the connectivity, usability and amenity of pedestrian, cycle and vehicles links which adjoin or cross the road corridor.
11. To design the highway with retention of all existing local roads and provide where practicable opportunities for increased accessibility through additional local connections and/or improved accessibility to public transport, cycle and walking networks.
12. Where appropriate, to design the new highway with consideration of the role of the old highway corridor in contributing to local accessibility for public transport, cycle and walking networks.
13. To design the highway to minimise social severance, community disruption and loss of amenity.
14. To design the highway to maintain or enhance access to waterways, the coast, open spaces and recreational activities.
15. To design the highway to avoid the creation of isolated pockets of land and not preclude use or development of sites in the future.

Legibility

16. To design the highway to create legible entry and exit points to and from urban areas with consideration of driver experience across the whole Wellington RoNS corridor.
17. To design the highway to provide road users with a coherent, interesting and pleasant experience.
18. To design the highway to assist safe driver behaviour with designed-in speed management and safety measures.
19. To design the highway to preserve distinctive local and distant views to aid orientation and enhance sense of place.

5.2 Design Decisions to Date

The focus of this section (and the ULDF generally) is on the urban and landscape design factors considered in the design. Importantly there were many other factors that had to be given consideration in the option analysis and design process and decisions were made balancing these factors.

This first section of the ULDF (section 5.2 -5.4) addresses foundation urban and landscape design decisions that have been made to date with respect to interchange locations, within route options and under/over options. The key design considerations are noted for these and the reasons why the decision were made are noted. These were important design process decisions noted in the methodology section of this ULDF (refer to section 1.3).

It is noted that the scope of the ULDF is on the Expressway project route determined by NZTA - it does not examine alterative route options. A separate alternative route options report describes the basis on which the proposed Expressway route was determined as preferred.

5.3 Interchanges Options Design

Early in the design process the location of interchanges along the Expressway and the points of tie-in to the existing SH1 were identified and given consideration to in the Multi Criteria Assessment process. The options considered were full or part interchanges in the sense of north and south facing ramps to give on and off access to the local road network from the Expressway. Several variant combinations of full or part interchanges were considered (refer to Figures A to D) :

A four full interchanges, being at the south end tie into SH1, Paraparaumu/Kāpiti Road, Waikanae/ Te Moana Road, and at the north tie-in to SH1 at Peka Peka

B one full interchange only at Otaihanga and no other local road connections, except connections back to SH1

C two full interchanges at Paraparaumu/Kāpiti Road and Waikanae/Te Moana Road in combination with part interchanges at the south end (south facing ramps to allow traffic off SH1 at this point) and the north end (north facing ramps to allow traffic on to SH1 at this point).

D a split interchange (in combination with other interchange options at other places as above) at Paraparaumu with on and off ramps in combination at Kāpiti Road and Ihakara Street extension.

Key Design Considerations

- the ability for the two main communities at Waikanae and Paraparaumu to have improved connectivity between them and so facilitate improved access between residents and services at each location
- the maintenance of an urban form in the district that follows the KCDC growth planning policy of a semi rural separation at Otaihanga by discouraging urban growth there and at Peka Peka
- the enhancement of economic growth opportunities in the district including the future development of Paraparaumu as the district centre

The decision made about interchange locations was for an interchange at Paraparaumu (Kāpiti Road) and Waikanae (Te Moana Road) - Option C in Figure 78. This option was preferred because:

- it provides for direct north-south connectivity between the two communities at Waikanae and Paraparaumu
- it continues to provide a good level of service on the Expressway
- it provide direct access for heavy vehicles to the Kāpiti Road commercial area and the large scale growth areas for commercial development at the airport
- it facilitates urban growth to occur in the planned for locations within the district and discourages it in other places - at Peka Peka and Otaihanga
- it provide resilience in the road network by allowing flexibility in how traffic is routed

Option A was not preferred as it had the potential to increase urban development pressure at Peka Peka against urban form planning policy. Also at Poplar Avenue the need for a full interchange was not warranted given the proximity at Kāpiti Road and additional cost.

Option B was not preferred as it had the potential to increase urban development pressure at Otaihanga against urban form planning policy, gave less immediate access to the key subregional destinations in the existing urban areas and would put more pressure on local roads like Ratanui and Mazengarb Road to deliver traffic to the Paraparaumu town centre.

Option D was not preferred as it would have impacted more on Wharemauku Stream and the walking and cycling amenity and relies on the Ihakara link being made which does not currently exist. It would also have meant a convoluted connection to the town centre for north bound traffic on the Expressway.

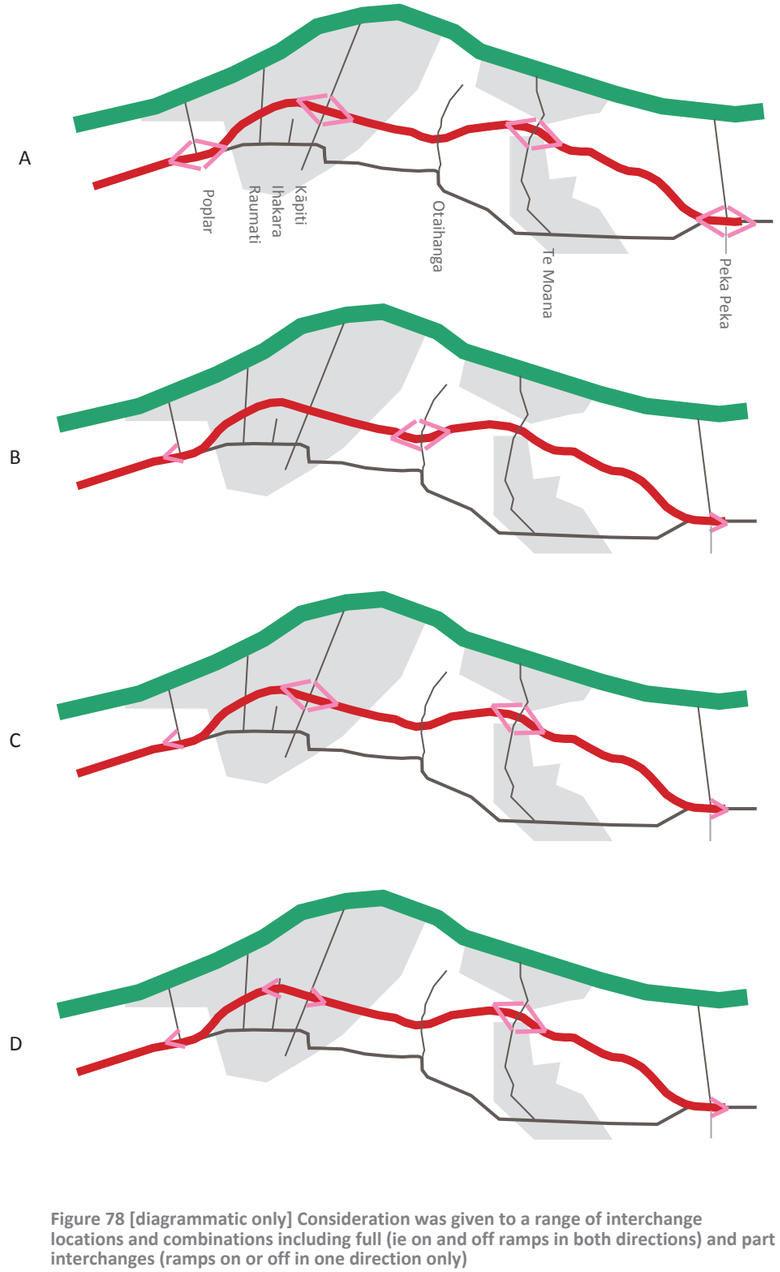


Figure 78 [diagrammatic only] Consideration was given to a range of interchange locations and combinations including full (ie on and off ramps in both directions) and part interchanges (ramps on or off in one direction only)

5.4 Route Adjustment Design

Adjustments to the currently designated route were needed in some locations to accommodate the road geometry for Expressway traffic design speed, and also to reduce effects on ecological features such as wetlands, sensitive land uses, cultural and heritage values, poor ground conditions, landscape features, and flood hazard areas.

From an urban and landscape design perspective the locations where these adjustments are of most significance are at the south end between Raumati Road and Queen Elizabeth Park, and at Waikanae between the river and Te Moana Road.

The important urban and landscape design factors considered and incorporated into the design and route option selection at these two specific locations are expanded on below.

South End

The two principal options at the south end were the routes which either:

- followed the designated area for the western link road between Raumati Road and Poplar Avenue with an extension into Queen Elizabeth Park to join back to the existing SH1; or
- followed the designated area part of the way south and then diverged to join back to the existing SH1 at what has nominally been described as 200 Main Road

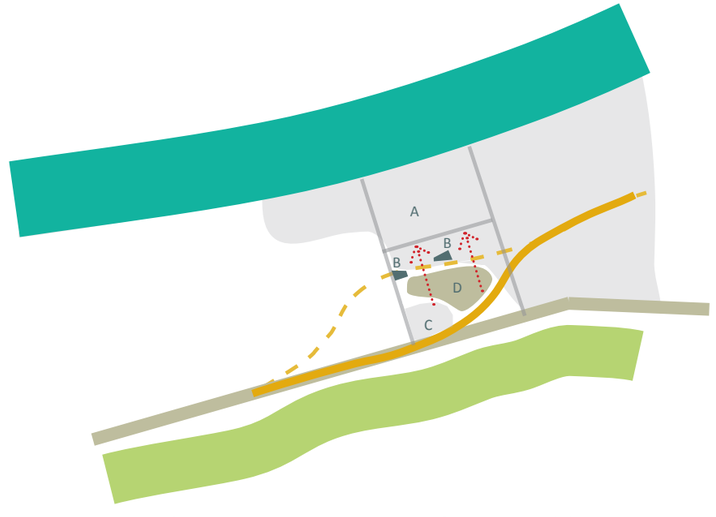
Key Design Considerations - South End

- the impact on local amenities (such as schools, parks)
- the effects on residential communities
- the opportunities to generate good quality new urban environments within residual or adjacent land
- the legibility of the route with respect to the way it fits and can be understood in the context of the urban environment
- the extent of effects on natural dune landforms and ecological areas
- the visual impacts of change

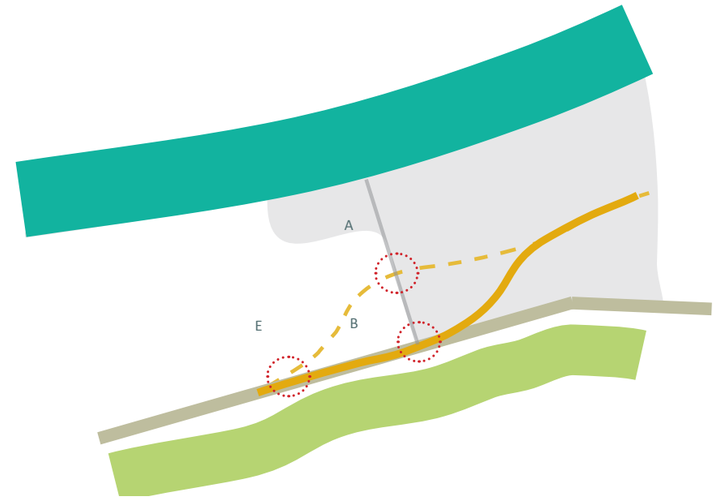
The decision made at the southern end was to take the Expressway along the more easterly route option. The reasons this option is preferred are:

- connections can be made between Leinster Ave back to Raumati where schools and other amenities are located
- it means only 1 over bridge on Poplar Ave is required and so reduces the visual effects for Poplar Ave side and Leinster Ave properties from the alternative
- it avoids effects on the dunes and ecological areas on the currently designated land
- it avoids running the Expressway close to Raumati South School, or having to remove Te Ra School
- it reduces the effects on QE Park and the potential future uses of the north end of the park
- it allows the pocket of land at the back of Leinster Ave and the existing SH1 to become part of the urban area in time if it is ever rezoned and can provided for the protection of existing features of wetlands and dunes
- it puts the south end interchange which at the urban edge of the area rather than in the QE Park which will read more logically to users

It is acknowledged that the preferred option requires the acquisition and removal of a number of residential properties. However, on balance for the reasons identified above (in combination with other non urban design or landscape reasons associated with the design) the preferred option has been selected to proceed to be designated for the Expressway.



At the south end the preferred option allows the enclave of Leinster Ave (C) residential area to better link back to the Raumati community (A) and the amenities there such as schools - Raumati South and Te Ra (B), shops, parks. The potentially residual land (D) could be developed in the future if it was rezoned as a residential area with the features of wetlands and dunes are recognised and provided for in the design.



At the south end the preferred option requires only one over bridge at the end of Poplar Ave (B) - the alternative would have required two bridges - 1 in the park (E) and the other on Poplar Ave in the proximity of residential and school uses. The preferred options also locates the bridge at the beginning of the Raumati urban area (A) - this is considered a more legible place to signal the arrival point and where a choice can be made to divert to the Paraparaumu town centre along the former SH1

Figure 79 [diagrammatic only] South End Options

5.4 Within Route Options Design

Te Moana Area - Waikanae

The two principal options at Waikanae were the routes which either:

- followed a route east of the designated western link road route; or
- followed a route on and closer to the existing designated corridor

It is noted that the currently designated route for the western link road has an alignment which functions for an 80kmh speed limit. The designated route has a bend in this Te Moana area section that will not accommodate the Expressway design speed of 110kmh. Accordingly a new alignment was required in this section to enable the required vehicle speed road geometry.

Key Design Considerations - Waikanae

- the effects on all cultural heritage including at Takamore, urupa, Maketu tree, as well as Greenaway Homestead
- the extent of effects on natural dune landforms and ecological areas including the watercourses
- the impact on local amenities such as the Waikanae River and access to schools
- the effects on residential communities
- the opportunities to generate good quality new urban environments within residual or adjacent land
- the legibility of the route with respect to the way it fits and can be understood in the context of the urban environment
- the visual impacts of change

The decision made for this section of the Expressway was to proceed with the more westerly route option. The reasons this option was preferred because:

- it reduces the number of residential properties affected
- it affects the wāhi tapu area, but only minimally in extent and much less than the current western link road designation

It is noted that consultation with iwi and the Takamore Trustees has been on-going throughout the Expressway design process.

The Cultural Impact Assessments (Technical Reports 11 & 12, Volume 3) describe the archeological and cultural values associated with this area and the mitigation proposed.The process of determining mitigation is on-going and includes consideration as to:

- the future use and ownership of currently designated land
- establishment of cultural identifiers (such as pou) and other amenities that improve the cultural function of the area
- environmental and ecological enhancement including wetland creation, landscape design, wāhi tapu spring restoration and planting.

Figure 81 Waikanae option (preferred) which show the Expressway alignment avoiding houses on Pururi Road

Figure 80 Mitigation including wetland enhancement and interpretation opportunities

Figure 82 Waikanae option (alternative) which show the Expressway alignment avoiding wāhi tapu area, but cutting through houses at Pururi Road

5.5 Over/Under Options Design

There are 12 locations along the route where a bridge is required to provide for an existing road or other access connection across the Expressway corridor.

At each of these locations the decision has broadly been whether to raise the Expressway to go over the local road, or raise the local road to go over the Expressway. The use of working simulations (see Figures 81 to 83) assisted to understand the issues associated with these different options.

The context for each of these bridge points vary from the more rural locations in the north to the more urban locations in the south. The roads themselves are typically oriented east west and provide critical roles in connecting between the beach communities (Peka Peka Beach, Waikanae Beach, Paraparaumu Beach and Raumati Beach) and the inland communities (Waikanae, Paraparaumu and Raumati).

Key Design Considerations

- the function of the local road for people walking, cycling, horse riding or moving in some non-vehicular mode who will be sensitive to changes in level, increased distances, personal security, light and air, and views
- the way in which the land form along the route currently relates relative to local roads
- the relationship to properties with access to the local roads from any over bridges changing visual relationships and physical access to that road
- the effects on the view along local road to landscape context and valued features -such as Kāpiti Island or the hills to the east
- the impact of bridge embankments on surrounding areas and connectivity
- the legibility and identity of the local road in terms of maintaining valued characteristics of that road

Linked into the decision about whether the Expressway went over the local road or vice versa was the width of the median. By considering a wider median it has been possible to split bridges to allow natural light down to the road below.

A further point to note with respect to the bridges over or under the Expressway is how this relates to any urban growth areas. This issue is covered in further detail under the Future Land Uses section. The decisions as to whether these future connections extend over or under the Expressway will be determined by the location of these and the form of the Expressway as constructed.

The decision made with respect to over and under bridges was to:

- provide for local roads at grade in the more urban southern section of the Expressway route (from Te Moana Road south) with the Expressway over on a bridge
- provide for the local road over the Expressway in the more rural northern section of the Expressway route (Smithfield Road and Ngarara Road) as well as well as any future additional east west links.

These options were preferred because:

- in most instances the local roads and larger watercourses are being used by people moving frequently east-west on the local roads. For walking and cycling and people with impaired mobility maintaining flat grades assists connectivity and accessibility between east and west side of the Expressway.
- the dune landforms allow for the Expressway to be located across the tops of dunes (Raumati and Mazengarb Road) - in other places the Expressway needs to be raised in part on embankments.
- local roads going over the Expressway would have required long ramps to provide reasonable grade slopes and this would have impacted on the ability to use properties beside those ramps
- due to the existing alignment of local roads to provide for these over the Expressway would have required substantial realignment to address curves and sight line on those local roads which would have both required additional properties to be acquired as well as changes the scale and patterns of the existing local road network.

Working simulation - view west along Kāpiti Road from approxiamtaely Arawhata Road

Figure 83 are working simulations (labelled preliminary accordingly) produced to assist the understanding of the advantages and disadvantages of the local road over or under the Expressway options. Top shows the existing situation, the middle shows the option of the local road over the Expressway, and the bottom shows the Expressway over the local road.

5.6 General Cross Sectional Design

The MacKays to Peka Peka Expressway is some 16 km in length. Along this length there are a variety of contextual conditions and these have been considered along with the essential functional and geometric design requirements in determining the standard cross section.

Several options were considered which included various median widths and embankment slopes.

Key Design Considerations

- the function of the Expressway as a safe and effective 110kmh design speed national highway route
- The RoNS guidelines for median widths
- the implications of a the width of the road footprint given the need for extensive ground improvements - the wider the footprint the larger the cost
- the desire to address the apparent width of the Expressway in the landscape
- the number of bridges required and the way in which these relate to local road crossings and any variations in median width
- the provision of a reasonably consistent driver experience for the Expressway user
- the degree to which the road width affects landforms
- the relationship between embankment slope batters and the amount of fill material required.

The decision made regarding cross section was to adopt two standard median widths (6 metres in the southern section and 4 metres in the north) with typically 1:3 batter slopes off the road edge or for cuts.

The reasons this cross section was preferred was because:

- it allows for wider median in urban areas with consequent space to plant and reduce the visual scale of the Expressway
- it allows for the Expressway over bridges to be split into two side by side and allows for light to local road below
- the embankment slope batter allows for runoff areas reducing the need for road side barriers - it is noted that NZTA requirements are being reviewed on this
- the narrower median width in the north end reduces the footprint in the areas where the ground improvements would be most extensive
- the narrower median in the north end reduces the footprint and thus the extent of the cut batters required

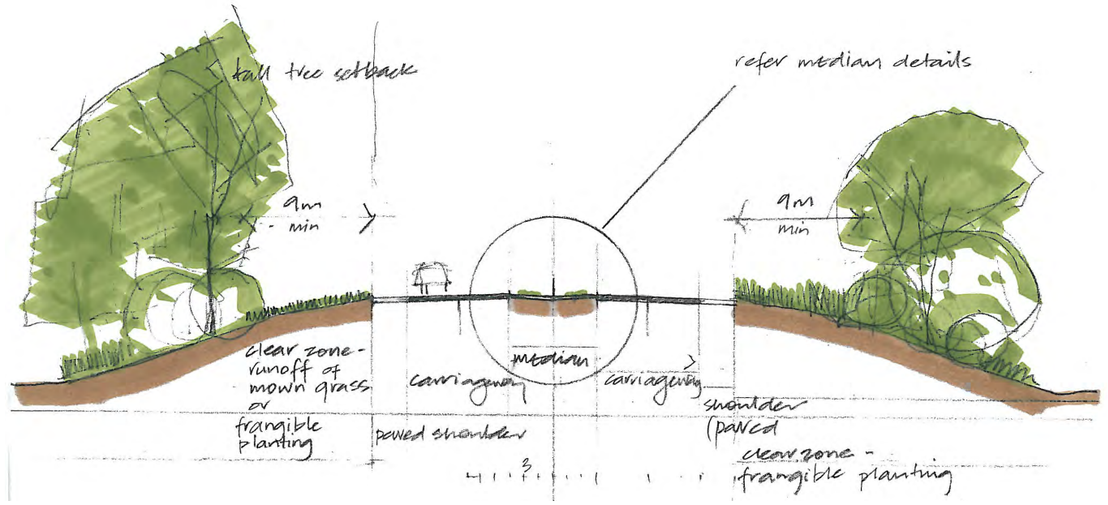


Figure 84 Preferred standard cross section showing 6m planted median

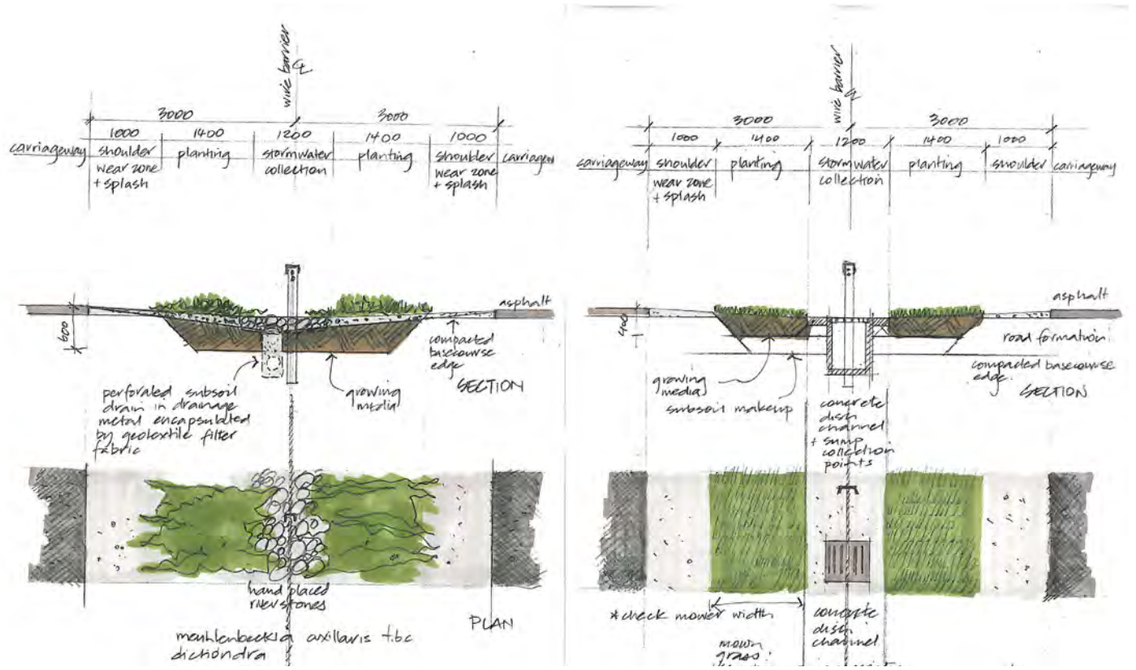


Figure 85 Options for median planting treatment for 6m width - low planting on the left or grass on the right.

5.7 Local Road Interface Design

There are seven locations where the Expressway crosses over a local road:

- Poplar Avenue
- Raumati Road
- Ihakara Street (future)
- Kāpiti Road
- Mazengarb Road
- Otaihanga Road
- Te Moana Road

Additionally there are two locations where the local road crosses over the Expressway:

- Ngarara Road
- Smithfield Road

Bridges which are not over local roads, but over waterways include the Waikanae as the largest, Wharemauku in tandem with the Ihakara Street extension, Waimeha and other smaller streams/drains to the north.

Design Concept

The concept for the local road interface design is that the public spaces of the roads and streets should take primacy over the experience for the Expressway user. It is people walking, cycling and driving on the local road that will interact with the spaces leading up to and under the Expressway -these need to be design and treated as public open spaces in their own right.

In designing for these crossings all make provision will be made for walking and cycling within the road reserve areas provided for, with the expectation that horses will utilise footpath and berm areas. For bridges over the Expressway (Ngarara and Smithfield Roads) provision is also made for a wider footpath that will provide space for horse use.

Design Principles

The following principles will apply to the design of these interface locations:

1. Recognise that the scale, form and materials should provide some consistency in approach given the frequency of local road interfaces with the Expressway
2. Provide for interaction in design of the Expressway local road interfaces with that of the bridge structures (see Bridge Principles) in terms of process and the consideration of use, materials, and forms
3. Direct sight lines along the local road to and under the bridges should be maintained and hiding places eliminated to provide walkers, cyclists and others not in vehicles with a clear and safe passage
4. Manage the scale of the abutments and their shape to provide an openness to the space beneath the bridge
5. Design the bridge approaches along local roads to lead users up to, beneath, and then beyond the bridge space so it reads as a continuous experience
6. Reference the particular characteristics of the landscape at each bridge approach to provide local identity in the landscape design treatment
7. Light the spaces beneath local road over bridges to enhance the quality of the space including the use of natural light penetration where the local road has a higher frequency of pedestrian cycling and other non-vehicular users
8. Utilise colours and materials for the space beneath the bridge over local roads that provide brightness, detail and texture to assist the visual amenity of the space
9. Ensure the surfaces and spaces beneath the bridges over local roads can be readily maintained and will not trap litter or attract graffiti
10. Provide for a simple and efficient construction to recognise that local road must continue to be functional during construction
11. Maintain adequate local road reserve widths to provide for existing and likely future upgrades and improvements and provide for interaction with KCDC in this respect
12. Provide for direct pedestrian and cyclist passage across Expressway on and off ramps to match desire lines and eliminate free turns at these intersections with local roads.

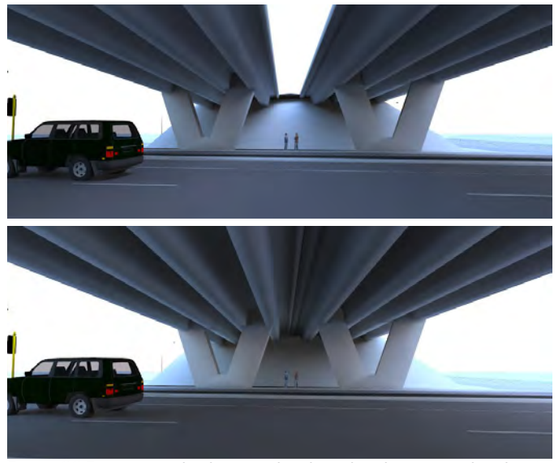


Figure 86 Expressway bridge over local road with a gap and without - use a gap where frequent local road use to allow natural down light

Figure 89 Concept of wrapping the under bridge abutments out into the landscape beyond

Figure 90 Existing landscape character can be retained - bend of the road, dune forms, scale and type of vegetation, path locations - continues local identity

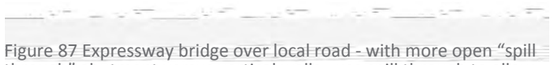


Figure 87 Expressway bridge over local road - with more open "spill through" abutment versus vertical walls - use spill through to allow more openness

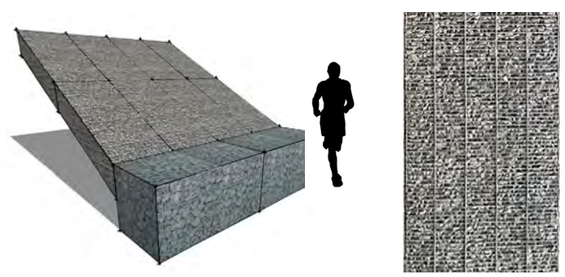


Figure 88 Use of materials that have a texture, do not attract graffiti and are easily maintained - proposed gabion basket - fill can be small stones or other granular materials that reflect the granular nature of sand dune country through which the Expressway passes

Figure 91 At local roads the surfaces can be treated differently and bright colours used to lighten the space

5.8 Bridge Design

As noted with regard to the local road interface design principles, there are bridges over local roads as well as local roads over the Expressway. There are also places for pedestrian bridges over the Expressway and bridges along the cycleway/walkway — the latter of these is addressed under the cycleway/walking design principles.

There has been some advancement of the design to enable some definition to the bridge forms and concept. This is described below with Principles to follow.

Design Concept

The Expressway is a new feature in the landscape and by its nature is strongly horizontal — the expression of that horizontality is acknowledged whilst also recognising that it hovers over the ground where it crosses local roads.

Where bridges interface with local roads the concept is to translate its supporting armature of columns and beams into a single and fluid shape to simplify the appearance of the structure rather than drawing attention to it — this is a sculptural approach.

More fluid forms are representative of natural shapes in the dune landscape and knits with the probable concrete material use planned for this project as it can be readily shaped.

The design of the bridges as a series of components that together form a whole allows for the bridges to be conceived as single kits of parts. It also allows for the components to be repeated and the same approach reused at the multiple crossings to register as a 'family' of bridges.

Using concrete prefabricated parts will allow fine levels of quality control, cost benefits and significant improvements in construction time at the crossings.

Components and Materiality

The typical bridge components include the edge barrier, cross head, deck and support piers. The intention is to use standard barrier (TL5 or the like), deck (super "T" or hollow core) and cross heads, but to sheath these and tie them into a seamlessly sculpted column. The concrete material should also be considered in terms of its texture and colour.

Design Principles

The following principles will apply to the design of the bridges:

1. Make the bridges generally consistent in their form so they register as a 'family' and provide some visual continuity within the local environment
2. Express the bridges as simple forms that sit across the changes in landscape and are not seen as strong statements in their own right
3. Unite the bridge elements of pier, cross head, deck and barrier as one sculptural form and ensure services are concealed from view
4. Ensure the form of the bridges from the underside is visually appealing to recognise the primacy of the local road user's experience in design consideration
5. Design the intersection of the piers with the ground in concert with the local road interface design of abutment forms and materials (refer to local road interface design principles)
6. Light the spaces beneath local road over bridges to enhance the quality of the space including the use of natural light penetration where the local road has a higher frequency of pedestrian cycling and other non-vehicular users
7. Use architectural lighting to emphasise the sculptural forms of the bridges and light units that are readily serviceable from the ground
8. Utilise the opportunity provided by multiple bridges to make a system of parts that can be repeated at each location and improve efficiency of construction
9. Use textured finishes within the bridge elements' surfaces to provide a crafted finish - avoid printed forms
10. Repeat the bridge design concepts within the design of pedestrian bridges recognising that these may be able to utilise lighter weight materials
11. Develop each bridge crossing design considering the pier types best suited to that location
12. Locate bridge piers associated with bridge watercourse crossings away from riparian edges to prevent need to armour stream edges
13. Ensure that the integrity and significance of the bridge forms as important to the amenity of the community is not accorded any less priority than the other design requirements for the Project

Figure 92 Dune shapes are sculptural and provide a point of reference — the play of light and shade provide relief

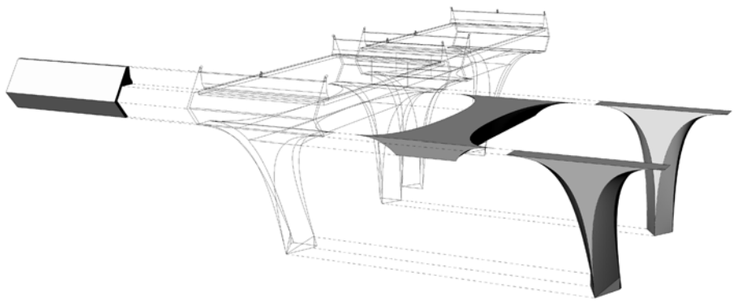


Figure 93 By considering the main elements of a concrete bridge that can be manipulated the barrier, cross head and pier present opportunities to be seen as one united form

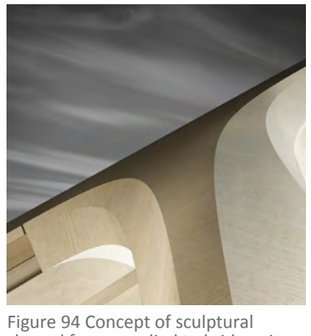


Figure 94 Concept of sculptural shaped forms applied to bridge pier

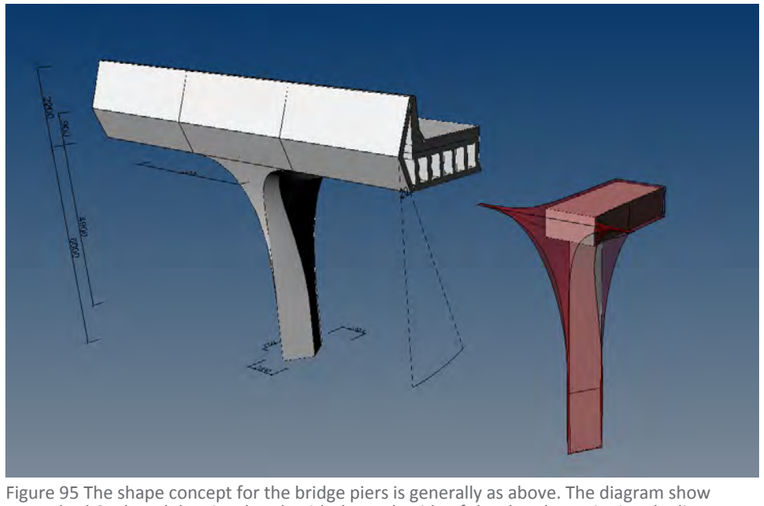


Figure 95 The shape concept for the bridge piers is generally as above. The diagram show a standard 6m length barrier sheath with the underside of the sheath continuing the line vertically to generate the incline of the pier. The intersection of the barrier sheath and the pier top hide the end of the crosshead. A void in the angle of the barrier sheath provides for deck drainage or other conduits. The angles and length of components will be determined in detailed design.

5.9 Noise Design

The context for the Expressway varies in character along its length and includes rural as well as urban interfaces. The existing SH1 and other local roads currently generate noise, but although adding the Expressway may reduce noise from SH1 there will be increased and new noise to areas that have otherwise been relatively quiet.

It is recognised from public consultation and consultation with KCDC that noise and its management is an important aspect of the Expressway design that needs to be well provided for.

Design Concept

The Expressway by its nature will change the noise environment. The noise generated by the Expressway will be addressed in two ways. First the approach will be to design the road surface to use asphalt that minimises noise at source (i.e. from wheels running on the road). Secondly shapes and forms that act as barriers to block noise between the Expressway and the potential receivers will be integrated into the landscape.

It is proposed that a standardised system of noise management shapes and forms will be produced that can be applied along the route in different configurations. This will provide a consistent visual, construction and maintenance regime for the Expressway and its context. The system in terms of its materiality will relate to the other structures on the route such as at bridge locations to reinforce the identity of the Expressway. Advantage will be taken of the corridor width, changes in ground level, and general intended planting density to treat the shapes and forms as integral to the landscape.

Components and Materiality

The typical noise management components include:

- Open Grade Porous Asphalt [OGPA] throughout the urban areas and extending north to approximately Smithfeild Road to reduce noise generation at point source
- the ground will be shaped to provide rises and extensions to natural land forms to block noise - these are planted
- gabion baskets forms in various heights with ramped and planted ground behind to visually integrate with context (Type B)
- standard concrete bridge barrier design (see bridge design) to block noise emanating from the over bridges (Type C)
- residential property timber panel boundary fences to incorporate noise reducing construction specifications (Type A)

Design Principles

The following principles will apply to the noise design:

1. Utilise both OGPA and landforms as the first choice for noise reduction.
2. Integrate noise reduction structures within the landscape by utilising gabion baskets as a standard form, ramping of the ground to the rear, and planting.
3. Prioritise the visual experience for the residential properties the structures are intended to protect and minimise the shading on these properties.
4. Modulate the ground built up to the rear of noise reduction structures to allow the top edge of gabion structures to be read and to prevent people accessing the tops of higher gabions from behind.
5. Where there is sufficient space, consider off-setting the longer gabions in places to reduce their wall like appearance and allow planting in between.
6. Examine the potential to avoid barriers inside gabions walls to reduce additional road side clutter and maintenance.
7. Where barriers are required, utilise wire rope type barriers and offset the gabion from the back of the shoulder the 1m required to allow for impact displacement.
8. Examine further the approach to integrate noise barriers as part of the Paraparaumu interchange.

Figure 96 (Left and below)

Shows three different fence type images and Type A cross-section

TYPE A: Timber or panelled type fence on residential boundary - can be planted with climbers or against with trees and shrubs. The fences can be offset to break up long lengths of wall. Clear panels can also be inserted. Needs specific design to ensure noise attentuating qualities.

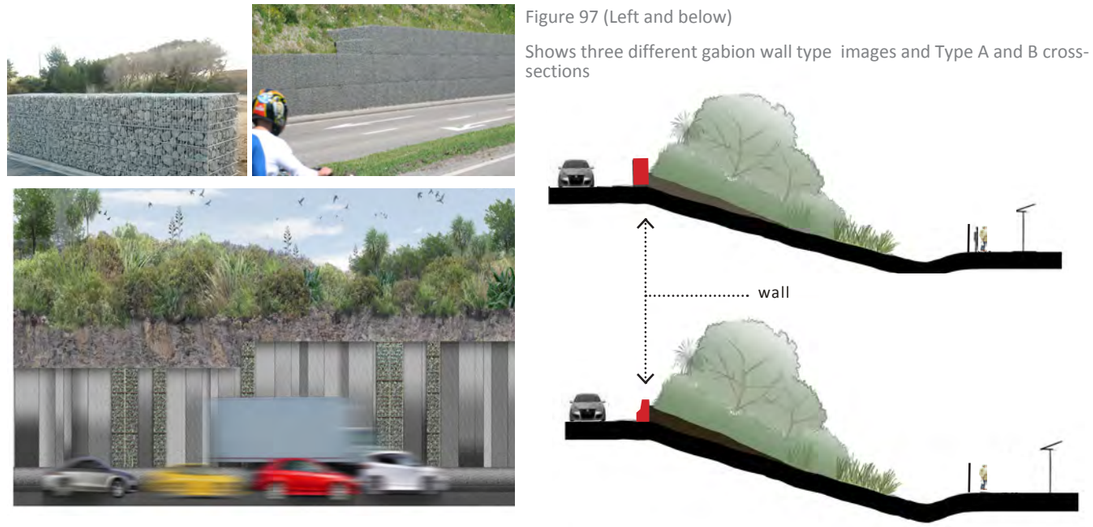


Figure 97 (Left and below)

Shows three different gabion wall type images and Type A and B cross-sections

TYPE B: Gabion basket type wall - maybe gabion facing with solid wall. TYPE C: use of standard slipform concrete barrier. For both types the land form behind the wall will be built up to mask the wall height from the adjacent properties and this slope planted.

Figure 98 (Above) Cross-section describes the building up of the ground to use the rise as part of the noise reduction block. This section is north of Leinster Ave with the Expressway on the right and residential property to the far left. The cycle path and service lane are part way up the slope.

5.10 Landscape - Landforms Design

The dunes are the ‘signature’ landforms encountered along the Expressway corridor. In the first instance the route alignment seeks to avoid significant dunes if possible. However, loss or modification of some dunes will be inevitable in places given the confined corridor available and the scale of the Expressway footprint.

It is noted that some of the dunes that still remain today do so because they are located in the existing road designation and thus have been ‘protected’ from modification for residential and other development. Notwithstanding this, integrating the Expressway linear form into the dune landforms is a key design objective.

Several streams or parts of streams will be diverted. Regardless of their current state (many are channelized and/ or weed infested) they will need to be reconstructed to allow indigenous ecology to re-establish. Other important landforms include the Waikanae River, existing wetlands, and distant views to Kāpiti Island.

Design Concept

The dune forms and other natural landform features have been avoided as best they can in the alignment of the Expressway. However, the Expressway will create change to landforms and the approach will be to ‘naturalise’ the changes as far as practicable, to integrate those changes with local topographical patterns.

Design Principles

The following principles will apply to the landform design:

1. Avoid modification of dunes, wetlands, and streams by minimising the construction footprint in sensitive areas.
2. Retain or enhance natural landforms wherever possible, including within both permanent and construction operational areas.
3. Design or modify landforms to acknowledge and reflect the local topographical pattern (scale, orientation, profile [refer Figure 99]).
4. Modify the slope or use retaining walls to reduce the size of cut faces. A standard 1:3 grade has been proposed in the preliminary design (refer Figure 100).
5. Shape (roll off) the tops of cut/ fill faces so the faces integrate with the existing dune profiles as far as practicable and minimise risk of water and wind erosion.
6. Shape visual and noise mitigation bunds to appear as ‘natural’ landforms (refer Figure 99), avoiding engineered appearances unless these forms are a component of a designed ‘land art’ formation.
7. Recognise that the Waikanae River corridor, including, oxbows, river bed and flood plains are a different landform to the dunelands area. The alluvial landform is an important linear feature providing a physical and visual link between the mountains and the coast.
8. Avoid where practicable the realignment of natural stream channels. Ensure that realigned streams are reinstated and designed to allow re-establishment of natural conditions to support indigenous ecology.
9. Recognise the views to the Tararua Ranges and Kāpiti Island as prominent and important landforms and features in the design of east/west local road crossings.
10. Recognise that the sand and peat substrates are likely to need conditioning to provide a good growing substrate for plants. Soils substrate trials will be undertaken to assess the needs and methodology to achieve this.
11. Minimise extent of exposed of sand areas during and post construction to limit erosion from wind and rain events.

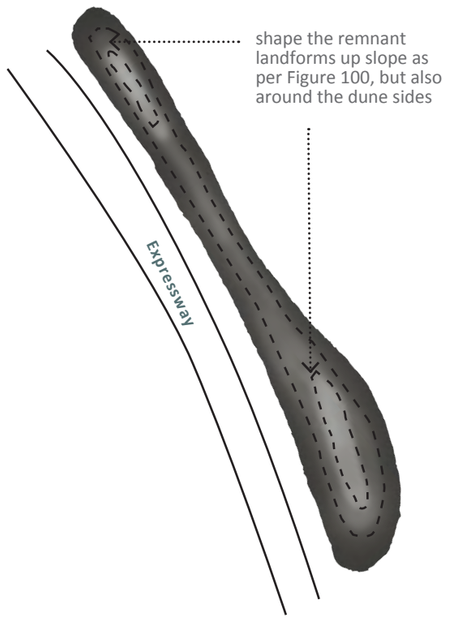
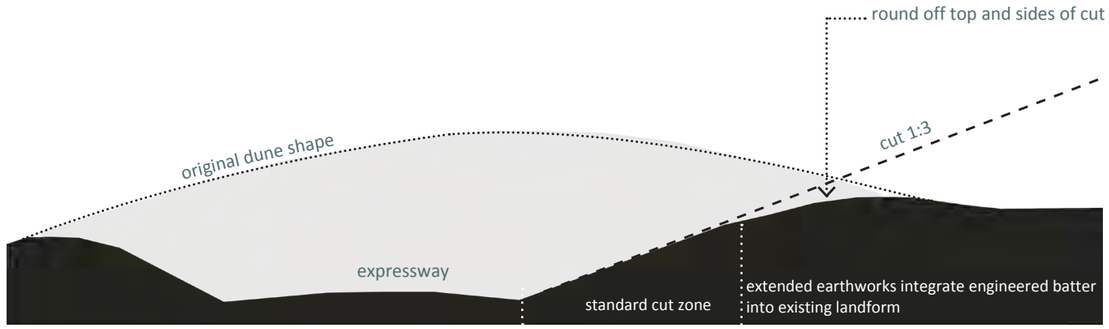
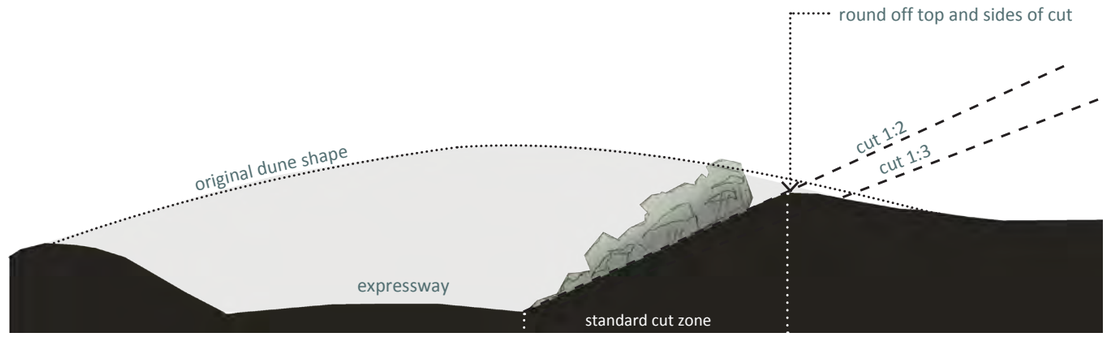


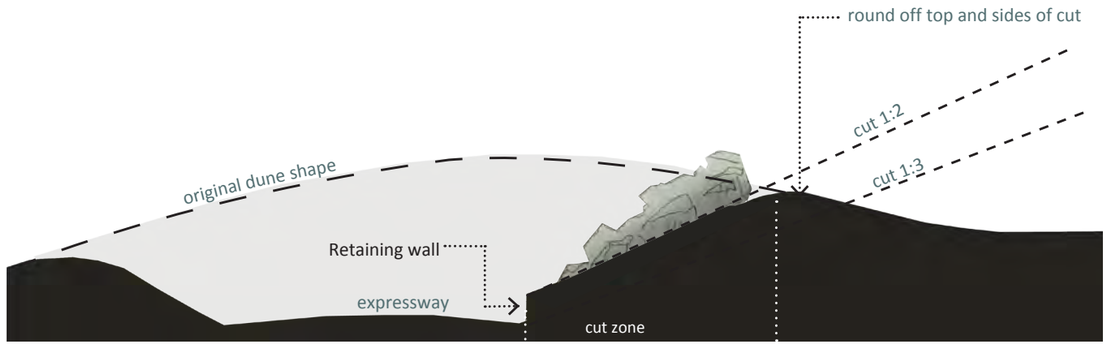
Figure 99 The Expressway has a linear form. Although the dunes are formed in an approximately linear pattern parallel to the coast they are not even and the Expressway cuts across them in places. In plan the remnant dune forms can be shaped to repeat slopes and shapes. The same approach should be used for bunds.



In open rural areas or where the landform will be seen from beyond Expressway consider extending the earthworks beyond standard cut zone to allow rounded dune forms



In areas to be planted consider a steeper cut as this allows more of the ground to be retained and can limit the need for extended earthworks beyond the engineers construction cut zone



Steepening the sides of the wall with retained toe reduces the size of the cut face and retains more of the dune land form. This same approach can be used where it is desireable to minmise the footprint adjacent to wetlands or other features

Figure 100 Expressway integration into the dune landforms can be improved by managing the cut face slopes and their angle at the slope top to wrap to the natural forms

5.11 Landscape - Planting Design

The diverse range of landscape characters through which the Expressway passes necessitates a site specific response to the planting along its length, to ensure new planting is consistent with the existing vegetation structure of specific localities. Figures 101- 107) show the proposed planting typologies along the route. The sector design plans in the ULDF also show how these typologies are applied and further detail is also provided in the Assessment of Landscape and Visual Effects (Technical Report 7, Volume 3).

Planting in the Expressway corridor will have multiple purposes of mitigation of visual effects, ecological enhancement, and integration of the Expressway into the wider landscape. It will be essential that the planting is maintained for a successful restoration and enhancement process.

Design Principles

The following principles will apply to the planting design:

1. Respond to the Expressway scale by using appropriate scale plant species to integrate it into the landscape.
2. Reflect the range of local vegetation character along the route with a appropriate plant species, palettes and compositions.
3. Recognise and retain existing trees and shelter belts to assist with landscape integration and mitigation.
4. Use both exotic and native plant species, as appropriate to the local character of the area, but the predominant species should be indigenous and locally sourced if practicable.
5. Develop the planting structure at the Kāpiti and Te Moana interchanges to specifically enhance the visual amenity of the public open space as well as to provide shade and shelter.
6. Maintain the open rural character, where appropriate, by extending pasture/mown grass to the edge of the paved roadway, and using ‘rural’ tree species.
7. Locate vegetation strategically to provide visual screening to the Expressway and associated structures, noise walls, and bunds.
8. Plant stormwater treatment wetlands, flood storage areas and their margins to reflect existing vegetation patterns and provide additional habitat to freshwater fish and bird species.
9. Establish riparian planting along stream corridors and their margins that assist with enhancing the ecology of the stream, including vegetation which will provide shade.
10. Select plant species that will be sustainable to the soil and climatic conditions within the corridor, to ensure successful establishment and growth.
11. Ensure that all indigenous plant species are sourced locally from the Foxton Ecological District.
12. Ensure that a post construction planting maintenance programme is established and appropriately funded to enable planting to be successfully established and self sustaining.

Figure 101 Massed Planting

Mass planting will primarily include native plant species to provide dense vegetated areas, and may consist of a mixture of species or areas of single species.

Species selection will consider the locality and planting substrate and generally include hardy pioneer species suited to the site. Species may include grasses, ground covers, shrubs and trees.

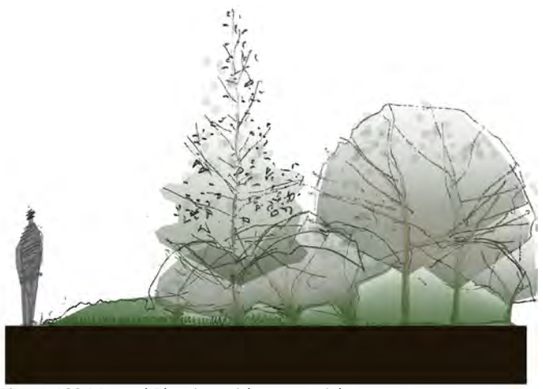


Figure 102 Massed Planting with tree enrichment

Mass planting will primarily include native plant species to provide dense vegetated areas. Enrichment planting of canopy tree species that require a sheltered environment to establish will enrich the biodiversity of the planting and wider area in the long term.

Plant shrubs and small trees at close centres to form a vegetation mass that out competes weeds and other unwanted vegetation for minimal long term maintenance requirements.

Figure 103 Trees under planted with Grass

Single specimen or groups of tall, exotic and native trees established in lawn or pasture to reflect the open character of the local area- to be used in open rural areas and interchanges.

Tree planting in rural areas will reflect existing patterns, such as shelter belts, wood lots and small groups of trees using species such as poplar, willow, pine, eucalypt. Exotic or native amenity trees will be used in civic areas. Avoid the use of willow on streams where practicable and in consultation with GWRC.

Figure 104 Specimen Trees under planted with ground cover

Single specimen or groups of tall, exotic and native specimen trees under planted with massed ground cover species including grasses and low shrubs.

Typically used at interchange or civic areas to provide a low maintenance robust tree structure, shade, screening, and shelter.

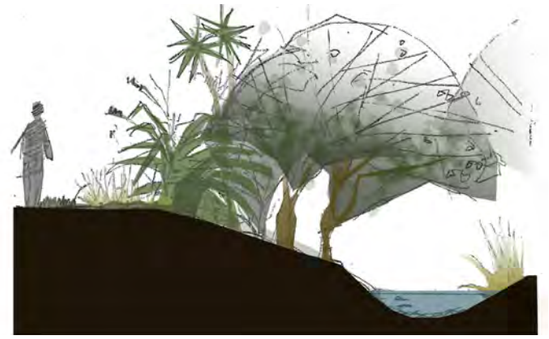


Figure 105 Riparian Planting

Riparian planting will provide transition to adjoining areas and enhance the ecological values of the stream and its margins, providing shade with overhanging vegetation, and stabilising banks.

Figure 106 Wetland/Stormwater Pond Planting

Wetland species consistent with local species including species tolerant of permanent and occasional inundation and drier land on the margins.

Figure 107 Storm water swales

Wetland species consistent with local species including species tolerant of permanent and occasional inundation and drier land on the margins.

Vegetation in swale channel will protect against soil erosion during peak flows.

5.12 Pedestrian, Cycle and Bridleway Design

The provision for walking and cycling as part of the Expressway project reflects the policy commitment from KCDC, NZTA and regional government to provide an integrated movement network that caters for a range and choice of modes.

The context description (refer to section 3) describes the current use of the existing network by walkers, cyclists and horse riders.

Design Concept

The design concept for walking and cycling is the provision of a continuous route which encourages cyclists off the Expressway shoulder and that enables walkers and cyclists improved and safe access to and from local and sub-regional destinations (refer to Figure 113). The new route will work in concert with the existing network and a future network being developed to enhance the walking and cycling activity in the district.

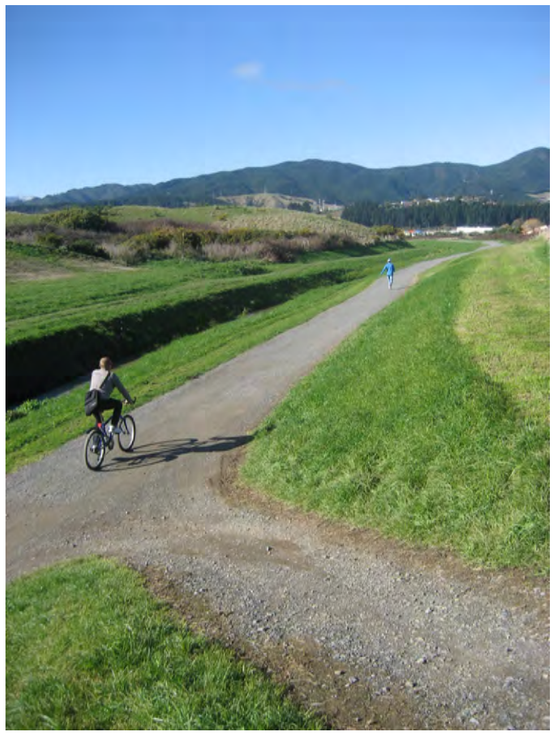
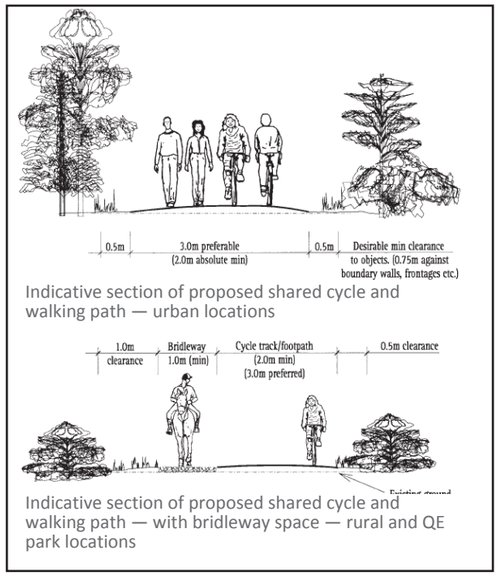


Figure 108 Existing shared cycle and walking path at Wharemauku Stream

Design Principles

1. Provide a safe cycle and walking shared path that is generally parallel to the Expressway route to encourage its use by cyclists and walkers.
2. Recognise and provide for connections to the existing and KCDC planned cycle and walking network as well as to all local roads in the positioning of access links of the cycle and walking path.
3. Ensure that the cycleway is planned in relation to linking with the connections at the Transmission Gully (south) end and the Peka Peka to Otaki (north) end.
4. Provide for slope grades that allow use by a range of users and design for these slopes at the places where the cycleway intersects with the local roads to facilitate cycleable access connections at all of these.
5. Secure with GWRC the provision of a southern section of the route through Queen Elizabeth Park, to link Paekākāriki and Raumati to facilitate commuting use between the community to the south and the services and amenities to the north. It is noted that this will not form part of the designation for the Expressway and will occur by separate agreement.
6. Provide a formed and appropriately surfaced path of 3m width that provides for road cyclists as well as other modes, with a sealed surface in the urban areas and looser surface in rural and Queen Elizabeth Park areas.
7. Identify separate lanes for cycling and walking paths to prevent conflicts in heavu use areas and use directional signage to assist wayfinding.
8. Provide low level lighting at the locations where the path intersects with local roads and integrate lighting with the local road interface design.
9. Consider lighting through the urban areas to provide for evening use of the path.
10. Reflect the context in the design of the walking and cycle path, such as through wetland areas using boardwalks and across waterways expressing the crossing by using bridges rather than culverts.
11. Recognise the opportunities for the integration of the walking and cycle path as a corridor for community art projects.
12. Provide for horse riding alongside the cycle and walking path in the rural and open space sections of the route such as at Waikanae River and Queen Elizabeth Park.

Figure 109 Indicative image of type of proposed shared cycle and walking path - shown as approximately 1m wide pedestrian and 2m wide cycle lanes

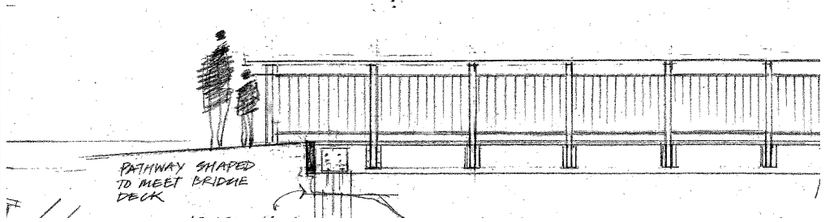


Indicative section of proposed shared cycle and walking path — urban locations

Indicative section of proposed shared cycle and walking path — with bridleway space — rural and QE park locations

Figure 110 Indicative sections (source KCDC)

Figure 111 Simple timber cycle and walking path bridge over watercourses



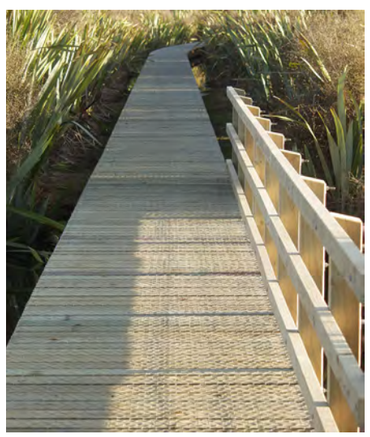


Figure 112 Simple timber cycle and walking path boardwalk over wetland areas — can be with handrail for open water areas

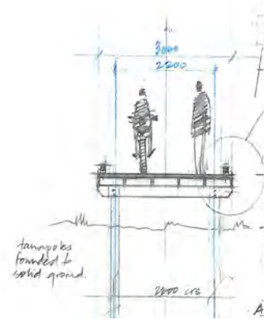


Figure 113 Cycle and walking network - note this shows a combination of the use of existing roads (purple), off road tracks (purple dash) and describes the Expressway connector (orange line). The other local roads that do not form a principal role in the cycle and walking network are shown in white. At each of the places where the Expressway path crosses a local road or another part of the cycle/walking network a connection will be made (circle) that allows cyclists, walkers or horse riders to get on or off the Expressway path to the road or track.

The plan is adapted from the KCDC and Kāpiti Cycling Inc Kāpiti Coast District Coastal Cycleway map. It does not show every small linkage, but shows the principal network.

5.13 Road Furniture Design

Road furniture is the set of elements that are required for the safe functioning of the Expressway. The elements include barriers, lights, signs and messaging systems. These elements need to function to provide the desired safety outcomes but can also be scaled, positioned, and selected to contribute positively to the driver's visual experience and to fit with the local environment.

Design Concept

To integrate all road furniture within the local environment sensitively and to enhance the Expressway driver experience through the Expressway by planning and designing the furniture purposefully from the outset.

Design Principles

Side Barriers

- If possible use runoff areas beyond Expressway shoulders to avoid the need for side barriers.
- Where side barriers are required for safety reasons:
  - > consider the use of ramped up ground as an altrenative to constructed barriers
  - > keep height of all barriers to a minimum to retain views beyond the carriageway
  - > avoid short sections of steel barrier - landform bunds are the preferred option
  - > match barriers on both sides of the carriageway
  - > avoid abrupt and hard ends to barriers, and tie back to bridge barriers with a slip form end
  - > integrate noise mitigation structures and safety barriers where these are required in combinations (refer to noise design)
  - > use concrete side barriers over bridges with the integration to the outward face (refer bridge design)
  - > design the transition of bridge barriers back to the landscape - emphasise the impression of the bridge ending from external view points and do not continue bridge barriers out into the landscape except with earth bunding behind (refer noise design)
  - > avoid surface motif patterns to concrete barriers - texture and natural colours may be used as part of the concrete surface treatment
  - > use steel (w-section and/or thrie-beam) barriers at culverts and minimise their extent

Median Barriers

- Two median widths are proposed - 6m and 4m - which apply to the urban and rural areas respectively. In both cases a wire rope barrier is preferred and the median strip planted on the wider median (refer to landscape planting design)

Lighting Columns

- Keep lighting along the Expressway to a minimum and locate lights at on and off ramps only.
- Use directional lights in the urban areas to minimise the light spill.
- Use steel light standards with a plain galvanised finish and have a defined acute angle between the pole and arm, or attach fitting directly to poles.
- Use consistent heights within each group of light standards (for instance within each interchange).
- Utilise the same pole to attach lights and any other furniture such as CCTV cameras.
- Place light poles and other furniture to avoid the need for additional barrier protection at the base.

CCTV

- Adopt design for CCTV camera standards that is either combined or consistent with light standards.

Sign Gantries and Signage Posts

- Design gantries so that beams and pillars join at right angles. Preference is for square box section, I beams and flat steel components.
- Design pillars to prevent unauthorised access without the need for such secondary fittings such as barbed wire.
- Use simple steel posts for smaller signs installed adjacent to the Expressway such as 'welcome' signs.
- Paint gantries a metallic colour that complements weathered galvanised steel.
- Where possible, signage should be visually contained within the depth of the spanning girder, through integrated design of girders and signage panels
- Signage should not be mounted on bridges as they are to be retained as clean sculptural shapes
- Signage on local roads directing users to the Expressway should be minimised and integrated with other furniture to both minimise visual clutter and minimise the number of support posts at ground level.
- Support posts for signs on local road should be located off footpaths and in places where they do not obstruct the passage of walkers, cyclists and horseriders.
- Avoid the use of overhead gantries on the local road to support signs or traffic lights.

5.14 Community Art Design

The development of national infrastructure, which the proposed Expressway is, needs to have some consistency in its design to recognise the functional requirements across its length, the ability to maintain the infrastructure over time, and the experience for the highway user.

However, the requirement for consistency in the design can detract from the sense of place for the local community. Each community along the route will have its own intrinsic character which derives from the landscape and built environment, and also its own cultural character from its heritage and the people that live there today.

To assist in balancing the change in the character the design of the Expressway aims for best practicable integration with the landscape and at places like local road crossings and interchanges. However, there is a significant opportunity to consider the potential for community art in those parts of the corridor which are less operationally constrained.

In particular there are community art opportunities along the continuous walking and cycle path that runs alongside the Expressway.

To be coherent and appropriate to the context as well as delivering a contribution to the sense of place, a community art strategy would be advisable. Such a strategy would:

- identify the local art community capacity and interest;
- tie in with existing Kāpiti arts programmes such as the art trail;
- develop a plan as to the types of community art that could be provided for and where it could possibly be located;
- determine a funding need over time;
- formulate a process for community art commissioning and implementation; and
- provide for collaboration with NZTA and other agencies responsible for managing designated land or land that was identified for art purposes.

Design Concept

The design concept for community art integration is to enable coordinated local community art initiatives along the cycle and walking path and at other locations associated with the Expressway (such as interchanges). It is proposed that this be coordinated by KCDC as part of other community art initiatives locally, and in collaboration with NZTA as the designating authority.

Community art can come in a range of media, scale, permanence, and themes. The opportunities to utilise the walking and cycle path as a venue for community art derive from:

- the path and its links is slower than a road and will allow people to 'read' art works at a pace that cannot be achieved at highway traffic speeds - this allows for more detailed art to be displayed;
- the speed at which people move past allows for smaller as well as larger items to be produced and displayed which provides a wider range of opportunities for artists who produce items of different scales;
- the pathway and allow people to stop and view or interact with art pieces;
- the length of the path as it passes through different communities allows for localised approaches to sections of the route;
- art can include the use of interpretive information to assist people to understand the sense of place or heritage or natural themes of the location;
- the ease of access to the route allows easy installation or removal of objects - art works can therefore be temporary or fixed;
- the pathway could link art venues together building on the existing Kāpiti arts programme which includes the annual arts trail concept; and
- the supply of power for lighting along urban sections of the route allows for lighting of objects.

Typical places along the pathway that art maybe able to be placed include at :

- bridges over streams
- the edge of wetlands on boardwalks for interpretation
- local road crossings
- intersections with other walking paths
- public spaces
- view points and seating places

The Expressway design currently incorporates the path infrastructure that will enable community art and in places such as around the Takamore area concepts for cultural markers are being advanced. Signage for wayfinding on the path and lighting is also provided for in the Expressway design and the nature of this can be progressed in detailed design with KCDC. The design of the forms and treatment of the bridges and spaces underbridges have already being advanced, but there is a role for community design input to detailing as part of the mitigation of effects.

Figure 114 Examples above and right of themes in sculpture along Wellington Cobham Drive - kinetic wind themed installations sponsored by Meridian and designs commissioned through Wellington Sculpture Trust

Figure 115 [left] Example of static sculpture in open space setting.

Figure 116 [right] Example of integration of art into landform

Figure 117 [below] Example of temporary art installation as part of the landscape

Figure 117, 118 [above] Examples of art in furniture forms - seat and interpretation

5.15 State Highway 1 Reconfiguration

The MacKays to Peka Peka Project Alliance Board (PAB) required work be undertaken to scope and cost the revocation to the local authority Kāpiti Coast District Council of the existing SH1 from Poplar Avenue to Peka Peka Road.

While cognaisant of the NZTA Planning Programming, and Funding Manual (PPFM) and its policy for road revocation, a report (SH1 [Kāpiti Coast] Revitalisation Options - Functionality Report) outlines the concept designs for the reconfiguring of SH1 to ensure:

- The nature and scale of the existing State Highway 1, especially at Paraparaumu and Waikanae town centres, delivers a viable and attractive roading and access system for local needs (from Guiding Objectives for the Project Alliance Board).

From the concept designs the SH1 work went on to:

- To confirm constructability of concept designs;
- To identify or remove constructability risk;
- To identify and quantify the fundable elements of the Project for future NZTA KCDC discussions.

The design concepts were consulted on and the outcomes of this consultation are described in section 4.1 of this ULDF.

Design Concept

The design for the reconfiguration of former SH1 responds to the different environments through which it passes (refer to Figure 120). The context includes two town centres and urban areas and extensive rural areas. The environment on either side of the road also differs. The process for the design concept elements described below to be progressed will be determined between NZTA and KCDC.

The essential elements of the reconfiguration in relation to these different contexts are bullet pointed below:

Town Centres

In Waikanae and Paraparaumu town centres the scope of work generally includes:

- Constructing new kerb lines and raised medians to form single lanes (and cycle lanes) generally each way.
- Reducing kerb radii at intersections for pedestrian crossing safety.
- Relocating services, altering drainage and resurfacing roads as require.
- Constructing raised medians, traffic islands and carparks.
- Widening and improving pedestrian footpaths and installing pedestrian safety measures.
- Creating a specialist pavement to encourage pedestrian crossings to Paraparaumu train station.
- Enhancing pedestrian connections from Waikanae train station to the shops opposite.
- Creating bus stops on SH1 between the train station, street and shops.
- Street furniture improvements.
- A new signalised intersection at Ngaio Street Waikanae.
- Landscape treatment including tree planting in medians and road edges between carparks.
- Stormwater run-off treatment swales in some areas.
- The proposed Otaihanga roundabout has been excluded from the scope of work because it will be required to be constructed as part of the Expressway to provide a more suitable route for construction traffic.

Rural Areas

In the rural areas the scope of work generally includes:

- Narrowing of the road width generally to 11-12 metres and removal of redundant road pavement width.
- Reuse of unrequired traffic road width for walkways.
- Road surface remediation as required.
- Creating new roundabouts at Raumati Road and Ihakara Street.
- Painting new cycle lanes and road markings.
- Reducing speed limits – new signage.
- Providing off-road pedestrian and cycling paths.
- Improving pedestrian/cycling across the Rimutaka Street rail bridge.
- Improving pedestrian/cycling across the Waikanae River bridge.
- Landscaping and tree planting, particularly where road pavement has been removed.
- Forming stormwater run-off treatment swales in some areas.

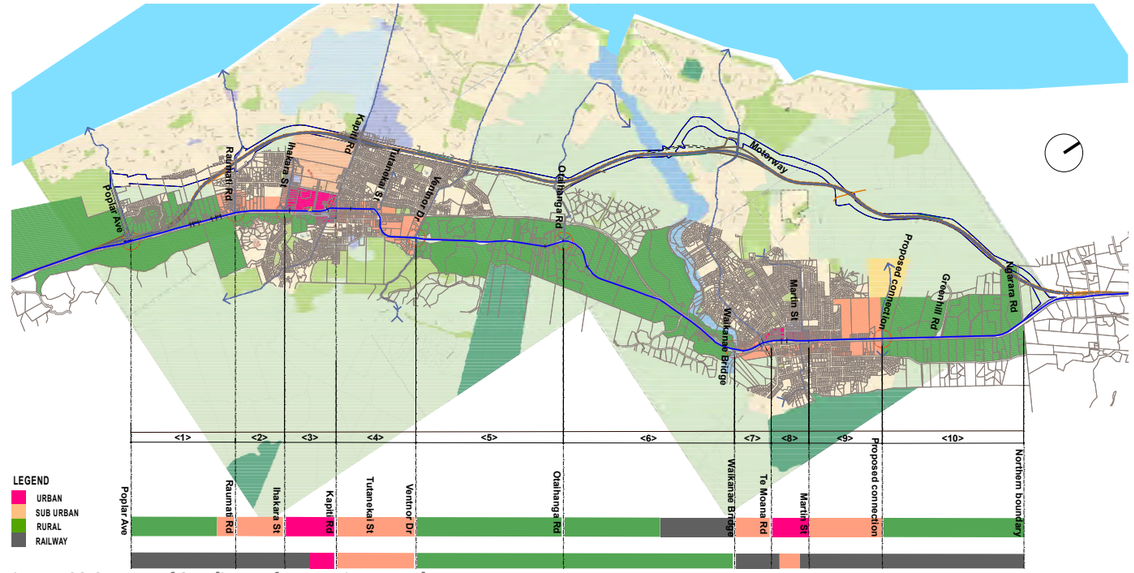


Figure 120 Context of SH1 [image from Kevin Brewer]

Figure 121 Sketch looking south in Waikanae Town Centre showing possible planting and improvements in visual amenity [image from Kevin Brewer]

Figure 122 Photo simulation of SH1 at Raumati showing possible increased berm width, parking and cycle lane marked

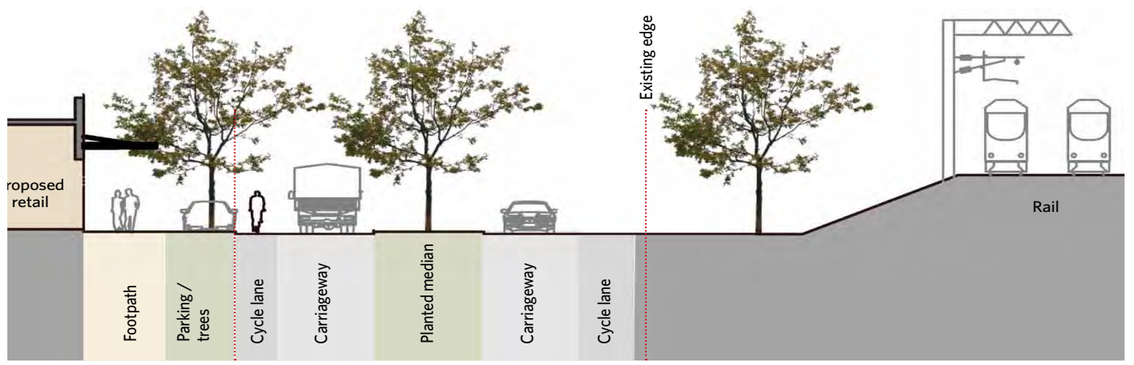


Figure 123 Cross section at Paraparaumu showing existing railway and possible planting, cycle lane and reduced vehicle traffic lanes [image from Kevin Brewer]

06|Sector Design

6.1 Introduction

This section of the ULDF describes the way in which the Expressway urban and landscape design has considered and responded to the design implications (identified in the Policy and Context section).

The tables below identify and discuss the design implications for each of the four sectors of the Expressway.

Plans for each of the sectors are also provided which show bridge locations, planting strategies, noise barrier designs, cycle and walking routes and connections and the Expressway itself.

Detailed design responses are also described in relation to Poplar and Leinster Avenue, Kāpiti Road Interchange and the Te Moana Road Interchange. These more detailed responses have been been developed for these locations because they are places where the relationship between the existing land uses, landform, ecology, hydrology, vegetation and the Expressway effects are more complex.

In considering each of the sector design implications, reference will need to be made to the Corridor Design section which describes the specific design approach proposed to different elements of the Expressway. Typically the corridor design aspects will be either recognised in the sector design already, or will be aspects of the design that need to be further developed as the Project design progresses through to implementation.

Policy and Context Headings section 2 and 3

Design implications under each of the headings in sections 2 and 3 specifically as they apply to each sector

How the Project design in its current form responds to these design implication

DESIGN IMPLICATIONS	SPECIFIC DESIGN IMPLICATION POINTS	URBAN AND LANDSCAPE DESIGN RESPONSE
policy		
landform		
hydrology		
vegetation		
ecology		
built environment and land uses		
movement networks		
heritage		

6.2 Sector 1 MacKays to Raumati

DESIGN IMPLICATIONS	SECTOR 1	URBAN AND LANDSCAPE DESIGN RESPONSE
policy	• Aim to protect outstanding landscapes (Waikanae River, dunes and foredunes) and ecological areas. • Aim to minimise visual, landscape, noise, land take and other potentially adverse effects on Queen Elizabeth Park.	The design considered an route option through Queen Elizabeth Park - this would have affected the park dunes and those behind Leinster Ave that route would have taken park land that could have recreational or amenity benefits in the future. The proposed route avoids these landforms and land take.
landform	• Recognise, as a first principle, the dune landscape by guiding the Expressway alignment to avoid dunes, or by positioning the Expressway above and within or between large dunes rather than removing them. • Re-creating new dune forms as context for the Expressway if the context enables the forms to reflect natural shapes and patterns. The prevailing alignment of the dunes runs roughly parallel to the coast therefore the design or modification of landforms should acknowledge and reflect this pattern. Introducing “dunes” as uniform bunds along the whole route will appear unnatural and contrived and should be avoided. • Retain or enhance views from the Expressway to features such as the coast, Kāpiti Island and Tararuas, although this should not be at the expense of causing adverse effects on the local communities. • Recognise that the sand will be vulnerable to wind and water erosion if not managed, and that peat ground or extracted peat will require conditioning before planting.	The alignment options considered a route through Queen Elizabeth Park and across the Western Link Road designation which would have significantly modified the dunes in the area behind Leinster Ave - the proposed route avoids these landforms. Earth bunds will be developed between the Leinster Ave area and Raumati Road to provide visual and noise separation to adjacent residential properties - the cycleway will sit along this in part. There are no views out to Kāpiti Island from Sector 1. However, views toward the coastal dunes may be possible from the elevated Expressway at the Poplar Avenue interchange. The construction methodology recognises that the sand areas will be vulnerable to erosion and this will be managed by limiting the extent of open areas and mixing in other materials and watering to stabilise sand.
hydrology	• Maintain and enhance the watercourses that remain with a view to reduced channelisation and more natural forms which can enhance the natural habitat for fish and other animals as well as improved visual amenity. • Consider the multiple stream and other watercourse crossings as places that can incorporate additional east-west walking and cycle Expressway crossing links. • Integrate planning and design for flood storage associated with the Expressway in conjunction with other urban development needs, such as at the Paraparaumu Town Centre and other places as appropriate. • Protect and supplement the few remaining wetlands with new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff.	There are no significant watercourses in this sector that are affected - Drain 7 will be culverted to allow continued fish passage exist. There is no large enough watercourse bridge in Sector 1 that could be used to gain access beneath for walking or cycling east-west connections. A flood storage area in the land to the east of the Expressway north of Leinster Avenue will provide flood storage and the two existing wetland areas retained to the west of the Expressway. Further urbanisation of the residual land in this location will need to consider additional flood storage needs. The existing wetlands behind Leinster Ave will be retained with the exception of a small area. The proposed stormwater management areas adjacent to the wetland will be planted with appropriate wetland species.
vegetation	• Recognise the value of all woody vegetation in terms of integration of the Expressway into the landscape; retention of existing amenity trees and shelter belts can assist with landscape integration and mitigation. • Reflect existing vegetation patterns and species mix in mitigation planting, using both exotic and native plant species, but with a predominance of native species. • Avoid the same vegetation treatment along the whole route and use site specific plant options and layouts that reflect the varying contexts. • Carefully select plant species that will be sustainable within the corridor and recognise the climatic conditions, soil types and that require minimal maintenance after establishment.	The existing vegetation to remain has been identified and will be protected during construction. Mass planting of indigenous species are proposed for this sector, along the route and surrounding the large wetland and stormwater areas. The species selection will reflect the existing manuka/wetland environment as well as the vegetation on the Raumati escarpment.
ecology	• Protect and supplement the few remaining wetlands with new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff. • Expand and extend the wetland network utilising the Expressway corridor to link between the numerous water bodies and existing wet areas within the design for stormwater management associated with the Expressway and adjacent land uses as appropriate. • Utilise and enhance existing wet depressions as components in a linked network of through good stormwater run-off design. • Utilise east west hydrological connections as habitat corridors across the Expressway in suitable locations. • Develop planting and stormwater treatment wetlands to reflect existing vegetation patterns and provide additional habitat to freshwater fish and bird species. • Ensure stormwater is sufficiently treated within filtration areas such as swales and wetland areas prior to entering water bodies.	The existing wetland behind Leinster Ave will be retained. The additional riparian planting proposed in association with the new stormwater management areas will enhance the riparian biodiversity of the existing wetland. Swale treatment areas will be accommodated along the sides of the Expressway. These will be grassed or vegetated to read as part of the general landscape planting programme - these swales will feed filtered stormwater to existing watercourses and wetlands.

6.2 Sector 1 MacKays to Raumati

built environment and land uses	• Maintaining wide corridors within the designation extent will be important to buffer the Expressway from adjacent residential uses. • Options for the Expressway should be designed to avoid effects on schools and to encourage the safety and directness for walking and cycling access. • Beach community residents and visitors will need to pass across the Expressway regularly and this movement needs to be visually, functionally and safely provided for. This includes interchange design to facilitate local road movements by pedestrians and cyclists. • The future development of residual areas of the Expressway designation (such as at Raumati) and at planned growth areas needs to be considered in the design especially in terms of connections, to, from and within these areas, as well as the protection of recognised features.	At the area around Leinster Ave the landscape design is utilising the corridor width created by the designation to manage adjacency with landforms and planting. The alignment option selection preferred allows continued access from the Leinster Ave area (some 100 households) to Raumati South School, and avoids the Te Ra School. The local road connection at Poplar Ave includes a separated walking and cycle path and will include on-road cycle lanes. Marked off ramp crossing points for the on-road cycle paths will be designed to best practice and accepted standards providing clear lines of sight and thresholds. The area (currently designated land or NZTA/KCDC owned) to the rear of Leinster Ave and Main Road properties could be residential in the future if KCDC allows it to be rezoned. Natural features including wetlands and dunes should be retained and also connections made from the Leinster Ave service road through to a connection into Matai Road. A new bridge over the Expressway may also be warranted depending on the extent of development and additional households. Provision has been made for a pedestrian bridge.
movement networks	• The Expressway crosses a number of east west oriented local roads linking the beach communities on the coastal side with those inland. These connections need to be maintained to provide for the interaction between these communities. This includes through the construction period. • The Expressway is to provide a consistent highway speed (100kmh) route through the district. The local road crossings will accordingly be grade separated and take the form of a bridge over or road under the Expressway. Walking and cycling movements will be most sensitive to the condition and quality of the crossing - be that having to move under a bridge or on an over-bridge. • The existing SH1 is part of the regional cycle network. Consideration needs to be given to either maintaining this route along its current alignment and/or providing a new commuter cycle route along the Expressway, as well as how this connects at either end to the wide network. In either case, the safety, convenience and amenity of cycling must be a primary consideration to satisfy transport policy and project objectives. • The Expressway enables the existing SH1 to take on a new character including revitalised town centres at Waikanae and Paraparaumu. The design for the condition of the existing SH1 is of interest to KCDC and the community generally, given that it will pass to KCDC once the Expressway is operational as the new SH1. • There will be an interaction between the existing SH1 and Expressway at the points where interchanges are provided for. The implications for the design of the local roads that connect the two need to be considered in terms of impacts on existing land uses and the quality of the road as a walking and cycling route. • The location of interchanges and the level of connectivity these provide will influence the use of land around them. Where there is good connectivity to the local network there is likely to be pressure for land development by urban land uses. Although this connectivity can be positive, KCDC's objectives are to limit urban growth outside of the existing towns and nominated growth areas. • The interaction between the existing SH1 and future land uses along its length will need to be considered to ensure that KCDC's urban growth objectives are not put at risk as a result of the change from the current limited access status. • There is the possibility of a future Raumati railway station - the Expressway design should not preclude this possibility.	The local road connection at Poplar Ave will be retained and at grade - the roundabout arrangement connection to the existing SH1 will facilitate safer connections from Poplar Ave for drivers heading south on SH1 and the off ramp from the existing SH1 to Poplar Ave will provide immediate connectivity for Raumati residents. The local road connection at Poplar Ave includes a separated walking and cycle path and will include on road marked cycle lanes. Off ramp crossing points for the on-road cycle paths will be designed to best practice and accepted standards providing clear lines of sight and thresholds. A cycleway/walking path will connect from Raumati through Queen Elizabeth Park to Paekākāriki to provide an alternative route to the use of the SH1 Raumati Straight. This path will give direct connectivity between the two settlements and the services and amenities they provide as well as being used for sub-regional cycling movements. This section of the cycle/walkway will be provided by agreement between NZTA, KCDC and GWRC and is not part of the designation for the Expressway. The link at the south end to the Transmission Gully cyclepath will need to be considered and provided for. A parallel cycle/walkway will connect from the Poplar Ave/SH1 intersection along the Expressway to Raumati Road (this continues north all the way to Peka Peka). Connections at Harry Shaw Way will connect the path back to Matai Road. A new bridge over the Expressway will connect Leinster area to existing SH1. Cyclepath connections at Poplar Ave and the end of Leinster Ave will give access to Leinster residents to this facility. The loss of a vehicle access connection for Leinster Avenue to the existing SH1 will reduce the connectivity for the existing residents. If future development of the land at the rear of Leinster Avenue does occur provision of a new street connection back towards Raumati or Matai Road should be considered. Remediation of the existing SH1 north of Poplar Ave may include reduced road width surface and lane numbers and the use of this width for amenity planting and walking and cycle paths. There is little risk that at the intersection of the Expressway off-ramp and Poplar Ave new land uses will establish around it that would be contrary to the KCDC Development Management Strategy given the constrained nature of this area. The constraints include the Park, road infrastructure and railway line. A future Raumati railway station and its associated parking facilities could be accommodated on the residual SH1 land and on the east side of that area adjacent to the rail corridor. There is also potential for land where the Expressway tracks west from the existing SH1 to become available for park and ride parking.
heritage	• Engage with iwi in the Project design to identify how the route alignment options and the landscape of the Expressway can best be designed to provided for Māori cultural values. • Consider the known sites, identify the significance of these, and aim to avoid these as far as possible. However, recognise the avoidance of all sites will not be likely given the many known and still unknown sites. • Consider the opportunities to enhance the awareness of the heritage in the way the Expressway and associated structures, pathways and other elements are designed.	There has been engagement with iwi throughout the design process to ensure cultural values are understood and the design has responded to this as best it can. A protocol arrangement with iwi has been developed to provide a process for managing sites uncovered in the course of construction. There are opportunities for cultural heritage to be recognised in the developed design process.

6.2 Sector 1 MacKays to Raumati

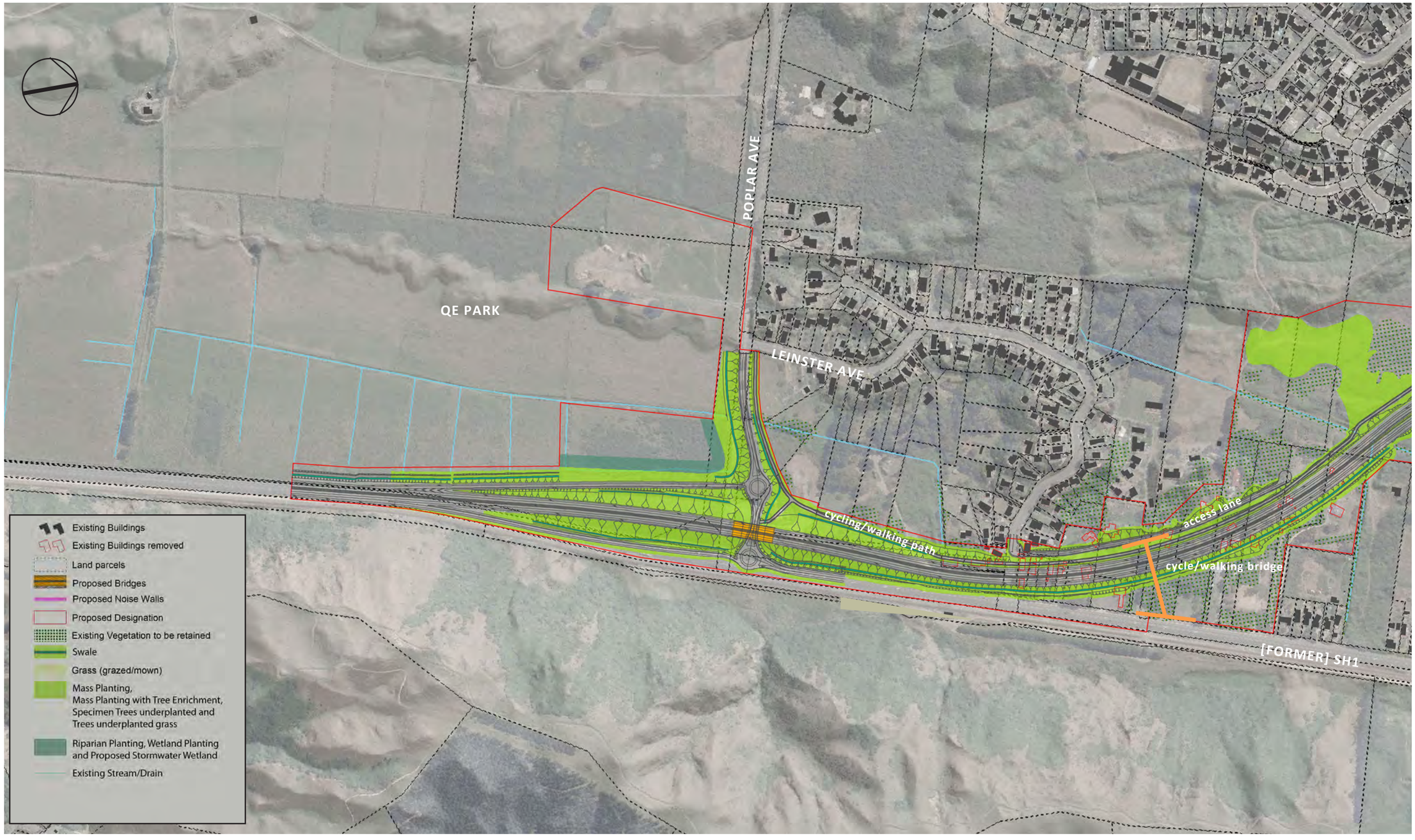


Figure 124

6.2 Sector 1 MacKays to Raumati

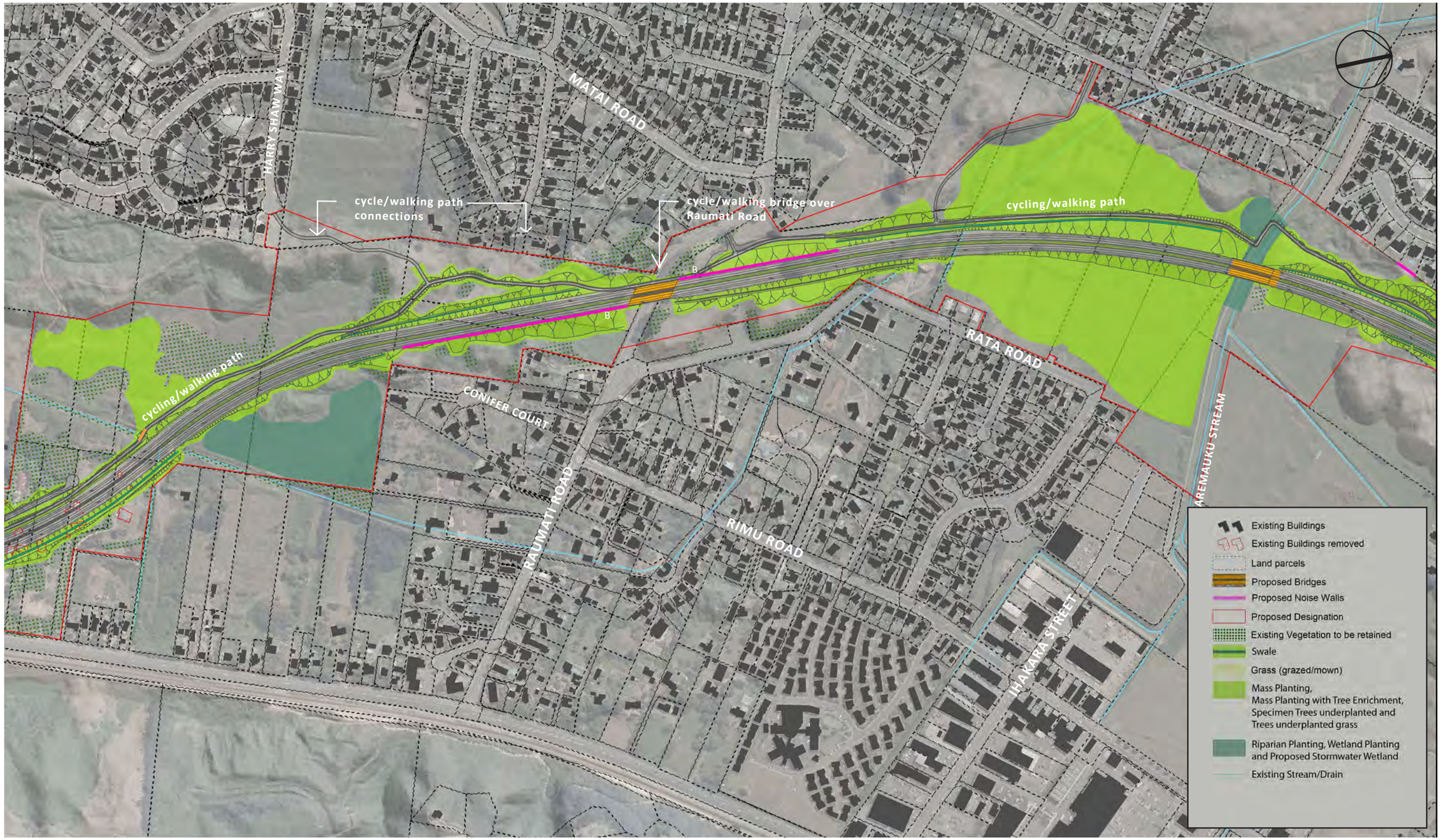


Figure 125

0 100 200 400m

6.2 Sector 1 MacKays to Raumati

A cycle and walking path
B private lane vehicular property access
C stormwater swale
D drain
E existing wetland retained
F potential Raumati rail station car park locations

Figure 125 Indicative view south to QE Park with Raumati Rd crossing in foreground

Figure 126 Indicative view down Poplar Ave to Expressway over bridge

Figure 127 Indicative view down (closed) Leinster Ave to turn area

Figure 128 At the Leinster Ave area showing landscape integration proposals and below sections describe the landform manipulation to provide visual and noise separation

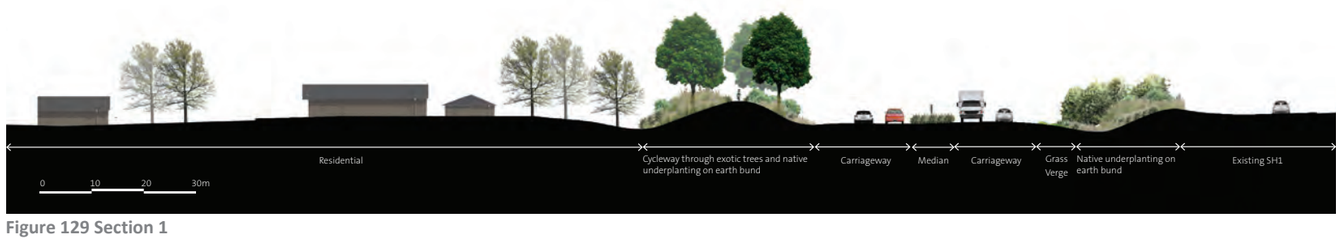


Figure 129 Section 1

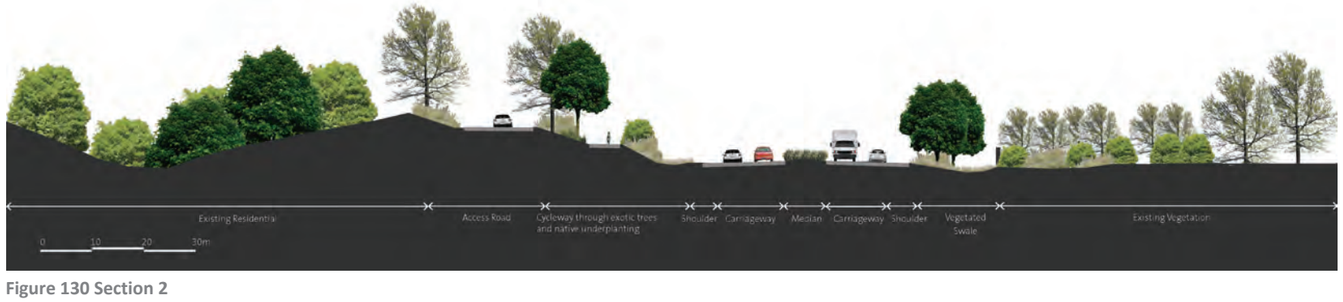


Figure 130 Section 2

6.3 Sector 2 Raumati/Paraparaumu

DESIGN IMPLICATIONS	SECTOR 2	URBAN AND LANDSCAPE DESIGN RESPONSE
policy	• Aim to ensure the location and design of any interchange at Kāpiti Road enables continued growth in this 'change area'. • Aim to integrate land use and transportation to achieve good urban form. The location and design of interchanges will be particularly relevant to such integration. • Aim to facilitate intensification and improved urban form at Paraparaumu. • Aim to provide for increasing road freight movement and likely increase in peak traffic congestion. The location of Expressway interchanges has the potential to help relieve traffic congestion and remove freight vehicles from the existing State Highway. • Aim to incorporate strategy actions in the Expressway design which includes linkages to important amenities and services and access across and along the Expressway corridor. • Aim for the design to enhance linkages within and across the Expressway corridor to provide connections for people moving between communities and for the ecological benefits.	The design includes an interchange at Paraparaumu (and Waikanae) which at its location on Kāpiti Road provides direct access to the proposed town centre growth area and the now developing airport area. The interchange will facilitate movement of freight and people to and from the highway network to the town centre and thus can contribute positively to its growth as an employment as well as amenity and services location. The design of the interchange to provide for local road movements by drives as well as walkers and cyclists will require careful attention to facilitate the access by the community to facilities which are located on either side of the Expressway. A new pedestrian bridge is proposed midway on the block between Kāpiti Road and Mazengarb Road which will assist this movement across the Expressway corridor. The Wharemauku Stream will continue to operate as an east-west corridor that can be enhanced to have higher ecological benefits with planting in balance with its function within the flood plain. The cycle and walking path within the Expressway corridor will enhance north-south linkages within the District.
landform	• Guide the design of the Expressway within the nominated corridor with the aim of minimising earthworks by: forming an alignment that runs between large dunes rather than removing them and forming its vertical and horizontal extent in response to natural levels • Recognise that some dune loss or modification will be inevitable given the confined corridor and consider approaches to address this such as: minimising the vertical profile of the Expressway to recognise that the coastal plain is relatively flat (even with the dune forms) - aim for an Expressway 'in' the landscape rather than 'on' the landscape. • Carry out earthworks so that final landforms reflect natural shapes and patterns of the existing dunes. The prevailing alignment of the dunes runs roughly parallel to the coast therefore the design or modification of landforms should acknowledge and reflect this pattern. • Avoid creating and reshaping "dunes" as uniform bunds as they will appear unnatural and contrived. • Recognise the views to the Tararua Ranges and Kāpiti Island as prominent and important landforms and features in the design of east/west local road crossings. • Recognise that the sand will be vulnerable to wind and water erosion if not managed, and that peat ground or extracted peat will require conditioning before planting.	Along most of this sector the Expressway will be cut into the top of the dunes. At numerous locations earth bunds will be constructed for noise and visual mitigation, and these landforms will be integrated with the natural dune landforms. Between Kāpiti and Mazengarb Roads, integration of the remaining dune landforms and mitigation bunding will require special consideration, given the limited space available, and need for near continuous bunding, due to the adjoining residential development. Views to Kāpiti Island and the Ranges are likely to be possible from several of the elevated points within this sector including the over bridges at Wharemauku Stream, Kāpiti Road and Mazengarb Road. The construction methodology recognises that the sand areas will be vulnerable to erosion and this will be managed by limiting the extent of open areas and mixing in other materials and watering to stabilise sand.
hydrology	• Maintain and enhance the watercourses that remain with a view to reduced channelisation and more natural forms which can enhance the natural habitat for fish and other animals as well as improved visual amenity. • Consider the multiple stream and other watercourse crossings as places that can incorporate additional east-west walking and cycle Expressway crossing links. • Integrate planning and design for flood storage associated with the Expressway in conjunction with other urban development needs, such as at the Paraparaumu Town Centre and other places as appropriate. • Protect and supplement the few remaining wetlands with new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff.	Drain 7 will be bridged and culverted to allow fish passage. Wharemauku Stream is a modified channel and the Expressway will bridge it to the west of the town centre. There will be no change to habitat values and bridge piers will be located away from the stream to prevent stream obstruction. Some stream edge protection maybe required to prevent the stream moving to undercut piers in heavy water flows. Access under the Wharemauku bridge will be maintained for the existing walking and cycle path and will also allow for future local road extension of Ihakara Street towards the airport. A flood storage area in the land to the south of Wharemauku Stream will offset loss of storage by the Expressway footprint. It can link to other flood storage areas provide by KCDC or other developers of town centre land in the future and provide an enhanced ecological appearance and setting for the town centre. A stormwater treatment wetland is also provided for managing the runoff from the Expressway prior to its discharge to the stream.
vegetation	• Recognise the value of all woody vegetation in terms of integration of the Expressway into the landscape; retention of existing amenity trees and shelter belts can assist with landscape integration and mitigation. • Reflect existing vegetation patterns and species mix in mitigation planting, using both exotic and native plant species, but with a predominance of native species. • Avoid the same vegetation treatment along the whole route and use site specific plant options and layouts that reflect the varying contexts. • Carefully select plant species that will be sustainable within the corridor and recognise the climatic conditions, soil types and that require minimal maintenance after establishment.	The existing vegetation to remain has been identified and will be protected. The future Kāpiti town centre is located in this sector. The vegetation framework will be designed to enhance the amenity of the town centre, with visual screening, shade, shelter and the opportunity to develop a local identity, where vegetation will consist of a combination of indigenous and exotic species. South of Wharemaku stream the large flood storage area will be planted with indigenous vegetation.

6.2 Sector 2 Raumati/Paraparaumu

built environment and land uses	• Maintaining wide corridors within the designation extent will be important to buffer the Expressway from adjacent residential uses. • Destination activities - eg airport, town centres and schools - will benefit from connections to the interchanges provided those connections are readily accessible from local road networks. • Freeing up the existing SH1 from highway traffic enables the design of the town centres to be designed to function more positively and with higher amenity, including better connections between the centres and railway stations. • Options for the Expressway should be designed to avoid effects on schools and to encourage the safety and directness for walking and cycling access. • Beach community residents and visitors will need to pass across the Expressway regularly and this movement needs to be visually, functionally and safely provided for. This includes interchange design to facilitate local road movements by pedestrians and cyclists. • The opportunity should be taken with the Expressway interchange design at Paraparaumu to set a positive precedent for the quality of the of whole of Kāpiti Road.	In the section between Kāpiti Road and Mazengarb Road the Expressway is in a confined corridor with residential properties built up to its edge. The width of the corridor is approximately 100m metres and allows for the separation space between the road itself (25m wide) and the edges of the corridor to be used to form bunds and for the areas to be planted to provide some visual and noise buffering. Noise barriers are required in places and these will be integrated using the design approaches described earlier in the ULDF. The Paraparaumu town centre will benefit from the interchange location at Kāpiti Road. The removal of traffic from the current highway will allow for Paraparaumu town centre to better connect across to the east and to facilities including employment and the railway station. It will also enable people living on the eastern side of the existing SH1 access to the facilities and amenity at the town centre. The design of the interchange and Kāpiti Road will need to provide for local movements by walkers and cyclists. The use of free left hand turns to on and off ramps should be avoided and pedestrian crossing facilities provided by traffic lights. A new pedestrian bridge is proposed midway on the block between Kāpiti Road and Mazengarb Road which will assist this movent across the Expressway corridor.
ecology	• Expand and extend the wetland network utilising the Expressway corridor to link between the numerous water bodies and existing wet areas within the design for stormwater management associated with the Expressway and adjacent land uses as appropriate. • Utilise and enhance existing wet depressions as components in a linked network of through good stormwater run-off design. • Develop planting and stormwater treatment wetlands to reflect existing vegetation patterns and provide additional habitat to freshwater fish and bird species.	The low lying areas behind the Paraparaumu town centre area will be utilised as flood storage and wetland areas that will also provide some stormwater filtration functions to intercept runoff from the Expressway prior to discharge to the Wharemauku Stream. The opportunities have been considered in the design of the wetland areas associated with the Expressway to link to future town centre wetland/flood storage provision which will need to be designed when the wider town centre planning is undertaken. The Wharemauku Stream will continue to operate as an east-west corridor that can be enhanced to have higher ecological benefits with planting in balance with its function within the flood plain.
movement networks	• The Expressway crosses a number of east west oriented local roads linking the beach communities on the coastal side with those inland. These connections need to be maintained to provide for the interaction between these communities. This includes through the construction period. • The Expressway is to provide a consistent highway speed (100kmh) route through the district. The local road crossings will accordingly be grade separated and take the form of a bridge over or road under the Expressway. Walking and cycling movements will be most sensitive to the condition and quality of the crossing - be that having to move under a bridge or on an over-bridge. • The existing SH1 is part of the regional cycle network. Consideration needs to be given to either maintaining this route along its current alignment and/or providing a new commuter cycle route along the Expressway, as well as how this connects at either end to the wide network. In either case, the safety, convenience and amenity of cycling must be a primary consideration to satisfy transport policy and project objectives. • The Expressway enables the existing SH1 to take on a new character including revitalised town centres at Waikanae and Paraparaumu. The design for the condition of the existing SH1 is of interest to KCDC and the community generally, given that it will pass to KCDC once the Expressway is operational as the new SH1. • The Waikanae River and Wharemauku Streams provide highly used corridors for recreation and commuting movements. They also have other amenity values. The sensitivity with which the Expressway crosses these waterways will be important to the continuance of the movements and enjoyment of these places. • There will be an interaction between the existing SH1 and Expressway at the points where interchanges are provided for. The implications for the design of the local roads that connect the two need to be considered in terms of impacts on existing land uses and the quality of the road as a walking and cycling route. • The interaction between the existing SH1 and future land uses along its length will need to be considered to ensure that KCDC's urban growth objectives are not put at risk as a result of the change from the current limited access status.	Local road crossings at Raumati Road, potentially Ihakara Street, Kāpiti Road, and Mazengarb Road all occur in this section. The approach has to been to provide for these local roads to remain at grade and for the Expressway to go over the top on a bridge. This means walking and cycling activities do not have to go up and over the Expressway, and maintains existing road configurations and patterns. Provision has also been made through this urban section for bridges to be split to allow light down to the local road. The level of Mazengarb Road in the section which currently forms a hump at the position of the Expressway alignment to allow the over bridge to be lower on the dunes. The design of the interchange and Kāpiti Road will need to provide for local movements by walkers and cyclists. The use of free left hand turns to on and off ramps should be avoided and pedestrian crossing facilities provided by traffic lights. A new pedestrian bridge is proposed midway on the block between Kāpiti Road and Mazengarb Road which will assist this movement across the Expressway corridor. The existing use of the Wharemauku Stream corridors for cycling walking and horses will continue to be provided for and the recreational as well as commuting purposes. The removal of traffic from the current highway will allow for Paraparaumu town centre to better connect across to the east and to facilities including employment and the railway station. It will also enable people living on the eastern side of the existing SH1 access to the facilities and amenity at the town centre. The provision of the interchange at Kāpiti Road is consistent with KCDC growth objectives as expressed in the Development Management Strategy and District Plan to encourage development at the town centre.
heritage	• Engage with iwi in the Project design to identify how the route alignment options and the landscape of the Expressway can best be designed to provided for Māori cultural values. • Consider the opportunities to enhance the awareness of the heritage in the way the Expressway and associated structures, pathways and other elements are designed.	There has been engagement with iwi throughout the design process to ensure cultural values are understood and the design has responded to this as best it can. A protocol arrangement with iwi has been developed to provide a process for managing sites uncovered in the course of construction. There are opportunities for cultural heritage to be recognised in the developed design process.

6.3 Sector 2 Raumati/Paraparaumu

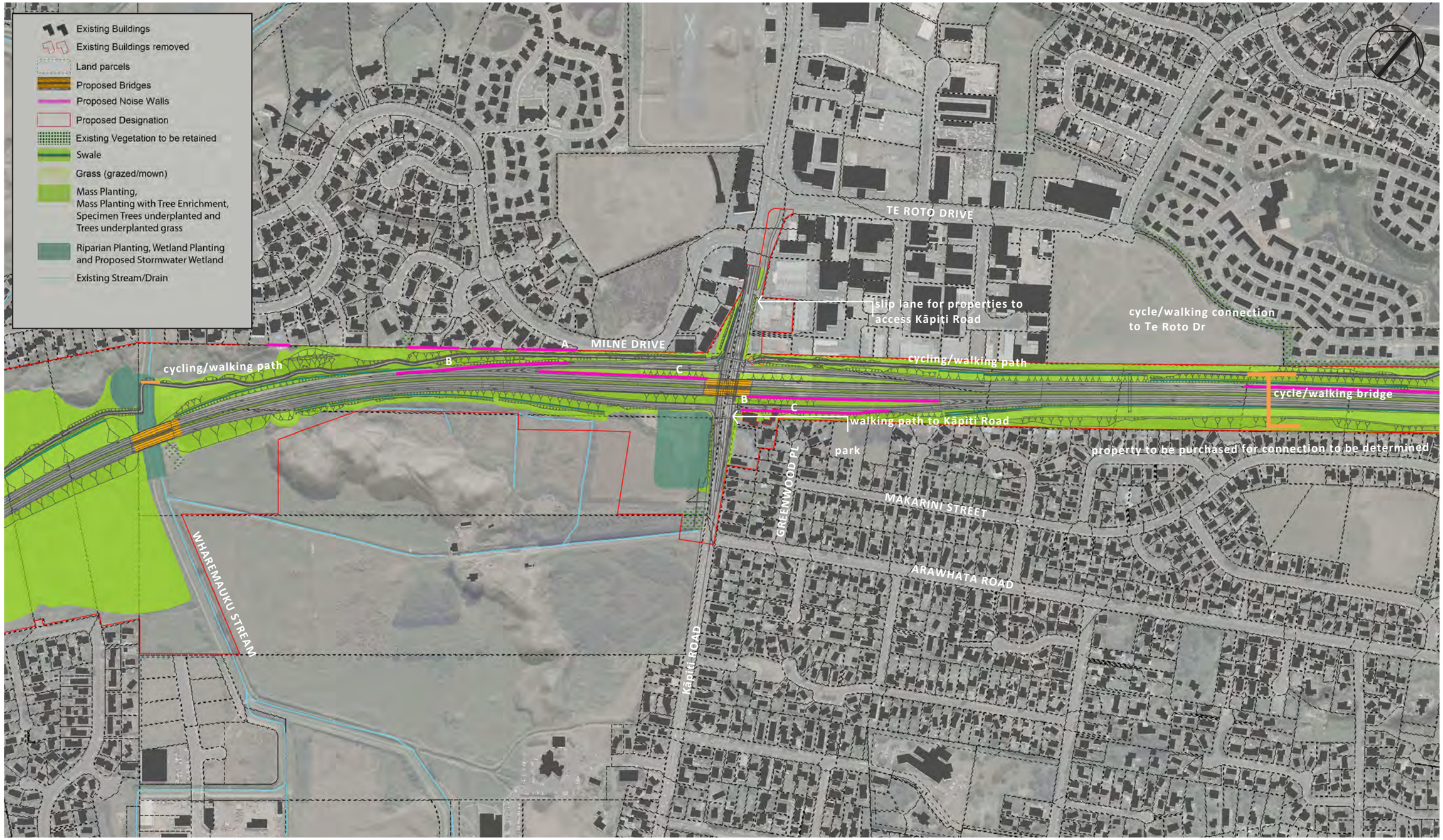


Figure 131

6.3 Sector 2 Raumati/Paraparaumu

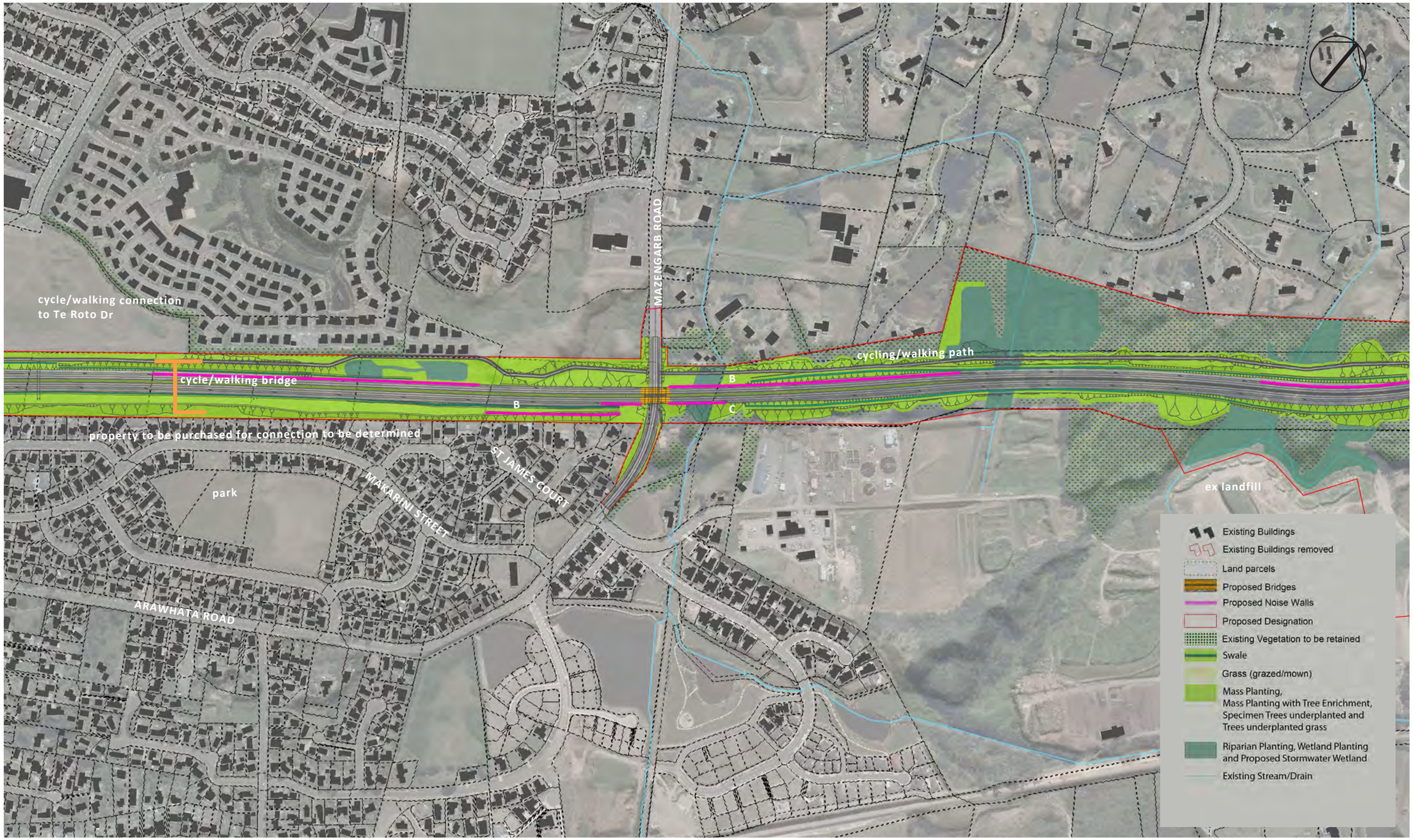


Figure 132

6.3 Sector 2 Raumati/Paraparaumu

A	wetland stormwater area
B	traffic signals
C	dense planting
D	open grassed areas
E	shared cycle/walking path
F	upright native trees
G	noise barrier
H	pathway to Kāpiti Road

Figure 133 Indicative view west along Kāpiti Road - tree planting not shown

Figure 134 Indicative view east along Kāpiti Road with Te Roto Rd crossing in foreground -tree planting not shown

Figure 135 At Kāpiti Road showing proposed landscape integration by utilising clear stemmed native specimen trees in conjunction with dense planting under. Walls can also be greened with climbers

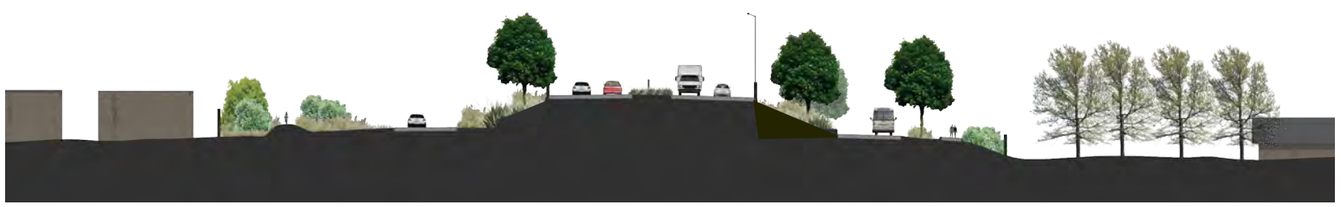


Figure 136 Cross section at Kāpiti Road Interchange

Figure 137 Simulation of Wharemauku Stream with Expressway over

6.4 Sector 3 Otaihanga/Waikanae

DESIGN IMPLICATIONS	SECTOR 3	URBAN AND LANDSCAPE DESIGN RESPONSE
policy	• Aim for the design of the bridge over the Waikanae River to provide good amenity for pedestrians below. • Aim to protect outstanding landscapes (Waikanae River, dunes and foredunes) and ecological areas. • Aim to facilitate employment and residential developments growth in targeted areas. The design of the Expressway needs to take into consideration the vehicular access and amenity levels of these sites. • Aim to provide an additional river crossing. The location and design of interchanges for in Paraparaumu and Waikanae should improve connectivity between the two communities. • Aim to integrate land use and transportation to achieve good urban form. The location and design of interchanges will be particularly relevant to such integration. • Aim for safe commuter cycling links between communities. The Expressway offers opportunities for improved commuter cycle route(s). • Aim for the design to enhance linkages within and across the Expressway corridor to provide connections for people moving between communities and for the ecological benefits.	The Waikanae River is an outstanding landscape and modification to it will occur from the addition of a bridge as well as realignment of a section of the river. The approach to the bridge design has been to down play its significance so it appears as a simple structure and similar to the other bridges across the route. With the river channel realignment design work needs to focus on the way in which any channel edge 'hardening' with riprap can be managed to enable re-vegetation. Beneath the bridge it will be important to consider the limitation for vegetation growth, and the amenity of people that move along the river corridor for recreation activity. The Expressway provides an interchange at Te Moana Road which will facilitate access to the growth areas to the north and will join the Waikanae community to Paraparaumu. There will be cycleway provision along the route and in this north section this will also allow space for horse riding alongside. The new bridge at Waikanae River will significantly improve the north-south connectivity within the district and for people moving throughout the lower North Island on SH1.
landform	• Guide the design of the Expressway within the nominated corridor with the aim of minimising earthworks by: forming an alignment that runs between large dunes rather than removing them and forming its vertical and horizontal extent in response to natural levels. • Recognise that some dune loss or modification will be inevitable given the confined corridor and consider approaches to address this such as: minimising the vertical profile of the Expressway to recognise that the coastal plain is relatively flat (even with the dune forms) - aim for an Expressway 'in' the landscape rather than 'on' the landscape. • Carry out earthworks so that final landforms reflect natural shapes and patterns of the existing dunes. The prevailing alignment of the dunes runs roughly parallel to the coast therefore the design or modification of landforms should acknowledge and reflect this pattern. • Avoid creating and reshaping "dunes" as uniform bunds as they will appear unnatural and contrived.	Most of this sector traverses dunes. Between Otaihanga Road and the Waikanae River the Expressway cuts through a series of relatively large dunes; with consequentially large cut faces (at 1:3 slope) it is intended that these faces and edges will be finished to avoid a 'tunnel' like effect and reflect the original form of the dunes. Between Waikanae River and Te Moana Road a more easterly alignment was considered that would have avoided the large crescent shaped dune near Pururi Road. However, this would have affected a larger number of residential properties. Consequently a large cut is proposed through the dune. Apart from the elevated posiitions on Otaihanga over bridge and Waikanae River bridge, views to Kāpiti Island are limited from this sector.
hydrology	• Maintain and enhance the watercourses that remain with a view to reduced channelisation and more natural forms which can enhance the natural habitat for fish and other animals as well as improved visual amenity. • Consider the multiple stream and other watercourse crossings as places that can incorporate additional east-west walking and cycle expressway crossing links. • Recognise in the design of the bridge structure the significance of the Waikanae River corridor as a 'mountains to sea' physical, ecological, landscape and recreational link.	Waikanae River channel and Maupoko Stream realignment design needs to focus on how any channel edge 'hardening' with riprap can be managed to enable revegetation. This will also influence the habitat values for fish. Beneath the Waikanae River bridge it will be important to consider the limitation for vegetation growth, and the amenity of people that move along the river corridor for recreation activity. The hydrological performance of the overland flow path from the Waikanae River towards the Waimeha Stream needs to be reflected in the landscape design.
vegetation	• Reinforce and supplement existing forest remnants where they can be extended into the Expressway corridor. • Recognise the value of all woody vegetation in terms of integration of the Expressway into the landscape; retention of existing amenity trees and shelter belts can assist with landscape integration and mitigation. • Reflect existing vegetation patterns and species mix in mitigation planting, using both exotic and native plant species. • Avoid same vegetation treatment along the route and use site specific plant options and layouts that reflect the varying contexts • Carefully select plant species that will be sustainable within the corridor and recognise the climatic conditions, soil types and that require minimal maintenance after establishment.	The existing vegetation to remain has been identified and will be protected. The Te Moana interchange occurs in this sector- the vegetation framework will be designed to enhance the amenity of the area, with visual screening, shade, shelter and the opportunity to develop a local identity.The planting will predominantly consist of indigenous species. Through the rural duneland south of the Waikanae River planting will consist primarily of grass and small groups of trees to reflect the open nature of the area. Elsewhere, native vegetation will dominate including riparian planting in the Waikanae river corridor and around stormwater wetlands.
ecology	• Replace any existing natural wetland area losses with new contiguous or linked wetland areas. Add new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff. • Expand and extend the wetland network utilising the Expressway corridor to link water bodies utilising the high water table. • Design any new wetlands with an appropriate maintenance regime that recognises its function as either natural, or for some form of stormwater management or flood detention. • Utilise and enhance existing wet depressions as components in the stormwater and flood detention design. • Utilise east west hydrological connections as habitat corridors across the Expressway in suitable locations. • Develop planting and stormwater treatment wetlands to reflect existing vegetation patterns and provide additional habitat to freshwater fish and bird species.	The wetland area at El Rancho will be affected to a small extent, but new wetland areas created on the east side of the Expressway to replace the area lost. The corridor of the Waikanae River and the ecologies within that area are being recognised and provided for with proposals to revegetate disturbed areas and provide riparian planting that will benefit in-stream habitat. The river edge treatment and the management of the land around the interchange and Waimeha Stream will require both riparian as well as wetland ecological design inputs. The design provides for the development of wetland areas in residual areas around Kauri Road and the riparian re vegetation at Waimeha Stream. Consideration should be given to the on and off ramp bridges design and also the cycleway bridge being connected to the off ramp to limit visual clutter, in-stream impacts and overhead shadowing where possible.

6.4 Sector 3 Otaihanga/Waikanae

built environment and land uses	• Maintaining wide corridors within the designation extent will be important to buffer the Expressway from adjacent residential uses. • Freeing up the existing SH1 from highway traffic enables the design of the town centres to be designed to function more positively and with higher amenity, including better connections between the centres and railway stations. • Options for the Expressway should be designed to avoid effects on schools and to encourage the safety and directness for walking and cycling access. • Beach community residents and visitors will need to pass across the Expressway regularly and this movement needs to be visually, functionally and safely provided for. This includes interchange design to facilitate local road movements by pedestrians and cyclists. • Design approaches should discourage urban growth at Otaihanga, Te Moana Road and Peka Peka. • The future development of residual areas of the Expressway designation (such as at Raumati) and at planned growth areas needs to be considered in the design especially in terms of connections, to, from and within these areas, as well as the protection of recognised features.	At the area around Puriri and Kauri Road a separation distance within the Expressway corridor allows for landscape mitigation in the form of bunds and planting. The mitigation will be designed to integrate within the existing context. The Development Management Strategy seeks to direct urban development away from Otaihanga and towards existing urban areas. The Expressway will assist with preventing urban growth at Otaihanga by not providing an interchange there. The Te Moana Road interchange is relatively well located to the Ngarara growth area and provision has been made to allow a new road connection to Te Moana Road for access to it. The removal of traffic from the current highway will allow for Waikanae town centre to better connect across to the east and to facilities including employment and the railway station. It will also enable people living on the eastern side of the existing SH1 access to the facilities and amenity at the town centre.
movement networks	• The Expressway crosses a number of east west oriented local roads linking the beach communities on the coastal side with those inland. These connections need to be maintained to provide for the interaction between these communities. This includes through the construction period. • The Expressway is to provide a consistent highway speed (100kmh) route through the district. The local road crossings will accordingly be grade separated and take the form of a bridge over or road under the Expressway. Walking and cycling movements will be most sensitive to the condition and quality of the crossing - be that having to move under a bridge or on an over-bridge. • SH1 is part of the regional cycle network. Consideration needs to be given to either maintaining this route along its current alignment and/or providing a new commuter cycle route along the Expressway, as well as how this connects at either end to the wide network. In either case, the safety, convenience and amenity of cycling must be a primary consideration to satisfy transport policy and project objectives. • The Expressway enables the former SH1 to take on a new character including revitalised town centres at Waikanae and Paraparaumu. The design for the condition of the former SH1 is of interest to KCDC and the community generally, given that it will pass to KCDC once the Expressway is operational as the new SH1. • There will be an interaction between the former SH1 and Expressway at the points where interchanges are provided for. The implications for the design of the local roads that connect the two need to be considered in terms of impacts on existing land uses and the quality of the road as a walking and cycling route. • The interaction between the former SH1 and future land uses along its length will need to be considered to ensure that KCDC's urban growth objectives are not put at risk as a result of the change from the current limited access status. • The Waikanae River and Wharemauku Streams provide highly used corridors for recreation and commuting movements. They also have other amenity values. The sensitivity with which the Expressway crosses these waterways will be important to the continuance of the movements and enjoyment of these places.	The local road crossing at Te Moana Road is a significant east west connector. The approach has to been to provide for these local roads to remain at grade and for the Expressway to go over the top on a bridge. This means walking and cycling activities do not have to go up and over the Expressway, and maintains existing road configurations and patterns. The bridge at Te Moana Road will not be split width-wise like those in the urban areas, but its length will maintain some sense of space beneath. The design of the interchange and Te Moana Road needs to provide for local road movements by drivers, as well as walkers and cyclists and will require careful attention to enable access by the community to facilities on either side of the Expressway. The large roundabouts at this interchange should be reconsidered. The removal of traffic from the current highway will allow for Waikanae town centre to better connect across to the east and to facilities including employment and the railway station. It will also enable people living on the eastern side of SH1 access to the facilities and amenity at the town centre. The interchange at Te Moana Road will give improved connectivity and access to the regional centre at Paraparaumu. The KCDC Development Management Strategy objective is to prevent urban growth in Otaihanga. The Expressway will assist with preventing urban growth at Otaihanga by not providing an interchange there. The Te Moana Road interchange is relatively well located to the Ngarara growth area and provision has been made to allow a new road connection to Te Moana Road for its access. The Waikanae River bridge and the treatment of the space beneath and around it will need to be carefully designed to enable the amenity and recreational benefits currently enjoyed by a large number of people. In particular designs will need to be developed to address the quality of walking surfaces, the surfaces that cannot be planted due to a lack of light, and safety of the space beneath.
heritage	• Engage with iwi in the Project design to identify how the route alignment options and the landscape of the Expressway can best be designed to provided for Māori cultural values. • Consider the known sites, identify the significance of these, and aim to avoid these as far as possible. However, recognise the avoidance of all sites will not be likely given the many known and still unknown sites. • Consider the opportunities to enhance the awareness of the heritage in the way the Expressway and associated structures, pathways and other elements are designed.	There has been engagement with iwi throughout the design process to ensure cultural values are understood and the design has responded to this as best it can. The sites have been identified including through the use of ground penetrating radar to identify if burial sites exist beyond the known Takamore urupa. A protocol arrangement with iwi has been developed to provide a process for managing sites uncovered in the course of construction. There are opportunities for cultural heritage to be recognised in the developed design process.

6.4 Sector 3 Otaihanga/Waikanae

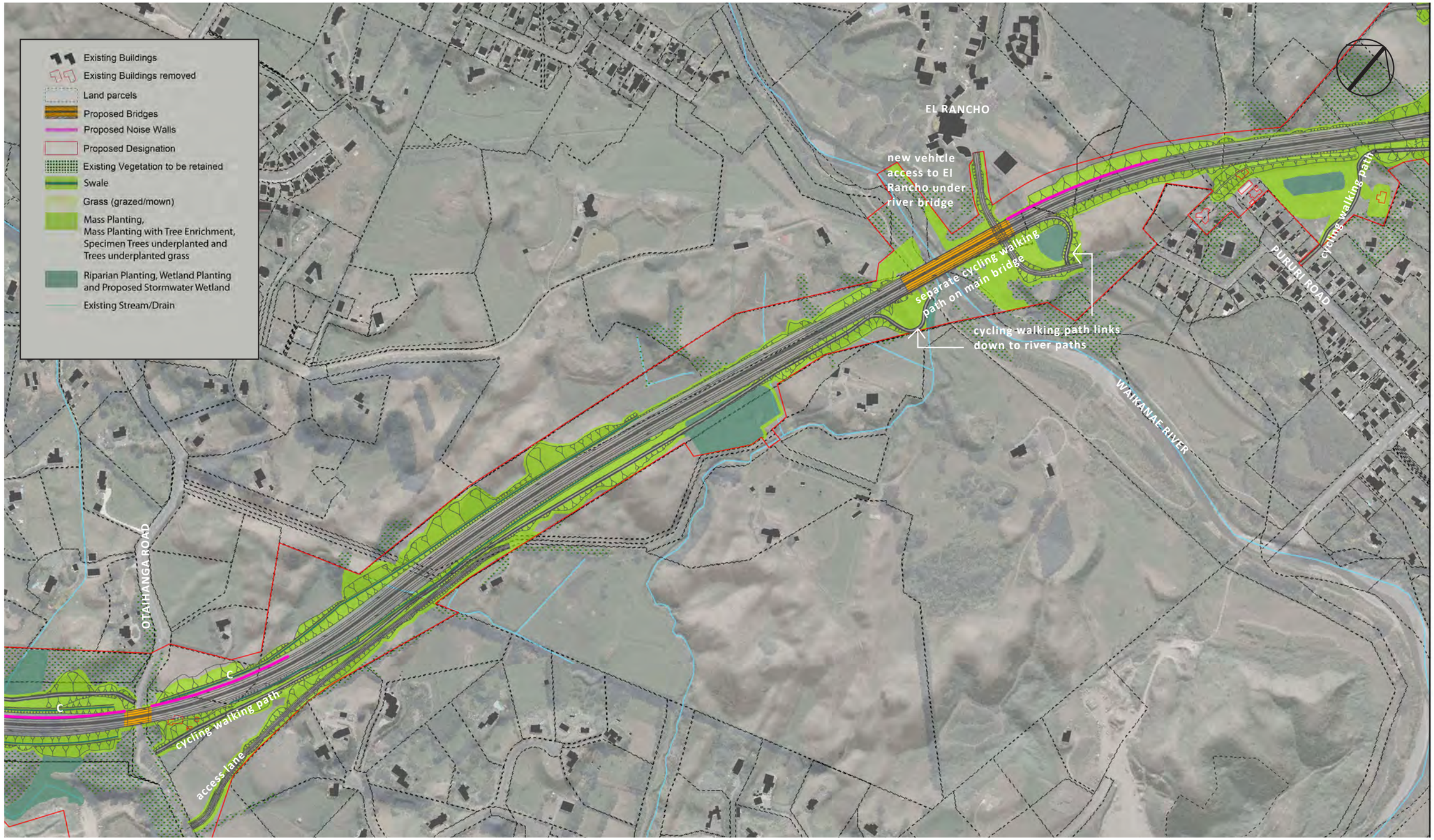


Figure 138

6.4 Sector 3 Otaihanga/Waikanae

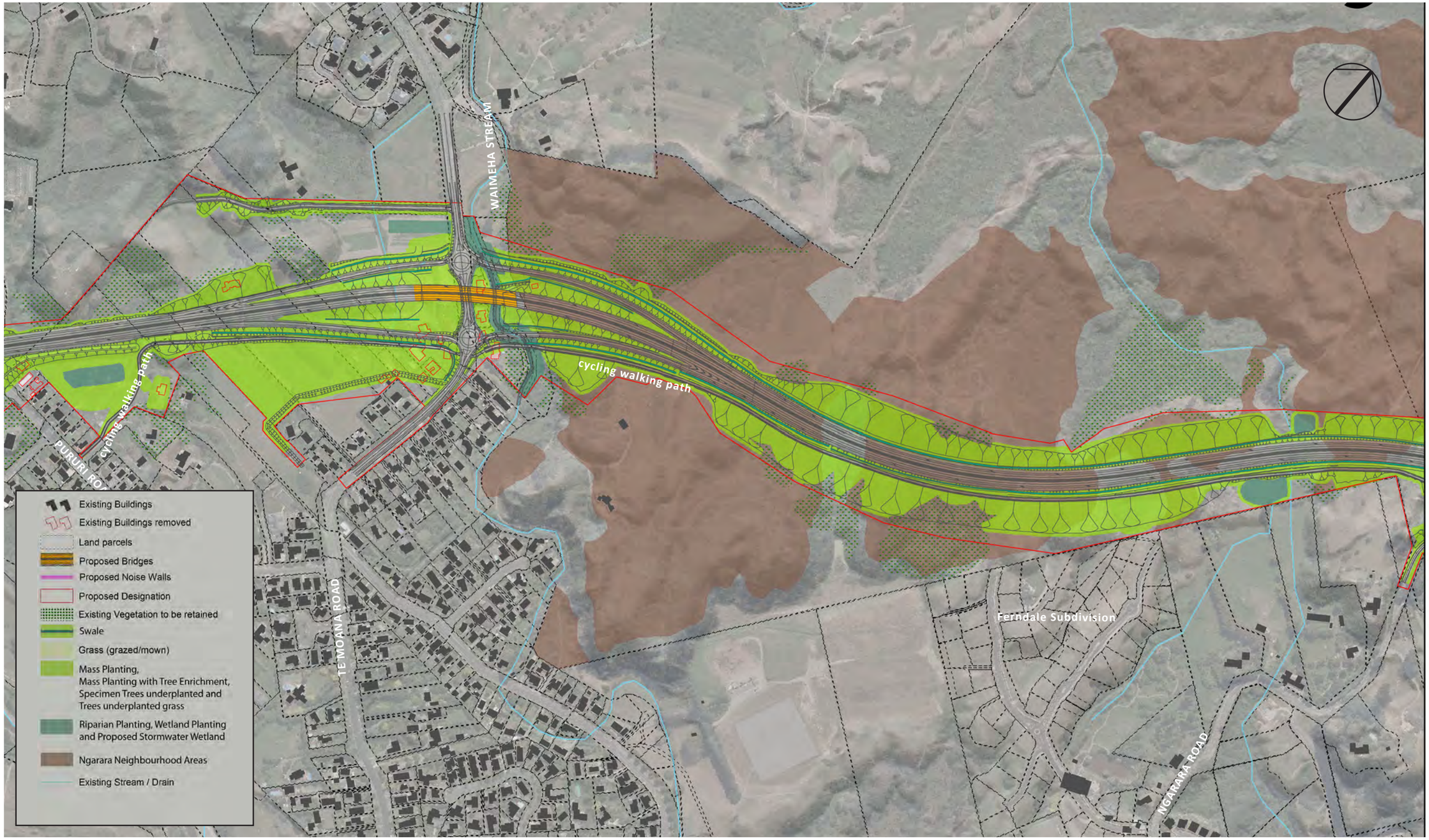


Figure 139

6.4 Sector 3 Otaihanga/Waikanae

A wetland stormwater area
B stream planting
C dense planting
D dense planting on bund
E open grassed areas
F shared cycle/walking path
G exotic tree rows
H bridge
I swale
J floodway

Figure 140 View of Waikanae River bridge looking east

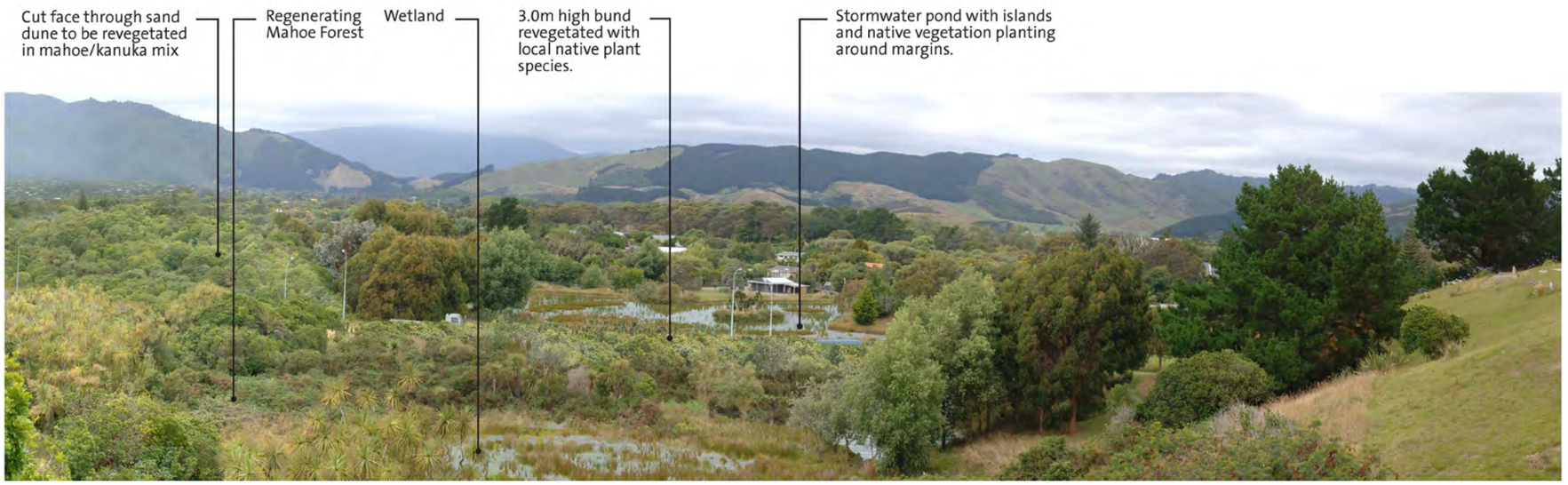
Figure 141 View of Te Moana Road interchange bridge

Figure 142 Plan view of Te Moana Road interchange

Figure 143 Cross section of Te Moana interchange

Figure 144 Existing view looking east from the urupa

Figures 145 and 146 Simulated view looking east from the urupa with the Expressway - without mitigation above and with mitigation below



6.4 Sector 3 Otaihanga/Waikanae

6.5 Sector 4 Waikanae North

DESIGN IMPLICATIONS	SECTOR 4	URBAN AND LANDSCAPE DESIGN RESPONSE
policy	• Aim to minimise disruption to planned growth areas and maintain or enhance current levels of access to these sites from Te Moana and Ngarara Roads. • Aim to facilitate employment and residential developments growth in targeted areas. The design of the Expressway needs to take into consideration the vehicular access and amenity levels of these sites. • Aim to supplement walking, cycling and horse riding routes. • Aim to facilitate employment and residential developments growth in targeted areas. The design of the Expressway needs to take into consideration the vehicular access and amenity levels of these sites. • Aim to integrate land use and transportation to achieve good urban form. The location and design of interchanges will be particularly relevant to such integration. • Aim for safe commuter cycling links between communities. The Expressway offers opportunities for improved commuter cycle route(s). • Aim for the design to enhance linkages within and across the Expressway corridor to provide connections for people moving between communities and for the ecological benefits.	The Expressway provides an interchange at Te Moana Road which will facilitate access to the north and will assist connectivity between Waikanae and Paraparaumu. The shared cycle and walking path will connect to Peka Peka Road and will facilitate the circuit down to the beach - this will also allow use by horse riders. The Te Moana Road interchange is relatively well located to the Ngarara growth area and provision has been made to allow a new road connection to Te Moana Road for access to it. The Expressway does cut through the Ngarara growth area and it will require new planning work to determine an appropriate new form for this area whilst recognising the objectives for the design. A substantial component of urban growth in the Ngarara can still be provided for. Connectivity across the Expressway to allow movement between Waikanae township and the growth area has been considered and will be sufficinetly provided for by the proposed bridges across Ngarara and Smithfeild Roads in conjuction with the other village and hamlet connections proposed within the Ngarara structure plan. The design of the Peka Peka connection to SH1 will be important to discourage urban growth at this location as this would be counter to the KCDC Development Management Strategy objectives and District Plan. The design proposes only north direction ramps that will allow existing Peka Peka residents to travel directly north, and north bound Expressway users are to connect to the local roads here. However, there will be no direct provision for Peka Peka residents to travel south on the Expressway at this point which will assist to achieve the desired inhibition to urban growth here. It is noted that Hadfeild Road residents will have less connectivity across to Peka Peka Road given the currently direct link will be severed.
landform	• Guide the design of the Expressway within the nominated corridor with the aim of minimising earthworks by: forming an alignment that runs between large dunes rather than removing them and forming its vertical and horizontal extent in response to natural levels • Recognise that some dune loss or modification will be inevitable given the confined corridor and consider approaches to address this such as: minimising the vertical profile of the Expressway to recognise that the coastal plain is relatively flat (even with the dune forms) - aim for an Expressway 'in' the landscape rather than 'on' the landscape. • Carry out earthworks so that final landforms reflect natural shapes and patterns of the existing dunes. The prevailing alignment of the dunes runs roughly parallel to the coast therefore the design or modification of landforms should acknowledge and reflect this pattern. • Recognise the views to the Tararua Ranges and Kāpiti Island as prominent and important landforms and features in the design of east/west local road crossings. • Recognise that the sand will be vulnerable to wind and water erosion if not managed, and that peat ground or extracted peat will require conditioning before planting.	Some of the largest dunes along the route occur in this sector, between Te Moana Road and Smithfield Road. The large cut faces (at 1:3 slope) are intended to be finished in such a way to avoid a 'tunnel' like effect and reflect, to some degree, the original form of the dunes. Views to Kāpiti Island and the Ranges are likely to be possible from several of the elevated points within this sector including the over bridges at the Peka Peka interchange. The construction methodology recognises that the sand areas will be vulnerable to erosion and this will be managed by limiting the extent of open areas and mixing in other materials and watering to stabilise sand.
hydrology	• Maintain and enhance the watercourses that remain with a view to reduced channelisation and more natural forms which can enhance the natural habitat for fish and other animals as well as improved visual amenity • Consider the multiple stream and other watercourse crossings as places that can incorporate additional east-west walking and cycle Expressway crossing links. • Integrate planning and design for flood storage associated with the Expressway in conjunction with other urban development needs, such as at the Paraparaumu Town Centre and other places as appropriate. • Protect and supplement the few remaining wetlands with new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff.	There are many smaller watercourses through this section of the route that are crossed by the Expressway. These are maintained and in some locations it is proposed to enhance these where there is an opportunity for offsetting some of the loss of open water due to bridges and culvert extensions. There is no large enough watercourse bridge in Sector 4 that could be used to gain access beneath for walking or cycling east-west connections. There are important wetland areas in this section of the route and these have largely been avoided by the Expressway alignment design. There are locations where these can be supplemented and also stormwater wetland areas and some flood detention areas are to be developed that will enable some ecological benefits to accrue.
vegetation	• Recognise the value of all woody vegetation in terms of integration of the Expressway into the landscape; retention of existing amenity trees and shelter belts can assist with landscape integration and mitigation. • Reflect existing vegetation patterns and species mix in mitigation planting, using both exotic and native plant species, but with a predominance of native species. • Avoid the same vegetation treatment along the whole route and use site specific plant options and layouts that reflect the varying contexts. • Carefully select plant species that will be sustainable within the corridor and recognise the climatic conditions, soil types and that require minimal maintenance after establishment.	Cues from the existing vegetation will guide the selection of species, and pattern of planting. Through the open rural land south of Peka Peka planting will consist primarily of grass and small groups of trees to reflect the open nature of the area. Elsewhere, native vegetation will dominate, particularly to enhance riparian areas of the realigned stream and stormwater wetlands. The Ngarara area is part of an east-west ecological corridorr that links the mountains with the coast, consequently the indigenous planing in the Expressway corridor will also be enriched with canopy species to enhance the biodiversity of the ecological corridor.

6.5 Sector 4 Waikanae North

ecology	• Replace any existing natural wetland area losses with new contiguous or linked wetland areas. • Add new wetland areas that have the dual role of flood storage and stormwater filtration required for the Expressway displacement and runoff. • Design any new wetlands with an appropriate maintenance regime that recognises its function as either natural, or for some form of stormwater management or flood detention. • Utilise and enhance existing wet depressions as components in the stormwater and flood detention design. • Utilise east west hydrological connections as habitat corridors across the Expressway in suitable locations. • Develop planting and stormwater treatment wetlands to reflect existing vegetation patterns and provide additional habitat to freshwater fish and bird species.	There are significant wetland areas in this sector. These have been avoided as far as practicable and supplementary wetland areas will also be created. Maintenance strategies will be required for these areas, particularly during the establishment phase. The need for flood storage areas in this sector will also require large areas of land to be managed to allow for detention in period of high rainfall. The habitat connections in this sector are import to recognise the movement from the hills to the coast by bird life. This will be provided for by the revegetation treatment within the Expressway corridor.
built environment and land uses	• Destination activities - eg airport, town centres and schools - will benefit from connections to the interchanges provided those connections are readily accessible from local road networks. • Freeing up the current SH1 from highway traffic enables the design of the town centres to be designed to function more positively and with higher amenity, including better connections between the centres and railway stations. • Options for the Expressway should be designed to avoid effects on schools and to encourage the safety and directness for walking and cycling access. • Beach community residents and visitors will need to pass across the Expressway regularly and this movement needs to be visually, functionally and safely provided for. This includes interchange design to facilitate local road movements by pedestrians and cyclists. • The opportunity should be taken with the Expressway interchange design at Paraparaumu to set a positive precedent for the quality of the of whole of Kāpiti Road. • Design approaches should discourage urban growth at Otaihanga, Te Moana Road and Peka Peka. • The future development of residual areas of the Expressway designation (such as at Raumati) and at planned growth areas needs to be considered in the design especially in terms of connections, to, from and within these areas, as well as the protection of recognised features.	The Peka Peka Beach community will be able to connect to the Expressway to move north, but to move south will use a new connection to the former SH1. This is less direct access than the current connection with SH1. However, any more of a direct access to the Expressway at this location needs to be balanced with the KCDC Development Management Strategy which is to discourage urban growth at this location. As noted above also the access for Hadfield Road rural residents to Peka Peka Road will change under this proposed intersection design. A relatively small number of people are affected by this change. The Expressway provides an interchange at Te Moana Road which will facilitate access to the north and will join the Waikanae community to Paraparaumu. The shared cycle and walking path will connect to Peka Peka Road and will facilitate the circuit down to the beach - this will also allow use by horse riders. The Te Moana Road interchange is relatively well located to the Ngarara growth area and provision has been made to allow a new road connection to Te Moana Road for access to it. The Expressway does cut through the Ngarara growth area and it will require new planning work to determine an appropriate new form for this area whilst recognising the objectives for the design. A substantial component of urban growth in the Ngarara can still be provided for. Connectivity across the Expressway to allow movement between Waikanae township and the growth area has been considered and will be sufficiently provided for by the bridges across Ngarara and Smithfield Roads in conjunction with the other village and hamlet connections proposed within the Ngarara structure plan.
movement networks	• The Expressway crosses a number of east west oriented local roads linking the beach communities on the coastal side with those inland. These connections need to be maintained to provide for the interaction between these communities. This includes through the construction period. • The Expressway is to provide a consistent highway speed (100kmh) route through the district. The local road crossings will accordingly be grade separated and take the form of a bridge over or road under the Expressway. Walking and cycling movements will be most sensitive to the condition and quality of the crossing - be that having to move under a bridge or on an over-bridge. • SH1 is part of the regional cycle network. Consideration needs to be given to either maintaining this route along its current alignment and/or providing a new commuter cycle route along the Expressway, as well as how this connects at either end to the wide network. In either case, the safety, convenience and amenity of cycling must be a primary consideration to satisfy transport policy and project objectives. • There will be an interaction between the former SH1 and Expressway at the points where interchanges are provided for. The implications for the design of the local roads that connect the two need to be considered in terms of impacts on existing land uses and the quality of the road as a walking and cycling route. • The interaction between the former SH1 and future land uses along its length will need to be considered to ensure that KCDC's urban growth objectives are not put at risk as a result of the change from the current limited access status.	The local road at Peka Peka Road is an east west connector from the current SH1 and also connects at its west end along the coast to Waikanae Beach. The local road will connect back to what will be the former SH1 via an over ramp to the south and to keep the relatively rural connection a simple form. The design of the connection for local road movements by drivers as well as walkers and cyclists will require careful attention to facilitate the access by the community. The KCDC Development Management Strategy is to prevent urban growth in the Peka Peka area and the Expressway assists this by locating the interchanges away from this area. The Te Moana interchange also allows for the growth in the Ngarara area to be provided for with direct access to the Expressway. The design of the cycle/walkway at Peka Peka Road will need to tie in with the design for the next section of the RoNS route - Peka Peka to Otaki
heritage	• Engage with iwi in the Project design to identify how the route alignment options and the landscape of the Expressway can best be designed to provided for Māori cultural values. • Consider the known sites, identify the significance of these, and aim to avoid these as far as possible. However, recognise the avoidance of all sites will not be likely given the many known and still unknown sites. • Consider the opportunities to enhance the awareness of the heritage in the way the Expressway and associated structures, pathways and other elements are designed.	There has been engagement with iwi throughout the design process to ensure cultural values are understood and the design has responded to this as best it can. The sites have been identified including through the use of ground penetrating radar to identify if burial sites exist beyond the known Takamore urupa. A protocol arrangement with iwi has been developed to provide a process for managing sites uncovered in the course of construction. There are opportunities for cultural heritage to be recognised in the developed design process.

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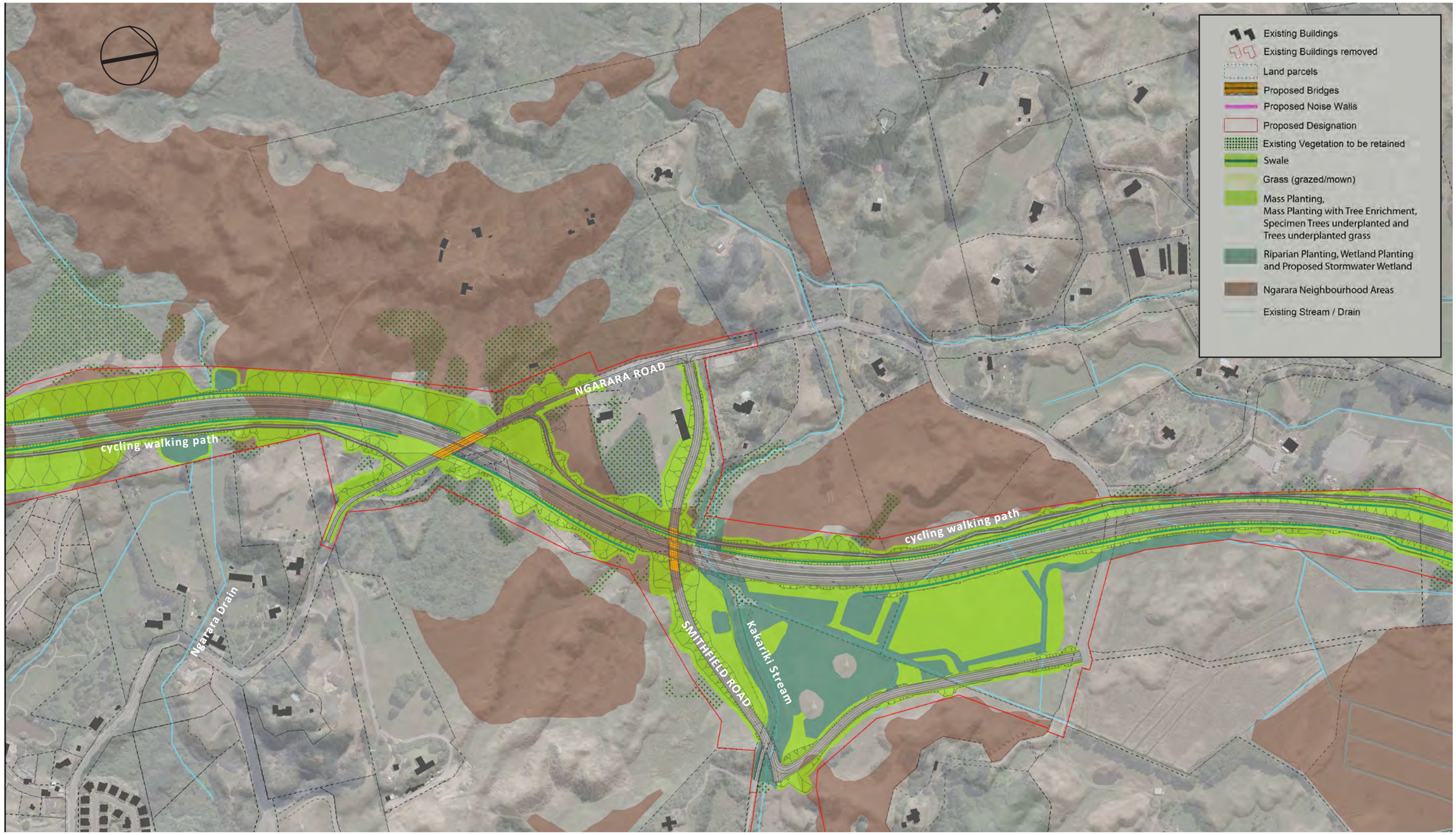

Figure 147

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Figure 148

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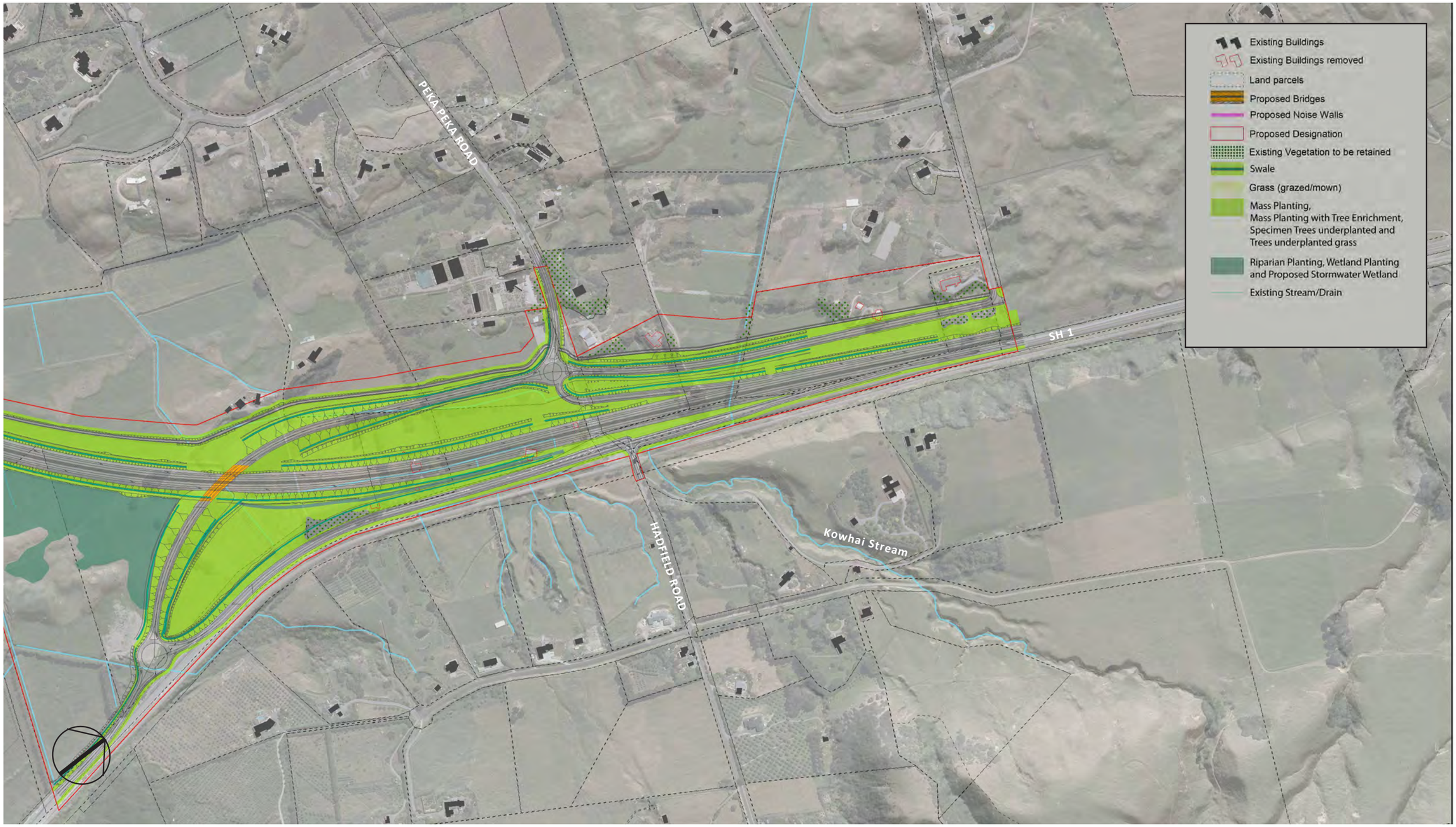

Figure 149

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