

PART C: DESCRIPTION OF THE ENVIRONMENT

6 Description of the environment

Overview

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

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

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

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

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

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

6.1 Introduction

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

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

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

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

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

6.2 Regional context

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

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

- The Kāpiti coastline, a continuous sandy beach extending between Paekakariki and Ōtaki;
- Kāpiti Island, located 5–6km offshore, rising to an elevation of 125m amsl³⁰;
- The coastal residential communities of Raumati South, Raumati Beach, Paraparaumu Beach, Waikanae Beach and Peka Peka Beach, and the rural hamlet of Otaihanga;

³⁰ Above mean sea level.

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

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

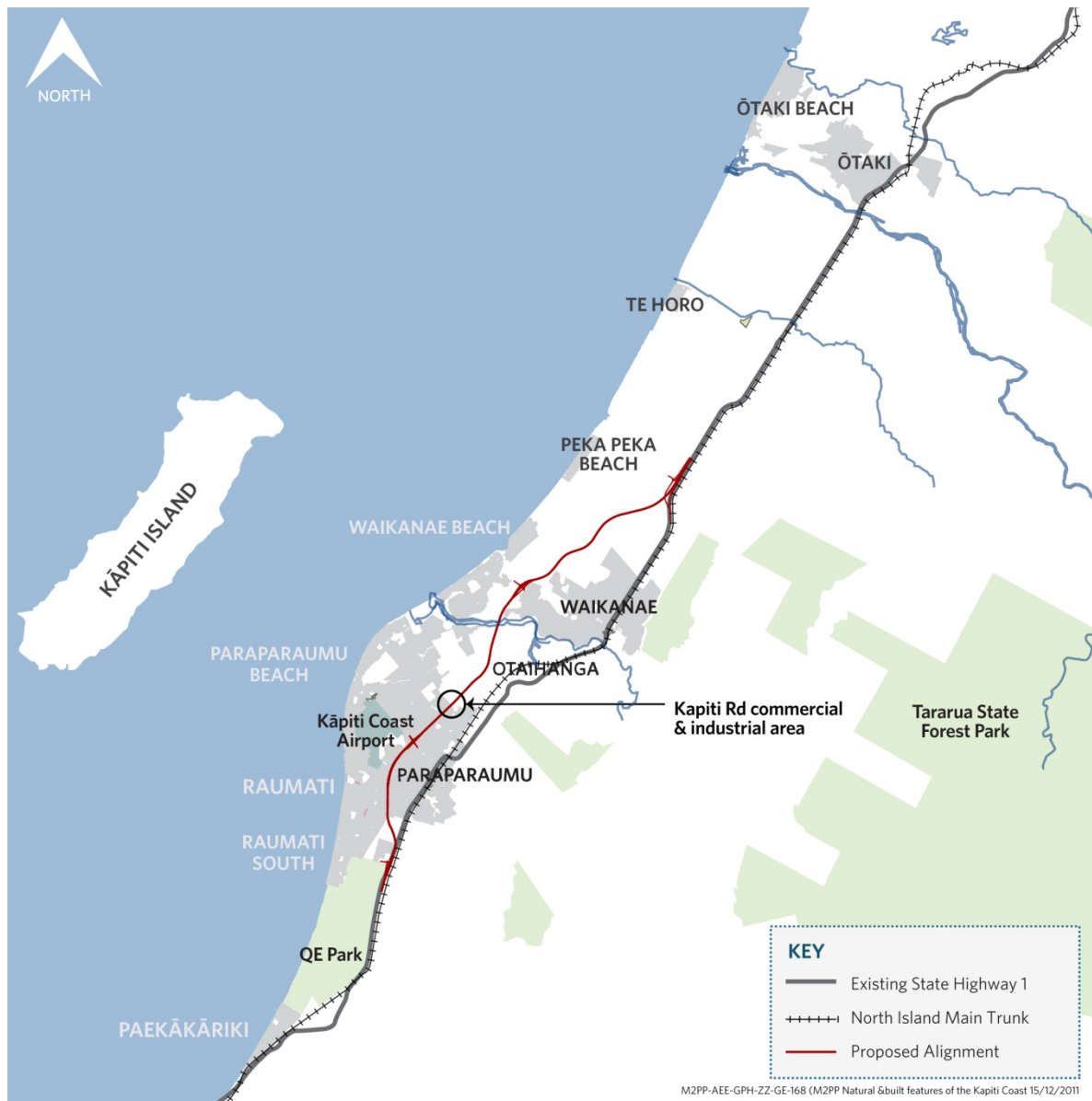


Figure 6.1: Built Features of the Kāpiti Coast

6.2.1 Topography and Landscape

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

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

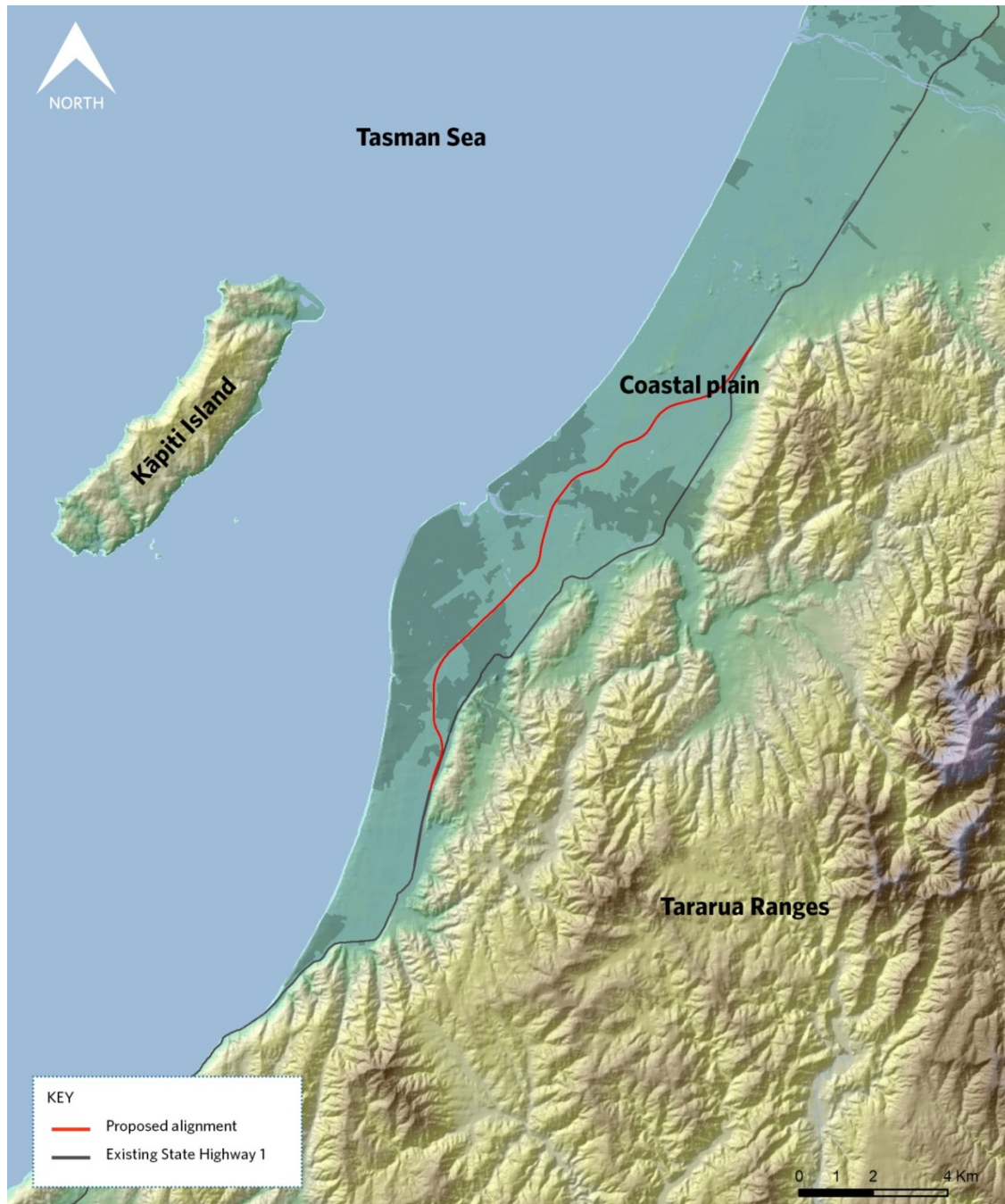


Figure 6.2: Kāpiti Coast Topography

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

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

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

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

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

6.2.2 Geology

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

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

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

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



Figure 6.3: Geology within the Project Area

6.2.3 Natural Hazards

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

6.2.3.1 Earthquakes

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

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

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

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

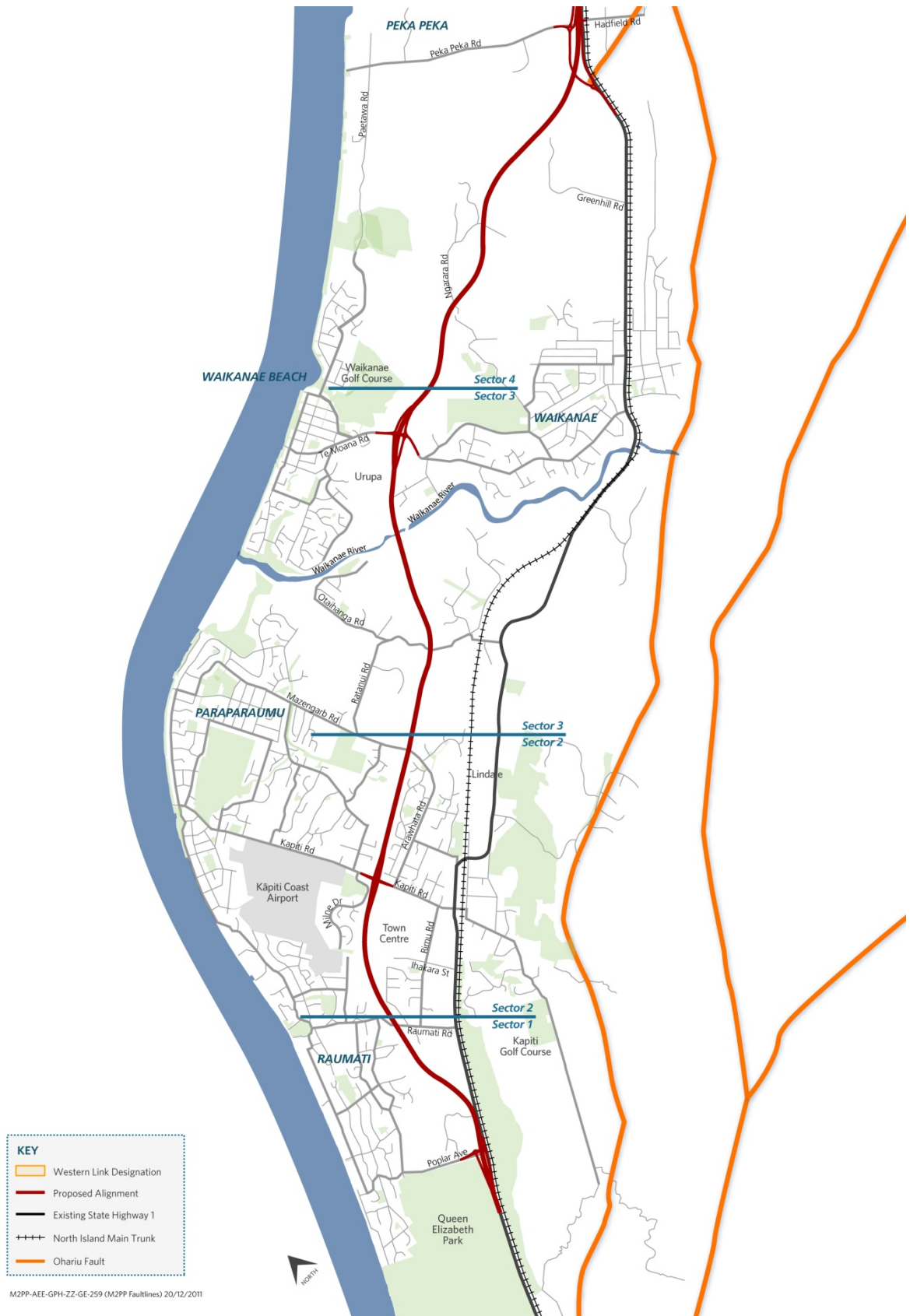


Figure 6.4: Principal Faultline within the Project Area

6.2.3.1 Storms

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

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

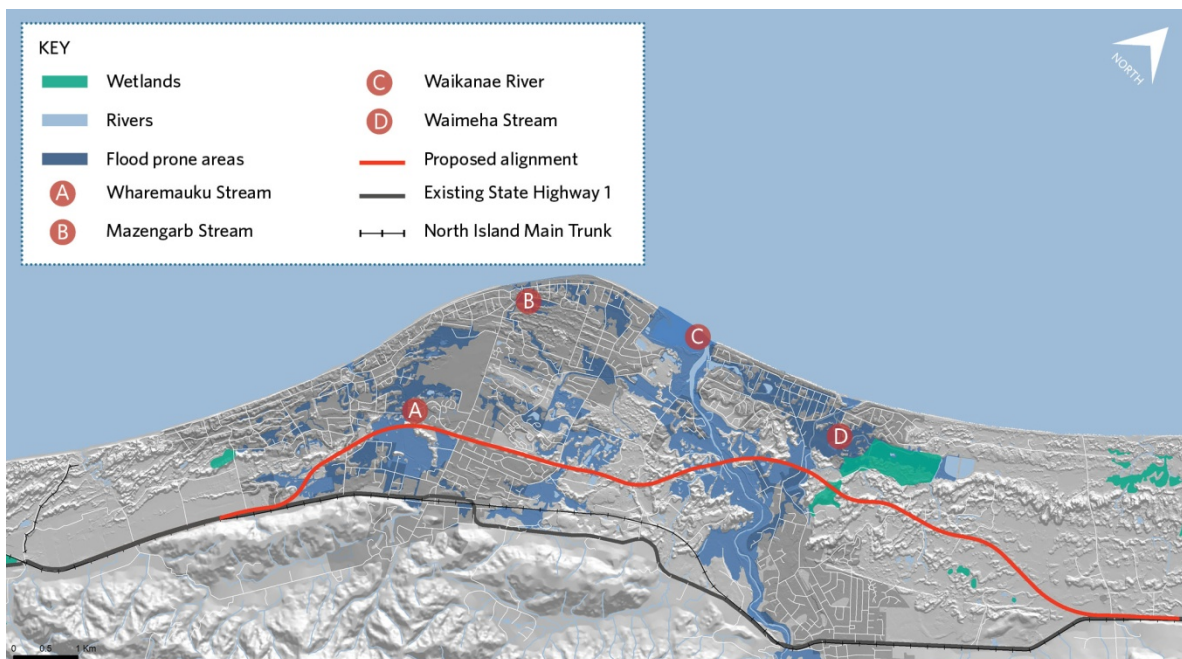


Figure 6.5: Principal Floodplains within the Project Area



Photo 6.1: Waikanae River flooding at Otaihanga, 28th October 1998³¹

6.2.4 Climate

The climate on the Kāpiti Coast is relatively temperate and does not typically experience extremes of temperature³². The most settled weather occurs during summer and early autumn. Summers are warm, with daytime maximum temperatures generally ranging from 19°C to 24°C and seldom exceeding 30°C. Winters are normally the most unsettled time of the year, with daytime maximum temperatures generally ranging from 10°C to 14°C.

Prevailing winds vary across the seasons, with northerly winds dominant during the summer and northwesterlies in the winter. Annual sunshine hours average approximately 2000 hours and annual rainfall levels average approximately 1311mm³³.

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

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

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

6.2.5 Hydrology

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

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

6.2.5.1 Watercourses and Catchments

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

The Project involves works within the following catchments:

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

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

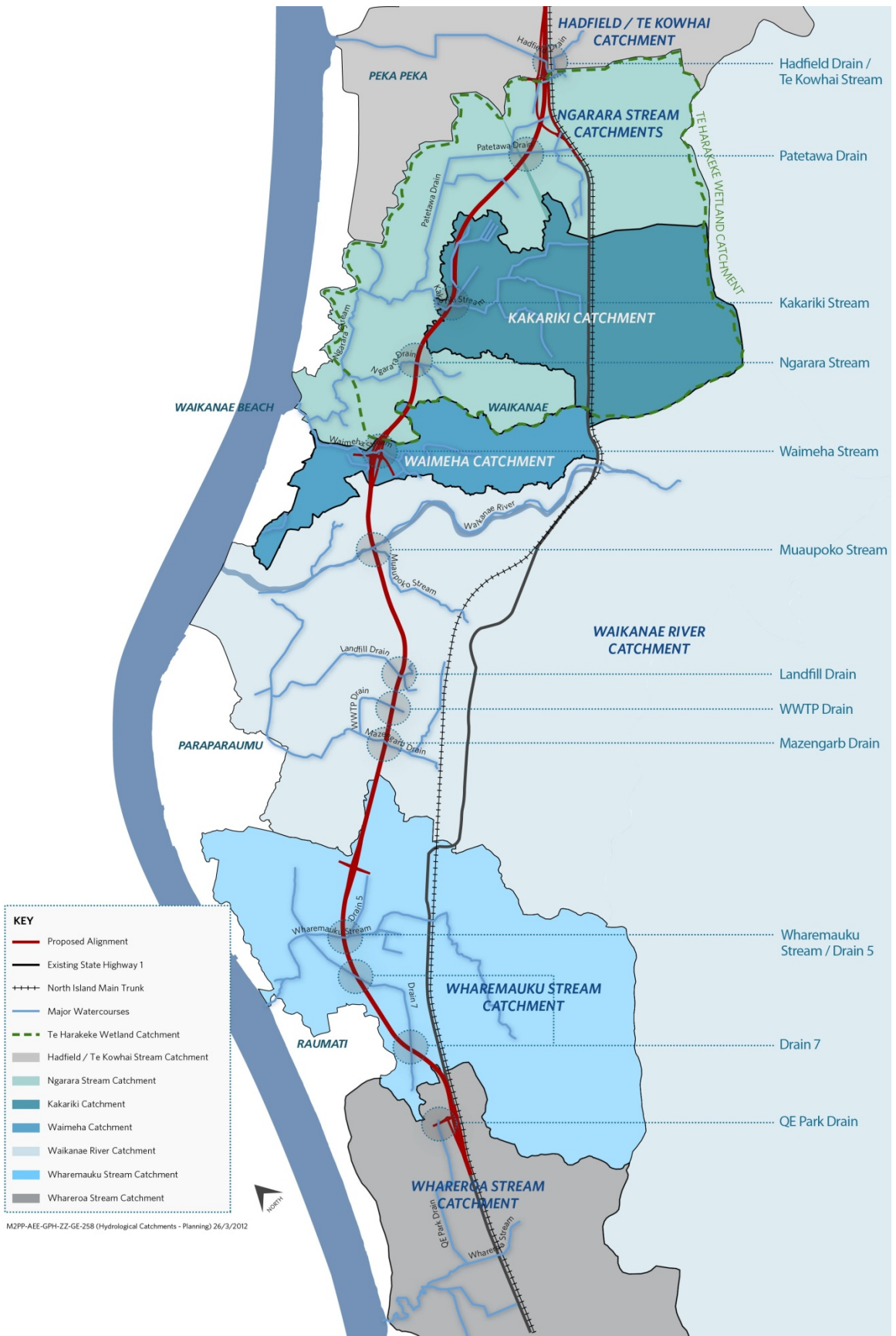


Figure 6.6: Hydrological Catchments

6.2.5.2 Groundwater

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

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

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

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

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

6.2.6 Ecology

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

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

6.2.6.1 Vegetation and Wetlands

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

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



Figure 6.7: Principal Vegetation Types in the Project Area

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

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

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

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

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

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

6.2.6.2 Avian and Herpetofauna

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

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

6.3 Built and human environment

6.3.1 Land Use and Built Form

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

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

6.3.2 Social Environment

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

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

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

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

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

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

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

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

6.3.3 Archaeology

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

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

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

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

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

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

Sufficient data has been gathered to create a predictive model on archaeology³⁴. This model postulates likely site occurrence, distribution, nature and relationships with the underlying geomorphology. Based on this model, sites are extremely likely on areas of sand dunes, particularly middens. Other likely site types are ovens and burials. Earthworks sites (including pits, terraces, and platforms) have been recorded in greater numbers north of the Waikanae River.

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

6.3.4 Māori History and Cultural Values

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

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

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

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

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

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

In May 2011, the Takamore Trust, with assistance from the Project team, prepared a number of constraints maps³⁵ to identify sites of cultural importance within the Takamore cultural heritage precinct. These sites include the Maketu tree, the Takamore urupā, the former Tuku Rakau Village and the registered wāhi tapu area.

6.3.5 Heritage

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

The Greenaway Homestead (B72) is a rare example of a still extant building dating from Waikanae's early 20th century history, located on the corner of Kauri and Puriri Roads, Waikanae. The Homestead's original setting has changed considerably over time, with its original role as a farm homestead ending over 60 years ago. The residential development surrounding the Greenaway Homestead, which began in 1954, has grown into a place with its own identity and character. An assessment of this building and its context can be found within Technical Report 10, Volume 3.

In the same vicinity as the Greenaway Homestead, but slightly further away from the proposed Expressway, is an old church building located within the grounds of the El Rancho Christian Holiday Camp (No.B41³⁶). This building, locally referred to as the Apiti Chapel, was constructed in 1896 and relocated from Apiti (about 50km northeast of Palmerston North) to its current location within the Holiday Camp, off Kauri Road, Waikanae.

There are no other registered European buildings of historic heritage value within the Project area.

6.3.6 Noise

Between April and May 2011, a pre-construction noise level survey³⁷ was undertaken as part of the Project.

Ambient noise measurements demonstrate a range of current noise levels from 40 to 68 dB LAeq(24h)³⁸. The range of existing noise levels is due to the relative proximity of sites to existing roads, with noise levels at the lower end representing positions located away from the existing roading network and at the higher end representing positions close to existing major roads (such as the existing SH1, Kāpiti and Te Moana Roads).

³⁵ Constraints Maps for the Takamore Cultural Heritage Precinct are contained within Technical Report 11, Volume 3.

³⁶ Refer to Technical Report 10, Volume 3

³⁷ Refer to Technical Report 17, Volume 3

³⁸ Ambient Noise is the all-encompassing noise associated with any given environment and is usually a composite of sounds from many sources near and far.

The existing ambient noise level for most of the Expressway alignment is not controlled by current road traffic noise. For new roads, noise sources controlling the environment are generally natural sounds that do not vary considerably from one area to the next along the alignment. This is the case for the Expressway, where large extents of the road will traverse areas of rural and rural residential character.

Technical Reports 15 to 17, Volume 3 relate to noise.

6.3.7 Air Quality

The Project area is within the Kāpiti Coast airshed, as defined by the GWRC³⁹. In terms of air quality within the Project area, vehicle emissions and domestic solid heating from the residential areas are the biggest contributors to air contaminants; namely particulate matter (PM₁₀), nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), carbon monoxide (CO) and benzene. Vehicle emissions in this area predominantly arise from vehicles on the existing SH1 and suburban streets, which contribute to background levels of PM₁₀, NO₂, NO_x, CO and benzene. Contaminants arising from solid fuel heating at Raumati, Paraparaumu, Waikanae and other residential areas are also contributors of background levels of PM₁₀ and CO within the environment.

The estimated background concentration levels, based on air quality monitoring undertaken near Raumati Road, are all below the relevant thresholds in the Air Quality National Environmental Standard, indicating a good overall level of existing air quality in most of the area. Air quality in rural settings is likely to be considerably better than the worst-case levels estimated for the more urban settings.

Further details on air quality can be found within Technical Reports 13 and 14, Volume 3.

6.3.8 Services

A range of major services supporting the urban environment are located within the Project area, and include transmission and distribution lines for gas, electricity, and telecommunications, and reticulated networks for water supply and wastewater disposal. Major service providers within the Project area include KCDC, Vector Gas, Electra, Telstra, Telecom and FX Network.

In general, services are located in the area between Poplar Avenue (Raumati South) and Te Moana Road (Waikanae), and at Peka Peka Road. These services are described below in Table 6.1.

Table 6.1: Service Networks within the Project Area

Type of service	Service providers	General locations	Typical construction
Water supply network	KCDC	Leinster Avenue to Ngarara Road	100mm / 200mm/ 250mm / 300mm diameter asbestos cement water mains 50mm/ 100mm/ 300mm diameter PVC water mains Water supply bore

³⁹

<http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Raumati-South-Air-Quality-Investigation-Report-Screen-Version-indd.pdf>

			hydrants/ valves
Stormwater network	KCDC	MacKays Crossing to Peka Peka Road	Refer Assessment of Stormwater Effects
Wastewater network	KCDC	Leinster Avenue to Smithfield Road	100mm/ 150mm/ 450mm/ 525mm diameter asbestos cement gravity mains 100mm/ 150mm diameter PVC gravity pipes 525mm diameter RCRRJ gravity main 100mm / 450mm diameter asbestos cement rising mains 350mm diameter PE rising main Pump Station Manholes
Electricity distribution	Electra	MacKays Crossing to Peka Peka Road	400V / 11kV / 33kV Buried cables and overhead lines (and poles) Streetlighting / transformers
Gas distribution	Vector	Raumati Road to Te Moana Road	32mm/ 50mm/ 100mm PE pipes
Telecommunication, including fibre optic cables	Telecom	Leinster Avenue to Peka Peka Road	Buried cables (telephone and fibre optic) Telecom cabinets and manholes
	Telstra Clear	MacKays Crossing to Te Moana Road	Buried and overhead cables (telephone and fibre optic)
	FX Network	Kāpiti Road to Mazengarb Road	Buried cables (fibre optic)

In addition to these, the Vector Gas Transmission Pipeline Corridor and the Transpower Bunnythorpe to Haywards A and B Transmission Lines cross the proposed Expressway alignment.

6.3.9 Transport Facilities

There are a number of existing transport networks within the Project area, including the existing SH1, the local road network, Kāpiti Coast Airport, the NIMT railway, bus networks, walkways, cycleways and bridleways.

6.3.9.1 State Highway Network

The existing SH1 connects Wellington to the Kāpiti Coast and further northwards to the central and upper North Island. The Consultation Draft of the NZTA's State highway classifications identifies the existing SH1 in the Wellington Region as a 'national strategic' State Highway⁴⁰, signifying its high importance in terms of strategic connections for freight traffic and other vehicles to Wellington City, CentrePort, the interisland ferries, and Wellington International Airport. Through the Project area, the existing SH1 is the primary north-south route, providing the only road crossing of the Waikanae River

⁴⁰ State highway classification: Consultation Draft, NZTA, February 2011

and accommodating both local and inter-regional traffic movements. Between MacKays Crossing and Peka Peka, the highway is generally located parallel to the NIMT, and is typically two laned except for several overtaking sections and for the section south of Poplar Avenue. The various communities of the District are accessed by a combination of the existing SH1 and/or secondary local roads.

6.3.9.2 Local Road Network

There are a number of major local arterial roads that connect to the existing SH1 within the Project area or that perform a significant function in the local road network. The existing east-west local roads and arterials which will either cross under or over the Expressway, and/or that will provide connections to the Expressway include (from south to north):

- Poplar Avenue;
- Raumati Road;
- Kāpiti Road;
- Mazengarb Road;
- Otaihanga Road;
- Te Moana Road;
- Ngarara Road;
- Smithfield Road; and
- Peka Peka Road.

Local roads, including those listed above, are typically two-laned. In the vicinity of the proposed Expressway, local roads have a speed limit of 50km/h, except for Otaihanga Road which has a speed limit of 80km/h.



Figure 6.8: Road Hierarchy Plan

6.3.9.3 Kāpiti Coast Airport

The Kāpiti Coast Airport is one of the few privately owned regional airports in New Zealand and is strategically significant as a second airport for the Wellington Region. Located off Kāpiti Road in Paraparaumu, the Airport has about 40,000 aircraft movements each year, predominantly light aircraft. The Airport has recently been upgraded to become a regional airport, with scheduled flights to various centres (recently including Auckland), with more options for national air travel to other major centres. In conjunction, a recent plan change (to the Kāpiti Coast District Plan) has provided for significant business development to occur adjoining the airport, which is expected to generate increased business and employment opportunities locally and is likely to result in additional traffic (freight and private vehicles) movements on local roads, particularly Kāpiti Road and the proposed future Ihakara Street extension.

6.3.9.4 Public Transport

The Kāpiti Coast District is well serviced by public transport with rail and bus services as shown in Figure 6.9.

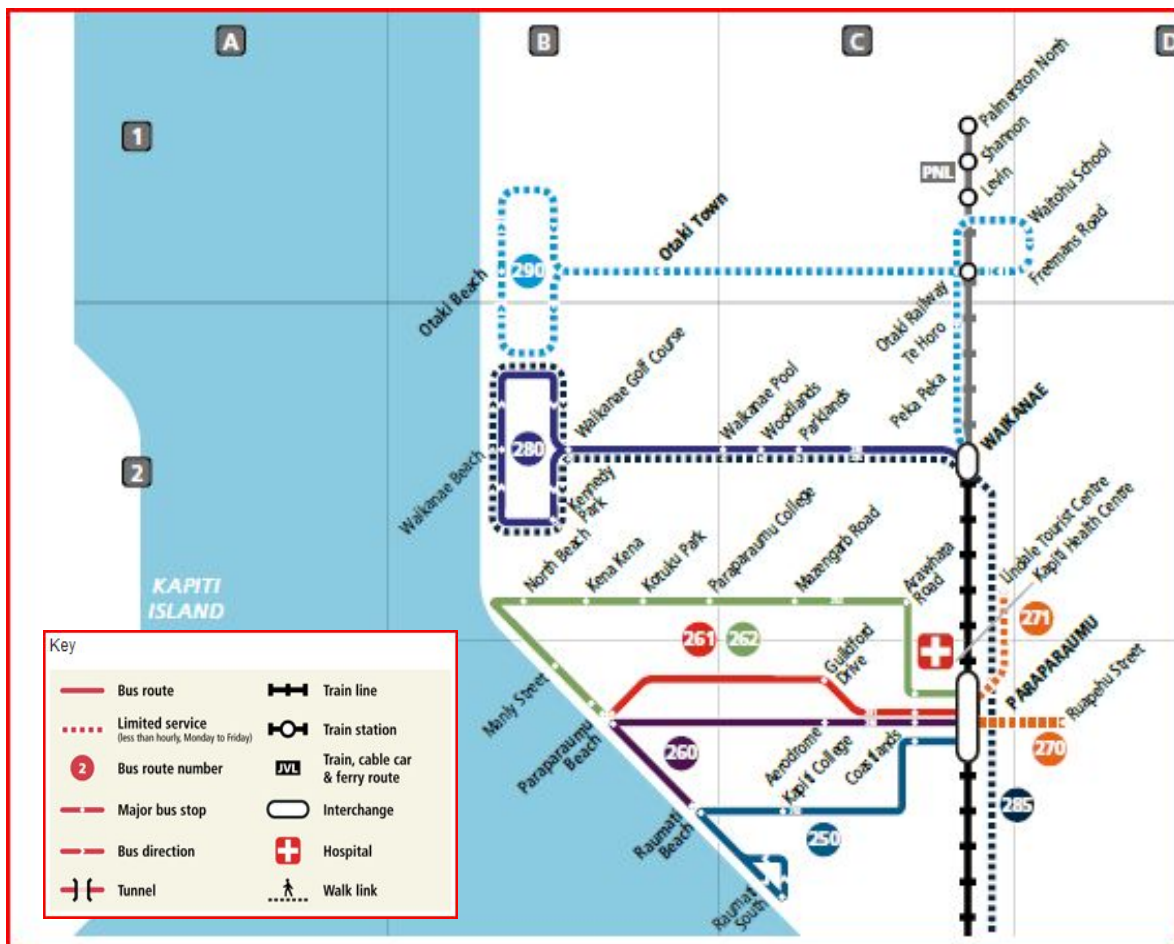


Figure 6.9: Project Area Public Transport Network Map

The NIMT rail line runs north-south through the Kāpiti Coast District. The NIMT carries approximately ten freight trains daily in each direction, while commuter trains operate between Wellington and Waikanae approximately every 30 minutes during peak times. In addition, it also carries a small number of longer distance services. Within the Project area, there are rail stations located in Paraparaumu and Waikanae.

As illustrated in Figure 6.9 there is a network of bus services on the Kāpiti Coast.

The bus network and schedule of operations within the Project area is primarily orientated towards providing connectivity between residential communities and the Paraparaumu and Waikanae Rail Stations. School bus services include services to and from Kāpiti and Paraparaumu Colleges along with Kāpiti Coast primary schools.

6.3.9.5 Walkways, Cycleways and Bridleways

The current provision for walking, cycling and horse riding through the District is by a mix of on-road facilities, footpaths and cycle lanes, as well as paths that traverse open spaces or cut through parks and between streets as lanes. The Wharemauku Trail and Waikanae River Trail are well used areas provided for recreational walking, cycling and horse-riding. Many of these accessways also provide for school traffic.

Both the existing SH1 and the Kāpiti Coast Cycle Route are part of the regional cycling network as shown within Figure 6.10. The 16km Kāpiti Coastal Cycle Route runs from Paekakariki through to Peka Peka beach, generally along residential streets, as well as Queen Elizabeth Park and along the Waikanae River. There are currently no cycle lanes on the existing SH1 between MacKay's Crossing and Peka Peka: cyclists ride in the shoulder, where available. The Paraparaumu rail overbridge and the Waikanae River Bridge are very narrow and cyclists are effectively forced to ride in the traffic lane in both of these locations.

A local movement survey was carried out as part of the Project investigations; the survey results are detailed and mapped within Technical Report 5, Volume 3.



Figure 6.10: Kāpiti Coast District Coastal Cycleway⁴¹

⁴¹ Source: Kāpiti Coast District Coastal Cycleway Guide, Kāpiti Coast District Council, 2011

6.4 Sector 1 – Raumati South

The Project has been divided into four geographic sectors as illustrated and described within Chapter 7 of this AEE Report.

The Project area within Sector 1 is located from just south of Poplar Avenue (chainage 1900m) to just north of Raumati Road (chainage 4500m).

6.4.1 Natural Environment

6.4.1.1 Topography and Landscape

Queen Elizabeth Park comprises an area of continuous and mostly unmodified dunes between the coast and the foothills of the Tararua Ranges. A line of high, relatively intact dunes extends from the centre of the Park to north of Poplar Avenue. To the west of these is a complex field of intact dunes, which extend towards the coast. The eastern part of the Park is relatively flat, low lying and traversed by several drains.

Between Poplar Avenue and Raumati Road is a line of relatively high dunes, some of which are over 20m amsl. There are also some dune formations adjacent to the existing SH1, including at Leinster Avenue. Between the dunes are several areas of low-lying damp ground and wetlands.

6.4.1.2 Geology

A large area of relatively thick peat (ranging between 4m and 6m) is present from the edge of the foothills across Queen Elizabeth Park. Peat is also present north of Poplar Avenue between the foothills and the sand dunes within the existing WLR designation. The area is generally underlain by alluvial sand and gravel deposits.

6.4.1.3 Hydrology

The waterbodies which cross the proposed Expressway alignment within Sector 1 include (from south to north):

- Whareroa Stream tributaries; and
- Drain 7 (tributary of the Wharemauku Stream).

6.4.1.4 Ecology

There are three known wetlands with moderate ecological values for wetland vegetation and habitat for indigenous fauna within the Project area within this Sector. The key areas of identified ecological importance are described below:

- The *Poplar Avenue wetlands* are located south of the Poplar Avenue/Matai Road intersection, within Queen Elizabeth Park. Although highly modified, these wetlands are part of a major joint community restoration programme being undertaken by GWRC, KCDC, DOC and community groups. An area surrounding the original wetland has been planted as part of this initiative.

- The *Raumati South Peatlands*, located north of Poplar Avenue, to the west of Leinster Avenue/Sydney Crescent. Although highly modified and fragmented, this large area of wetland vegetation is dominated by manuka, kanuka and a range of exotic species.
- The *Raumati manuka wetland*, located inland of 200 Main Road, Raumati. This area is currently in a highly modified state.

6.4.2 Built and Human Environment

6.4.2.1 Land Use and Built Form

As shown in Figure 6.11 below, the Project area within Sector 1 consists of a mix of low to medium density urban residential areas and large areas of open space (primarily Queen Elizabeth Park and the undeveloped areas within the existing designated alignment).

The local communities through the Project area of Sector 1 include Raumati South and Raumati Beach.

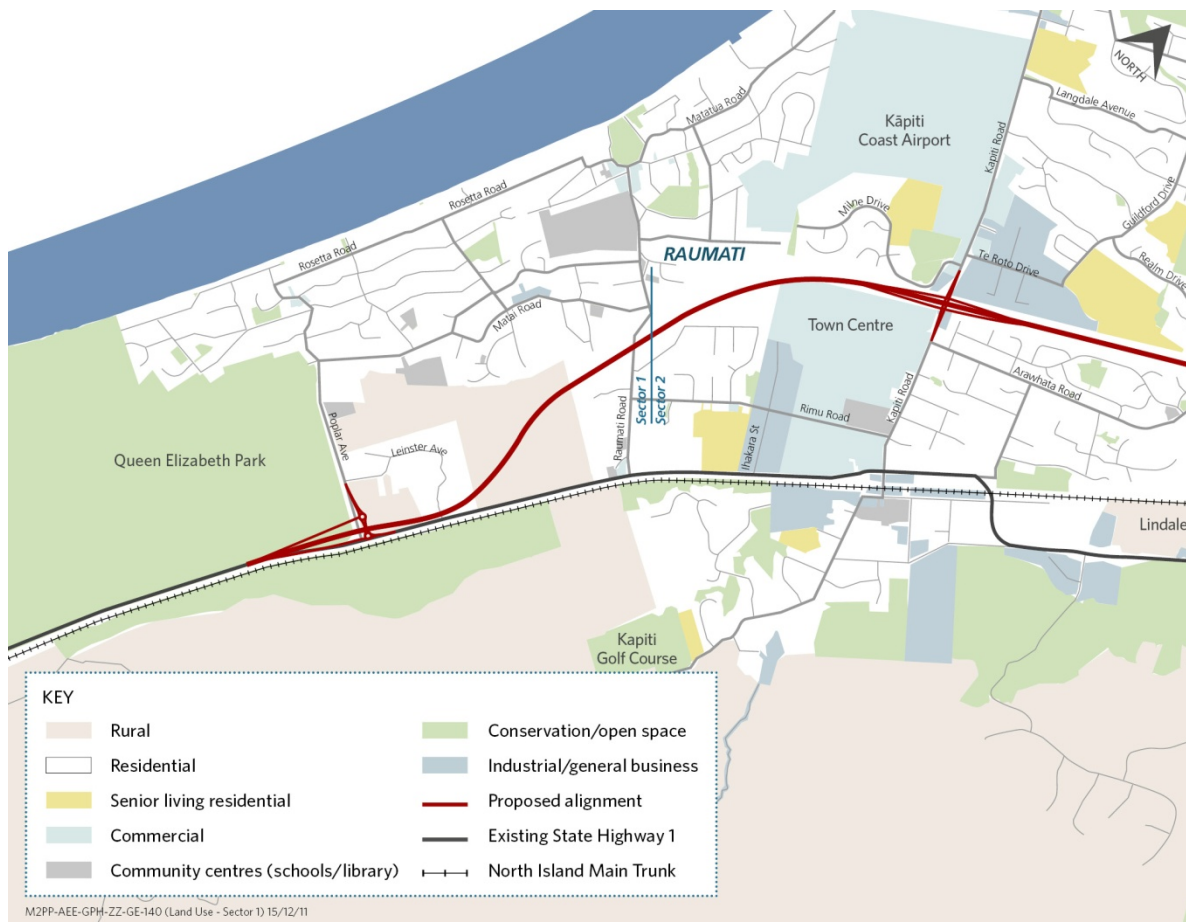


Figure 6.11: Land Use within Sector 1



Photo 6.2: Sector 1 (Facing South)

As described above, in this Sector the land within the existing designated alignment has largely been left free from development since the 1950s. The existing WLR designation protects a wide (at least 100m) area from development, which contributes to the informal open space environment within Sector 1. Much of the designated land is regenerating native and/or exotic scrub, with ephemeral and permanent wetlands.

Urban development in this Sector has terminated at the existing WLR designation boundaries, with no east-west connectivity between the two residential area, north of Poplar Ave and south of Raumati Road. The designated alignment is, however, criss-crossed with informal walking connections. While part of the Raumati community, the residential neighbourhood of Leinster Avenue/Sydney Crescent is separated from the remainder of the Raumati area by the existing WLR designation.

South of Poplar Avenue

Poplar Avenue marks a distinct change in the landscape character within Sector 1. To the south of Poplar Avenue is Queen Elizabeth Park, a Wellington Regional Park comprising 650 hectares, classified as a Recreation Reserve under the Reserves Act 1977⁴². The Park is zoned Open Space and designated under the Kāpiti Coast District Plan (D0401) for recreation and reserve purposes.

⁴² Queen Elizabeth Park is classified as a recreation reserve under the Reserves Act 1977. The Wellington Regional Council was appointed by the Minister of Conservation to control and manage Queen Elizabeth Park as a reserve for recreation purposes, pursuant to Section 28 of the Reserves Act 1977.

Queen Elizabeth Park provides a number of recreation facilities, including the Wellington Tramway Museum and picnic areas. Inland of the foredunes, the Park is largely grazed open pastoral land, leased for farming operations, including that part of the Park adjacent to existing SH1 along the Raumati Straight. The core of the Park's facilities and activities occur to the south of the Project area, accessed from the MacKays Crossing interchange. While parts of the Park have been modified, the basic system of coastal and inland dunes, backed by wetlands, remains intact and thus represents an example of the coastal plain prior to urbanisation. The history of Queen Elizabeth Park includes a long history of Māori occupation and its use in World War II as a base for a 20,000 strong US marine camp.

North of Poplar Avenue

Sector 1 north of Poplar Avenue consists of a mixture of low to medium density suburban development to the west and east of the existing designated alignment. The community contains two schools: the Raumati South (State) Primary School on Matai Road and the Te Ra Waldorf Primary School on Poplar Avenue (the latter also containing the Te Rawhiti Waldorf Kindergarten).

The residential communities to the west of the designated alignment and in the vicinity of Leinster Avenue are medium density neighbourhoods, with the roads and pattern of housing generally following the local dune topography. On the existing SH1, between the residential neighbourhoods at Leinster Avenue and Raumati Road is a pocket of low density larger residential properties, with access off the existing SH1.

6.4.2.2 Community Facilities

As well as permanent homes and holiday baches, the Raumati community is served by a local shopping village, recreational amenities and educational facilities. The shopping village is located at Raumati Beach, on the corner of Raumati and Rosetta Roads opposite the Marine Gardens and includes part of Margaret Street. There is also a small commercial centre at the beach end of Poplar Avenue and small industrial area on Matai Road.

6.4.2.3 Archaeology and Maori History

Queen Elizabeth Park is located partly within a historic Ngati Toa Rangatira reserve (extending from Paremata to Wainui) that was set aside by the Crown as part of the purchase of Porirua in 1847. The Park includes areas of early Ngati Toa Rangatira settlement, and contains a number of important wāhi tapu, including urupā, and pā sites at the mouths of the Whareroa and Wainui Streams. These were traditionally used for fishing and still retain important cultural associations. The Whareroa Stream is the traditional tribal boundary between Ngati Toa and Te Ati Awa.

6.4.2.4 Noise

The noise environment of this Sector varies from relatively elevated ambient noise levels in areas close to the existing SH1 (for example, at Leinster Avenue) and local main roads to relatively quiet in areas removed from main roads. As part of investigations for this Project, noise levels were measured at 12

locations, including two long duration noise level surveys⁴³. Noise levels were found to vary from 42 to 70 dB $L_{Aeq(24h)}$, generally dependent on the location of the sites to road noise.

6.4.2.5 Services

The most significant network utility in this Sector is the wastewater pump station located on Leinster Avenue, near its intersection with Poplar Avenue. The pump station is in proximity to the proposed Expressway.

6.4.2.6 Local Road Network

The beach community of Raumati South is accessed from the existing SH1 via Poplar Avenue and is connected to Raumati Beach via Rosetta Road and Matai Road/Hillcrest Road. These road corridors are classified as Secondary Arterials in the District Plan. The residential enclave around Leinster Avenue is accessed either directly off the existing SH1 or via Poplar Avenue.

Raumati Beach is accessed off the existing SH1 via Raumati Road and connected to Paraparaumu Beach through Matatua Road/Wharemauku Road/Marine Parade. Raumati Beach is connected to Paraparaumu town centre by Rimu Road. Both these road connections are classified as Secondary Arterials in the District Plan.

6.4.2.7 Walkways, Cycleways and Bridleways

The formal and informal walkways and cycleways throughout Raumati are widely used. These include those through Queen Elizabeth Park and the Kāpiti Coastal Cycle Route along Rosetta Road. Informal tracks include access between Leinster Avenue and Raumati South School. The Kāpiti Pony Club and other horse riders use tracks in the dune areas off Raumati Road and circuits to the beach.

6.5 Sector 2 – Raumati/Paraparaumu

The Project area within Sector 2 is located north of Raumati Road (chainage 4500m) through to north of Mazengarb Road (chainage 8300m).

6.5.1 Natural Environment

6.5.1.1 Topography and Landscape

The topography of Sector 2 consists of unmodified dunes (ranging up to approximately 20m amsl) interspersed with low lying interdunal sand plains. The Sector is bisected by the Wharemauku Stream.

The southern half of this Sector includes dune landforms ranging between 10-20m amsl, with a low lying flat interdunal area located between the Wharemauku Stream and Kāpiti Road. The dunes through

⁴³ Refer to Technical Report 15, Volume 3.

the northern part of Sector 2 remain largely intact and unmodified due to the long history of its protection for roading purposes. However, the surrounding development has significantly modified the adjacent dune landforms up to the existing WLR designation boundaries. Generally, the surrounding land is at the same elevation as the proposed Expressway alignment, except for the residential areas near Mazengarb Road and off Milne Drive, which are slightly elevated above the alignment.

6.5.1.2 Geology

From Raumati Road to north of Mazengarb Road, peat is present in isolated depressions between the sand dunes. Near the Wharemauku Stream, the peat deposits are interbedded with alluvial deposits to a depth of 6m.

The near surface geology from Raumati Road to Mazengarb Road consists of recent dune sand (Himatangi Group), with inter-dunal deposits (peat) between the sand dunes. The dunes comprise fine to medium sand that is of loose to medium density, with occasional thin beds of silt and clay. The sand is fresh to slightly weathered, and is dry at the ground surface.

The inter-dunal deposits between Raumati Road and Kāpiti Road comprise organic silty clay and amorphous and fibrous peat with minor components of woody peat. In places, the peat is inter-layered with dune sand. These organic soils are generally soft with high water content. These soils are generally 0.5m to 2m thick, and occasionally can range up to 3m to 4m thick.

The inter-dunal deposits along the Kāpiti Road to Mazengarb Road section comprise organic silt and soft peaty sand, with minor components of amorphous peat. These organic soils are generally soft with high water content. The soils are up to 3 metres thick and are underlain by sand of the Himatangi Group.

6.5.1.3 Hydrology

The waterbodies which are proposed to be crossed by the Expressway alignment within Sector 2 from south to north include:

- Wharemauku Stream; and
- Mazengarb Stream.

6.5.1.4 Ecology

Within this Sector, there are four wetland areas and three streams or smaller tributaries with known ecological values. These wetlands primarily consist of low-lying wet dune depressions with low botanical values (dominated by exotic wet pasture species). Ecological values are considered low and are primarily valued for their provision of a seasonal habitat for a range of waterbirds.

The wetlands of identified ecological significance in this Sector include Andrew's Pond, located off Milne Drive, and Crown Hill Manuka Bush, located off Sovereign Drive.

The Wharemauku Stream and the associated 'Drain 7' provide known habitat for a number of threatened species (including Giant kokopu and Longfin eel) and at-risk species. The Wharemauku Stream is listed in the Wellington Regional Policy Statement as having regionally important ecological values and is the subject of a community restoration plan⁴⁴.

The Mazengarb Drain/Stream to the north of Mazengarb Road is also known to provide habitat for a number of native freshwater fish species, some of which are likely to be threatened.

An ephemeral wet area is located to the south of the Wharemauku stream, adjacent to the residential properties as shown in Photo 6.3.



Photo 6.3: Ephemeral wet area to the south of the Wharemauku Stream

6.5.2 Built and Human Environment

6.5.2.1 Land Use and Built Form

As shown in Figure 6.12, the predominant land use within Sector 2 is predominantly urban residential, with some commercial and industrial uses on Kāpiti Road, and rural residential development to the north of Mazengarb Road.

⁴⁴ The Wharemauku Stream Community Freshwater Plan (2005) is the outcome of a process involving Kāpiti Coast District Council, Greater Wellington (the Regional Council), the Department of Conservation, Te Ati Awa ki Whakarongotai, Forest & Bird, local consultancy Aurecon, and the community at large.

The communities of Raumati Beach, Paraparaumu Central and Otaihanga are immediately adjacent to the Project route in this Sector, while the Paraparaumu Beach North and Paraparaumu Beach South communities are located in the wider surrounding area. Most of the proposed Expressway alignment in this Sector has been protected by various roading mid line proclamations or designations since the mid-1950s, with urban development occurring to the west and east.

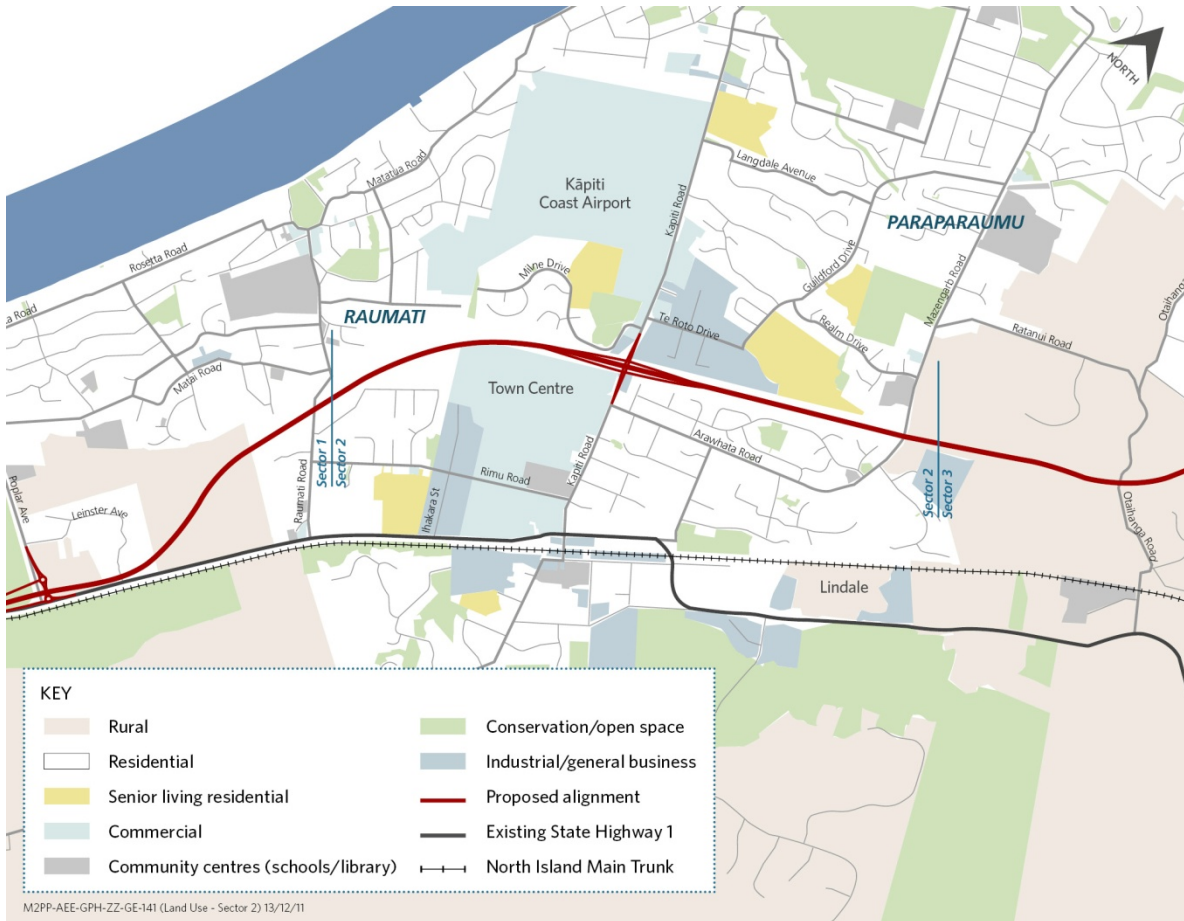


Figure 6.12: Land Use within Sector 2



Photo 6.4: Sector 2 (Facing South)

Raumati Road to Wharemauku Stream

At the southern end of this Sector, Raumati Road connects the beachside community of Raumati Beach with the existing SH1. Raumati Road services an established residential neighbourhood, with at its western end a small shopping centre, Kāpiti College and Raumati Beach Primary School.

The area north of Raumati Road to Wharemauku Stream consists predominantly of medium density residential areas. The open space is largely located within the existing WLR designation, part of which (north of Raumati Road) is leased by the NZTA, under delegated authority from the Crown, for use as a pony club.

Wharemauku Stream to Kāpiti Road

Between the Wharemauku Stream and Kāpiti Road is a large expanse of open undeveloped land, partly contained within the existing WLR designation and partly within an area long identified for the expansion of the Paraparaumu town centre. Alongside the Wharemauku Stream is an existing wetland, as well as the Wharemauku Trail, a walkway popular with pedestrians and cyclists. This Sector also contains a system of unmodified dunes that generally range between 10 and 20m amsl in elevation. The Midlands subdivision, located between the Kāpiti Coast Airport and the existing WLR designation, is the most recent area of residential housing development. The more established residential area of Kiwi Road occupies lower lying land to the south of the Wharemauku Stream.

The Paraparaumu town centre is located to the east of the proposed Expressway, between Rimu Road and the existing SH1, and is the principal commercial business centre for the Kāpiti Coast, containing a

range of civic, retail, service, and office activities. There is a large area of commercial vacant land to the west of Rimu Road which is currently zoned for future “Town Centre” development.

Further to the west of the proposed Expressway is the Kāpiti Coast Airport, a long established centre for light aircraft activity, which is planned to grow substantially as a regional commercial base.

Along Kāpiti Road is a significant area of business activity west of the proposed Expressway, comprising a mix of light industry, general business and large format retail activities. Kāpiti Road has high traffic volumes and is one of the key local arterial roads (along with Te Moana Road) within the Project area.

Kāpiti Road to Mazengarb Road

Between Kāpiti Road and Mazengarb Road, urban development has built up to the edges of the existing WLR designation. To the west of the existing WLR designation is an established area of industrial development in the Te Roto Drive/Kāpiti Road vicinity, with retirement housing and medium density residential development located further north. To the east of the existing WLR designation is an established area of residential development. To the north of Mazengarb Road is largely rural-residential land use.

6.5.2.2 Community Facilities

As Kāpiti Coast’s principal commercial centre, there is a particularly large and varied range of social services provided within Paraparaumu⁴⁵.

The Coastlands and Kāpiti Road vicinities contain a number of medical facilities, including the Paraparaumu Medical Centre and the Kāpiti Health Centre. The Paraparaumu Police Station is located on the corner of Rimu Road and Kāpiti Road, while the local fire station is on Te Roto Drive. There is a small ambulance base at the Paraparaumu Medical Centre.

6.5.2.3 Noise

Apart from areas immediately adjacent to the local main roads (Kāpiti, Mazengarb and Raumati Roads), the ambient noise environment is considered to be low for a suburban area. As part of investigations undertaken for this Project, noise levels were measured at 19 locations, including two long duration surveys⁴⁶. Noise levels varied from 42 to 55 dB L_{Aeq(24h)}.

6.5.2.4 Services

Kāpiti Road includes a number of major urban services, including water supply, electricity and gas reticulation. There is a critical watermain (300-600 mm diameter) in Kāpiti Road that crosses beneath the proposed Expressway alignment.

⁴⁵ A detailed overview of the social environment is provided within Technical Report 20, Volume 3.

⁴⁶ Refer to Technical Report 15, Volume 3

6.5.2.5 Local Road Network

Paraparaumu is centred on the existing SH1, with a number of important local roads intersecting with the highway. The main intersections are at Ihakara Street, Coastlands Parade, and Kāpiti Road, the latter controlled by traffic signals. Unsignalised intersections are at Kāpiti Lights, Amohia Street, Hinemoa Street, Buckley Grove, Rimutaka Street and Ruahine Street. The principal connection for the community of Paraparaumu to the east of the existing SH1 is Ruapehu Street. A large number of properties also have direct access to and from the existing SH1. Arawhata Road, which connects to Kāpiti Road, is an important link to Paraparaumu Beach North and Otaihanga.

Paraparaumu Beach is accessed via Kāpiti Road. The loop comprising Kāpiti Road, Manly Street, Ngapotiki Street, Te Kupe Road, Mazengarb Road and Arawhata Road provides an alternative link between the beach community and the Paraparaumu town centre. This loop is identified as a Secondary Arterial in the District Plan. A grid of interconnected streets provides numerous connections between Kāpiti Road and Mazengarb Road.

6.5.2.6 Walkways and Cycleways

There is a network of widely used formal and informal walkways and cycleways in Paraparaumu. The Wharemauku Trail follows the Wharemauku Stream, providing a popular pedestrian and cycle route between Raumati Village and Rimu Road in Paraparaumu. There is evidence of informal walking tracks across the existing WLR designation between Kāpiti Road and Mazengarb Road. Other walkways include the 22 kilometre section of Te Araroa walkway between Paekakariki and the Waikanae River Bridge.

6.6 Sector 3 – Otaihanga/Waikanae

The Project area within Sector 3 is located from just north of Mazengarb Road (chainage 8300m) to north of Te Moana Road (chainage 12,400m).

6.6.1 Natural Environment

6.6.1.1 Topography and Landscape

The topography of Sector 3 includes moderately high rolling duneland south of the Waikanae River, with lower lying flood plains along either side of the River which become progressively wider toward the estuary. North of the Waikanae River are a series of moderate to high meandering rolling dunes interspersed with low-lying interdunal hollows and wetlands. A narrow alluvial floodplain contains the Waimeha Stream, which was once a northern outlet of the Waikanae River.

6.6.1.2 Geology

In the interdunal hollows in this Sector are small areas of permanent and ephemeral wetlands and water bodies. Peat deposits across this Sector are expected to be relatively shallow.

In the centre of this Sector, the Waikanae River flows east-west, with associated low-lying alluvial terraces on either side. Underlying alluvium typically becomes very dense at depths of around 10m below ground.

6.6.1.3 Hydrology

The waterways crossing the proposed Expressway alignment within Sector 3 include (from south to north):

- Unnamed drain from Wastewater Treatment Plant
- Unnamed drain from former Landfill
- Muaupoko Stream, at its confluence with the Waikanae River
- Waikanae River, and
- Waimeha Stream.

Both the Waikanae River and the Waimeha Stream are listed in the Regional Policy Statement as regionally important waterbodies.

6.6.1.4 Ecology

This Sector has the greatest concentration of ecologically significant sites on the route. These sites include a number of wetlands of high value, the Waikanae River and its associated values, and other smaller streams (including the Waimeha Stream, just north of Te Moana Road); the smaller streams are key connectors between wetland remnants. Wetlands of identified ecological value are:

- The *El Rancho wetlands* situated within the El Rancho Holiday Camp north of the Waikanae River. These wetlands are made up of three to four distinct areas of manuka dominated wetland vegetation with areas of open water. Although highly modified from their original extent, the El Rancho wetland complex is home to a number of rare or threatened plant species. These wetlands are also likely to provide habitat for native bird, freshwater fish and lizard species.
- The two *Osborne's Swamp* wetlands located just to the south of Te Moana Road. While similar to the El Rancho wetlands, the Osborne's swamp complex is considered to be more modified and thus less representative of its original extent. However, the wetlands are suspected to contain rare or threatened plant species and are also likely to provide habitat for native bird, freshwater fish and lizard species.
- The *Otaihanga Landfill wetlands* and bush remnant, located within the Otaihanga Landfill. Although degraded by invasive weed species and the close proximity of the landfill, these three distinct areas of ecological value support indigenous plant species and are likely to provide habitat for freshwater fish, lizards and avifauna.

Although downstream and outside the Project area, the mouth of the Waikanae River (including the Waikanae estuary) is of recognised national ecological significance. The Waimeha Stream just north of Te Moana Road is a DOC administered Stewardship Reserve.

6.6.2 Built and Human Environment

6.6.2.1 Land Use and Built Form

As shown in Figure 6.13, the overall predominant land use and landscape character within Sector 3 is rural-residential.

However, Sector 3 of the Project area includes or is near the communities of Paraparaumu Central (northern part), Otaihanga, Waikanae Beach and Waikanae Park. The Waikanae West and Waikanae East communities are within the wider surrounding area.

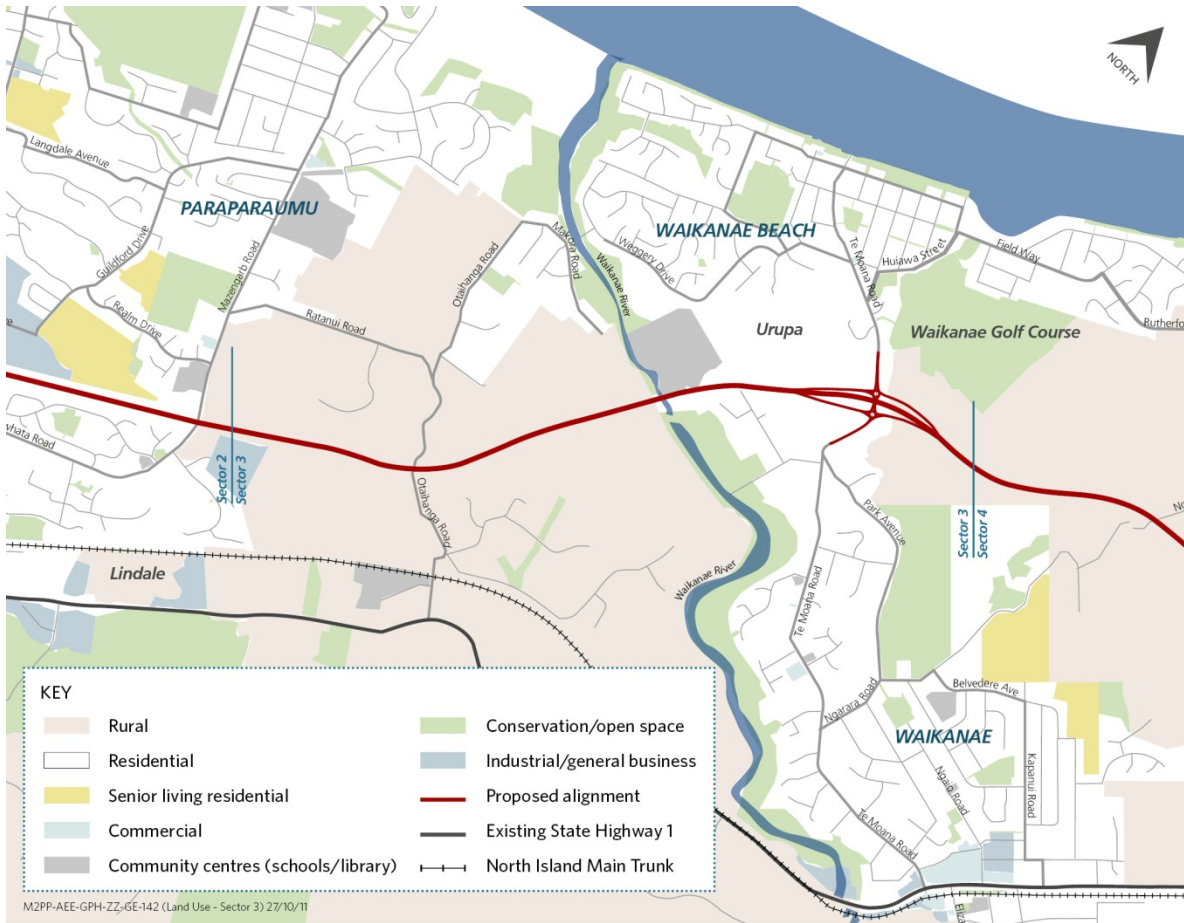


Figure 6.13: Land Use within Sector 3



Photo 6.5: Sector 3 (Facing North)

South of the Waikanae River

Between Mazengarb Road and Otaihanga Road, land uses consist of a mix of farmland, pine plantations, rural residential lots and infrastructure facilities, including the former landfill (now closed) and the Paraparaumu Wastewater Treatment Plant.

The area from Mazengarb Road to the Waikanae River is rural in character, with the Otaihanga residential area located to the west, on the southern banks of the Waikanae River. The rural residential area accessed from Greendale Drive adjoins the existing WLR designation boundary near Otaihanga Road. Small and medium sized rural blocks, with grazed pasture, small wood lots and shelter belts occupy most of the area.

Waikanae River Corridor

The Waikanae River Corridor includes the River, its margins and the floodway. The corridor provides an important lineal area of open space linking the coast and the foothills of the Tararua Ranges. The Waikanae River Corridor is identified as an outstanding natural landscape in the KCDC District Plan. The corridor contains a walkway, cycleway and bridleway on either side of the River, which is used both for commuting locally (primarily school students) and for recreation. There are two pedestrian/cycle bridges across the Waikanae River: one at Otaihanga Domain, and another near Jim Cooke Park. The vegetation of the river corridor is dominated by willow and poplar trees planted for flood and erosion control, although long continuous stretches of the bank have been planted with well-established native species.

North of the Waikanae River

To the north of the Waikanae River, in the immediate vicinity of the Project, is a mixture of open space and large residential lots with a semi-urban character. There are also a number of rural residential properties and small rural holdings and horticultural activities. Further east of the Project area is a well-established residential area along Te Moana Road, with a small residential enclave on Puriri, Kauri, and Greenaway Roads. Greenaway Homestead, the original farmstead in the area, is located on the corner of Puriri and Kauri Roads.

To the immediate west of the Project area, on the northern bank of the Waikanae River is the El Rancho Christian Holiday Camp, which has its principal vehicle access off Kauri Road. North of the camp is an area of undeveloped wetland and duneland, located within land long protected from development by the historic mid line Proclamation and subsequent designations, including the existing WLR designation. The Takamore urupā is located on a dune immediately west of the Project area. West of the wetlands is the Waikanae Beach residential area.

Te Moana Road links Waikanae Beach with the urban area of Waikanae, which has developed on both sides of State Highway 1 and the NIMT railway. Waikanae Town Centre is about 3km to the west of the Project area, and contains a mix of small retail and commercial activities. A small area of large format activities, general business and light industry is located to the north of the town centre.

6.6.2.2 Community Facilities

The Waikanae town centre is located between existing SH1, Marae Lane and Mahara Place. The centre contains a range of shops, businesses and services, as well as gardens and a small children's playground. The local police station, information centre and library services are also located there. Specialist medical services are provided nearby at the Waikanae Health Centre in Marae Lane. Other shops and services run in parallel to the west of existing SH1.

Waikanae is divided by the existing SH1 and the NIMT railway; the area east of the NIMT and the existing SH1 contains the War Memorial Hall and several businesses and services.

While there are no secondary schools within Waikanae, there are a number of other educational facilities.

6.6.2.3 Archaeology and Culture

Recorded archaeological sites within or near to the proposed Expressway in this Sector include middens, pits and terraces. This part of the Project area is of high cultural and archaeological significance to iwi, particularly that part between the Waikanae River and Te Moana Road which is referred to as the Takamore cultural heritage precinct⁴⁷ which has a long history of settlement. In this area are several

⁴⁷ Refer to Technical Report 11, Volume 3

recorded sites, including urupā, a village, middens and ovens, terraces and pits. The presence of unmodified dunes increases the likelihood of as yet unknown archaeological sites⁴⁸.

6.6.2.4 Noise

The character of Sector 3 is generally rural or rural-residential, with occasional dwellings located adjacent to the proposed Expressway alignment. Areas of denser residential activity include the Kauri Road area and Te Moana Road. Ambient noise levels were relatively low for most of the survey locations in this Sector. Noise levels were measured at nine locations, including three long duration noise level surveys⁴⁹. Noise levels varied from 42 to 53 dB $L_{Aeq(24h)}$.

6.6.2.5 Services

The principal network utility within this Sector is the Vector Gas transmission pipeline, which transports gas from Kāpuni to Wellington. The pipeline corridor crosses the proposed Expressway alignment several times in a 1.6km stretch immediately north of the Waikanae River. There are two pipelines in the corridor, being 200 and 300mm in diameter, assumed to be buried 1200mm below the surface.

On the gas pipeline in this Sector is a Delivery Point Station located adjacent to the El Rancho Holiday Camp, by the Waikanae River. This facility comprises filtration, pressure reduction and metering equipment. The station is situated underground in a 20m by 15m compound enclosed by security fencing.

6.6.2.6 Local Road Network

South of the Waikanae River, the main local road is Otaihanga Road, which provides access to State Highway 1 for residents of Otaihanga and (via Mazengarb and Ratanui Roads) Paraparaumu North. Both Otaihanga Road and Ratanui Road are classified as Secondary Arterials in the District Plan. There is currently no legal road connection between Otaihanga and Paraparaumu Beach.

Waikanae, like Paraparaumu, is centred on the existing SH1 and is served by a number of local road connections. Many properties also have direct access onto the existing SH1. The location of the railway line parallel to the highway limits roading access to the eastern part of Waikanae to a single crossing point at Elizabeth Street, which has a signalised intersection with the existing SH1. The other main intersection with the existing SH1 in this Sector is Te Moana Road which has traffic signals.

Te Moana Road provides the main local road access between Waikanae and Waikanae Beach; however, a secondary route to the existing SH1 is available from Waikanae Beach via Rauparaha Street/Huiawa Street/Field Way/William Street/Rutherford Drive/Paetawa Road. This link to Peka Peka is classified as a Secondary Arterial in the District Plan.

There are no direct local road connections between Waikanae Beach and Paraparaumu Beach or Otaihanga; all local traffic has to use State Highway 1 via Te Moana Road. Consequently, there are

⁴⁸ Refer to Technical Report 9, Volume 3

⁴⁹ Refer to Technical Report 15, Volume 3

significant levels of vehicular traffic movement on the existing SH1 between the communities of Waikanae and Paraparaumu because of the relative location of schools, services and retail facilities.

6.7 Sector 4 – Waikanae North

The Project area within Sector 4 is located north of Te Moana Road (chainage 12,400) to Peka Peka (at approximate chainage 18,050m).

6.7.1 Natural Environment

6.7.1.1 Topography and Landscape

The topography of Sector 4 is undulating with small to moderate scale dunelands which reduce to gently rolling and almost flat farmland in the north.

An area of intact complex dunelands is located between Te Moana Road and Smithfield Road, with dune sequences up to 30m amsl or 20m higher than the surrounding ground in places.

6.7.1.2 Geology

The geology of the Sector generally comprises dune sands, with some peat in low lying areas, underlain by marine/beach/estuarine deposits. A large area of peat is located to the north of Smithfield Road, which is expected to be in the order of two to three metres thick.

A splinter fault of the Ohariu Fault known as the Hatfield Fault has been identified at the northern extent of the Project area. This fault complex, including the associated level of uncertainty regarding its exact location, is indicated on the KCDC Fault Hazard Maps.

6.7.1.3 Hydrology

The waterways crossing the proposed Expressway alignment within Sector 4 from south to north include:

- Ngarara Creek
- Kakariki Stream (located at Nga Manu Wildlife Reserve)
- Smithfield Drain
- Paetawa Drain; and
- Hadfield/Te Kowhai Drain

6.7.1.4 Ecology

The Nga Manu Nature Reserve is located just north of the Waikanae Township. This area of 14 hectares was established as a reserve in 1974 and encompasses the largest single remaining remnant of coastal lowland swamp forest on the Kāpiti Coast.

Sector 4 contains the following wetlands and water bodies (it should be noted that the proposed Expressway alignment itself avoids all of the wetlands listed below):

- The Kawakahia wetland, being part of the 120ha Te Harakeke wetland complex, is located north of the Waikanae golf course and is the largest single remaining area of freshwater wetland complex on private land in the lower North Island. The majority of this wetland has been formally protected by a Queen Elizabeth II covenant and it has been recognised by both GWRC as of particular significance under the Key Native Ecosystems Programme and by DOC as a Wetland of Ecological and Representative Importance (ranking of 3) and as a moderate-high site of Special Wildlife Importance. The wetland contains a highly diverse mix of vegetation types including one of the few remaining examples of lowland podocarp forest on sandplains in the region. Te Harakeke wetland also provides habitat to a number of threatened bird species and given its large size (120ha) provides an important role in bird movement in the wider landscape.
- Unnamed regenerating wetland located to the east of Te Harakeke wetland. Although largely modified from its former extent, this wetland consists of large areas of regenerating vegetation and is likely to provide habitat for threatened bird species. The wetland is formally protected via a Queen Elizabeth II covenant.
- Unnamed regenerating wetland located east of Ngarara Road. This wetland is known to contain rare plants and provides potential habitat to threatened bird species.
- The Ngarara Stream and its associated waterbodies are known to contain threatened native freshwater fish species (including giant kokopu and long-finned eel). The Ngarara Stream provides important hydrological and habitat connections between the Nga Manu Nature Reserve and Te Harakeke wetland.

6.7.2 Built and Human Environment

6.7.2.1 Land Use and Built Form

Sector 4 has an open rural character for all of its length as illustrated in Figure 6.14 and Photo 6.6. The area is generally a mix of farmland and rural lifestyle blocks, and accordingly dwellings are scattered throughout the Sector, with a small residential hamlet at the intersection of Peka Peka Road and the existing SH1.

The local communities within the wider Project area in Sector 4 include the residential area at Waikanae Park, part of Waikanae West and the beachside settlements at Waikanae Beach and Peka Peka.

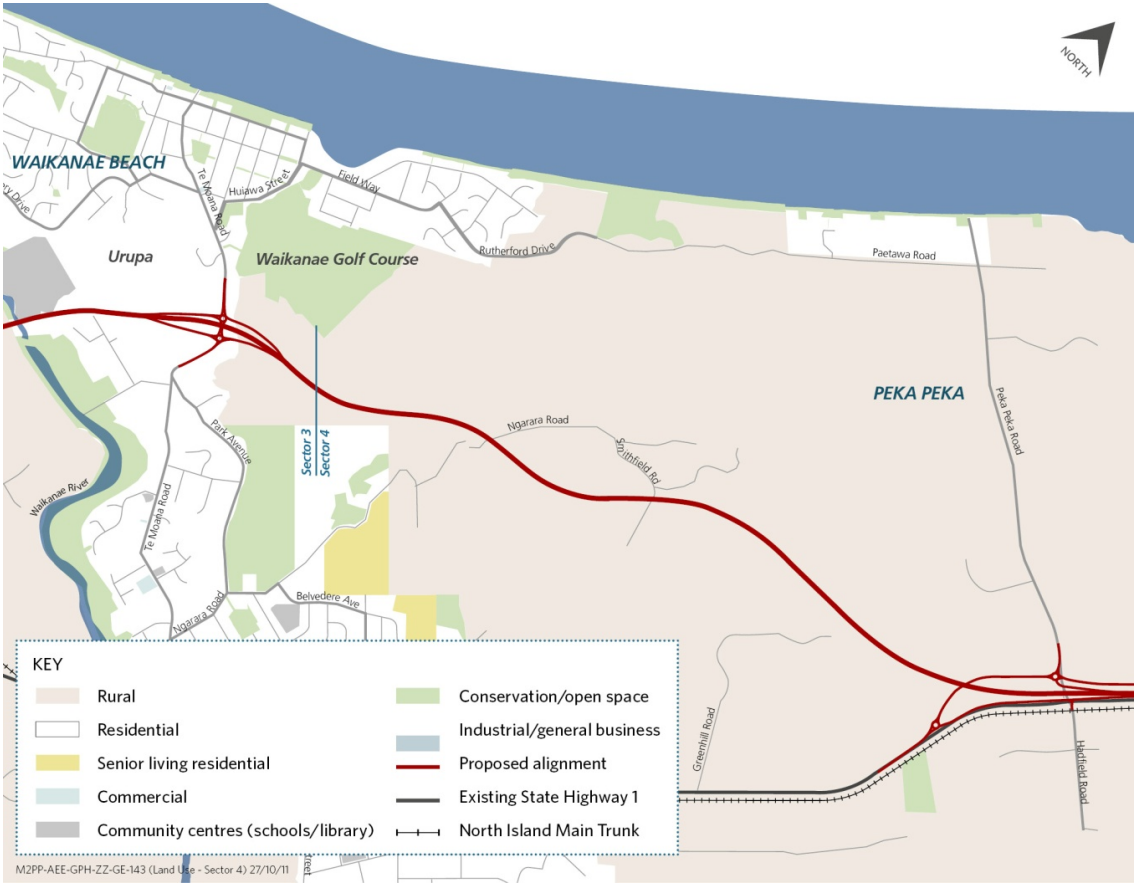


Figure 6.14: Land Use within Sector 4



Photo 6.6: Sector 4 (Facing South)

Te Moana Road to Smithfield Road

Land use between Te Moana Road and Smithfield Road is primarily pastoral farmland with some smaller rural residential and lifestyle blocks, and the partly occupied Ferndale residential subdivision off Ngarara Road.

Smithfield Road to Peka Peka

From Smithfield Road northward, the area consists of open rural land with small rural land holdings. Dwellings are located on the higher ground amongst the dunes and on the slopes of the foothills, with the lower damper ground being used as grazing land. A Garden Centre is located on Peka Peka Road near the existing SH1. There are rural lifestyle enclaves at Greenhill Road, Hadfield Road, Kensington Drive and Ngarara/End Farm Road.

In the north of the Sector, the existing SH1 and the NIMT, run along the toe of the Tararua foothills. The Tararua foothills are dominant element of the local landscape, providing a significant physical and visual backdrop to the east. The existing SH1 and the NIMT are located at the base of a small but distinctive coastal escarpment north of Hadfield Road.

Urban Growth Strategy

The Kāpiti Coast District Plan was recently changed (through Plan Changes 69, 79 and 80) to provide land area for future urban expansion in Waikanae North, within a new “urban fence” imposed from between the existing SH1 just south of Greenhill Road to the beach. The Waikanae North area is currently used for a mix of rural and rural lifestyle activities but has been rezoned to allow a range of residential densities and some limited commercial and community uses in the future. Plan Change 79, which introduced the urban fence, also provided for the development of small clusters of housing (eco-hamlets) north of the urban limit. Plan Change 69 rezoned an area of land adjoining the existing SH1 to a range of medium to high density housing (referred to as the Waikanae North development). Plan Change 80 resulted in the rezoning of land north of Te Moana Road to the urban fence (referred to as Ngarara), providing for a range of different residential neighbourhoods, separated by open space and protected wetlands. A limited amount of commercial development was proposed in the southernmost neighbourhood.

6.7.2.2 Community Facilities

Given the rural nature of Peka Peka, the only retail activity is a garden centre/café located on Peka Peka Road just west of existing SH1. There are no social services, educational facilities or recreational facilities.

6.7.2.3 Archaeology and Maori History

Recorded archaeological sites within or near to the proposed Expressway alignment in this Sector include middens, pits and terraces. The wetland areas of Te Harakeke and Kawakahia are of cultural importance to local iwi (Te Ati Awa ki Whakarongotai and Ngati Raukawa).

6.7.2.4 Noise

As part of investigations for this Project, noise levels have been measured at seven locations through Sector 4, including one long duration survey⁵⁰. Noise levels varied from 44 to 55 dB $L_{Aeq(24h)}$. Overall, ambient noise levels along the proposed Expressway alignment are relatively low due to the absence of major local roads or industry in this area.

6.7.2.5 Services

The Transpower 220kV transmission lines, from Bunnythorpe to the Haywards power station, cross the Project area north of Waikanae. There are a number of transmission towers in close proximity to the proposed Expressway alignment, between Ngarara Road and Peka Peka Road.

Two of these towers are situated just north of Smithfield Road, within the proposed Designation, at approximate chainage 13,950m.

6.7.2.6 Local Road Network

Peka Peka is accessed off the existing SH1 via Peka Peka Road. As mentioned above, it is also linked to Waikanae Beach via a road running parallel to the coastline. Hadfield Road provides access to a small residential community on the hillside to the east.

There are few roads in this area currently, with Ngarara Road being the main route from Te Moana Road servicing the Waikanae North area. As discussed above, Waikanae North is the area where future urban growth is proposed, which includes provisions for the development of a series of local arterial roads to provide further north-south and east-west links. While some of these potential links would need to be reconfigured as a result of the proposed Expressway, there are a number of potential opportunities for east-west connections over the Expressway in this sector.

6.7.2.7 Walkways and Cycleways

The coastal route is widely used for recreational cyclists, and alongside as a walkway and bridleway. The proposed urban development for this area includes a network of walking and cycleways. As with future roading, the proposed Expressway will require a reconfiguration of possible walkways and cycleways in the area.

⁵⁰ Refer to Technical Report 15, Volume 3