

## 3 Corridor context

This chapter provides a summary of the main features of the highway corridor and highlights the key issues influencing the design of the Project.

### 3.1 Landform

Wellington's landscapes are characterised by a regional pattern of parallel hill ranges oriented on a NE-SW alignment, separated by the region's main faults. The main ranges of hills are tilted so that they typically have steeper escarpments on their south-eastern flanks and more gradually dipping slopes on their north-western flanks. There is a secondary pattern of splinter faults and folding on a north-south axis within the ranges of hills, which results in a finer scale pattern of north-south valleys and basins such as those occupied by Porirua Harbour, Pautahanui Inlet and Wellington Harbour.

The proposed alignment of the Transmission Gully Project responds to this geomorphic pattern. Travelling from the north the existing State Highway 1 (SH1) follows an NE-SW alignment along the edge of the coastal plain at the toe of the Ohariu Fault escarpment to the vicinity of MacKays Crossing, from where the proposed new highway will be parallel to the Ohariu Fault up the Te Puka Stream valley and over the Wainui Saddle. From the Wainui Saddle the route then follows a splinter fault on a north-south alignment as far as the James Cook Interchange. The Horokiri Stream and the upper sections of Ration Stream follow the splinter fault. From the James Cook interchange the proposed alignment follows the Moonshine Fault along the Duck Creek valley on a NE-SW alignment to the vicinity of the Takapu Substation, before swinging to the north-west across the grain of the landscape around the southern perimeter of the Porirua Basin. The route rejoins SH1 at Linden where it picks up the Ngauranga Fault, another splinter fault on the north-south alignment.

Figure 3.1 illustrates the topography in the Project area.

Figure 3.2 illustrates the landform in the Project area.

#### Geotechnical issues influencing the design

The presence of fault lines and secondary splinter faults along and across the alignment and variations in substrate limit the potential engineering solutions. The Project balances the development of appropriate engineering solutions, including the need to provide route security (a primary objective of the Project), with potential bio-physical, visual and experiential impacts.

It is desirable to achieve a corridor-wide balance between the amounts of cut and fill resulting from construction earthworks. The Project develops earthworks solutions that minimise earthworks quantities. Where surplus fill needs to be disposed of, sites have been selected that will have the least impact on landscape character and ecology.

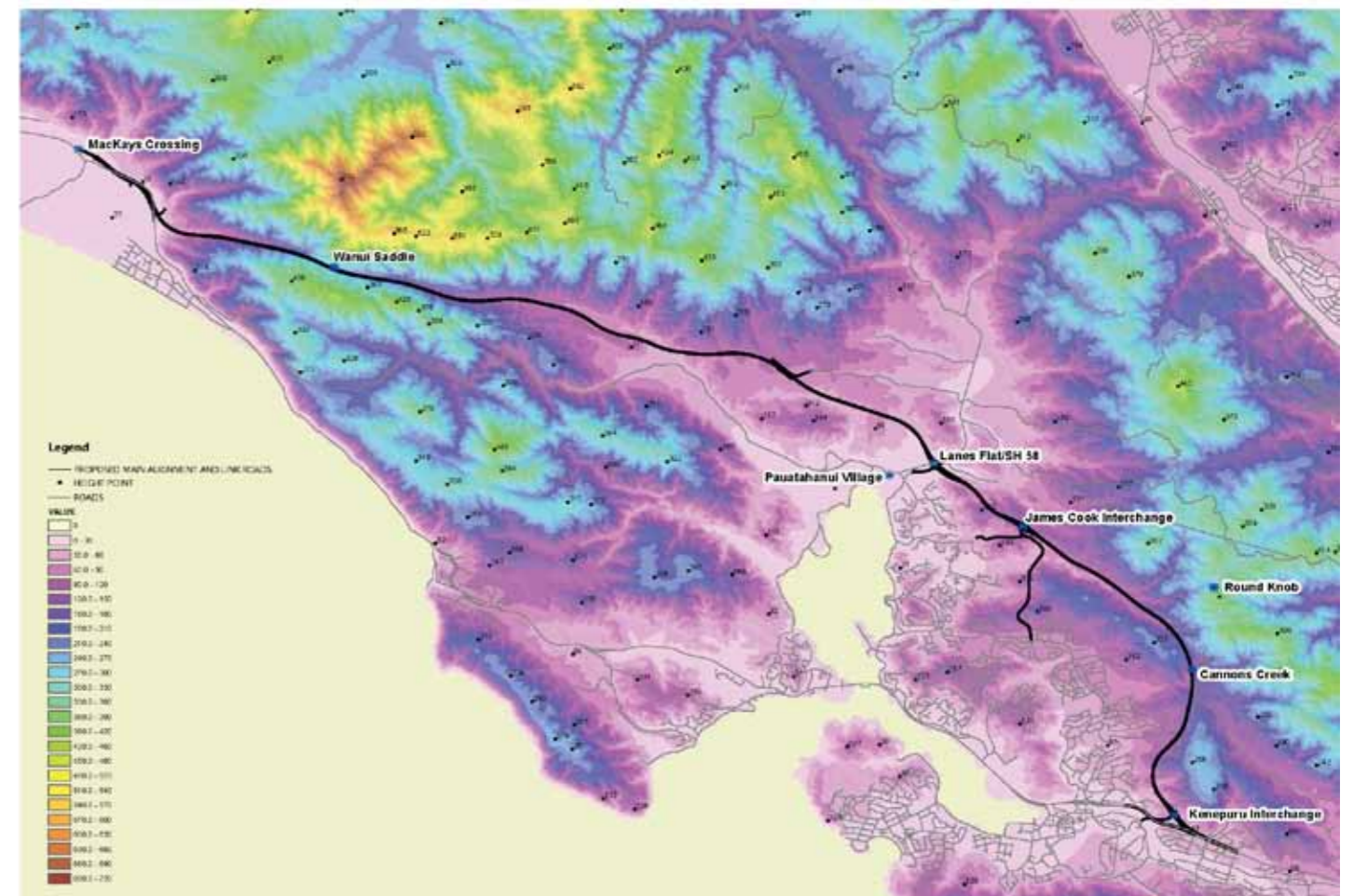


Figure 3.1: Topography



Figure 3.2: Landform

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## 3.2 Hydrology

Stream patterns in the area respond to the tectonic patterns. The main streams in the area traversed by the proposed alignment –Te Puka Stream, Horokiri Stream and Duck Creek- follow faults and splinter faults and consequently have relatively straight valleys on either NE-SW or north-south alignments. The tributary streams, on the other hand, tend to follow more meandering courses with inter-leaved spurs. Those tributary streams on the fault escarpments, such as the western tributaries of Te Puka Stream, Horokiri Stream and Duck Creek, are shorter and steeper while the tributaries on the more gently sloping dip-slopes are longer and have larger catchments.

Two thirds of the proposed Transmission Gully Project route traverses catchments that converge on Pauatahanui Inlet, including the catchments of Horokiri Stream, Ration Stream, Pauatahanui Stream and Duck Creek, and the Onepoto Arm of the Porirua Harbour. Most of the rest of the route drains into the southern arm of Porirua Harbour by way of tributaries of Kenepuru Stream. Only the northernmost 5km encompassing Te Puka Stream catchment does not drain toward Porirua Harbour, instead flowing across the narrow coastal plain through Queen Elizabeth Park to a stream mouth north of Paekakariki.

Figure 3.3 illustrates the main streams and catchment areas.

### Hydrological issues influencing the design

The Project follows Te Puka and Horokiri streams and requires re-alignment of several stream segments. The narrow nature of the Horokiri and Te Puka stream valleys either side of Wainui Saddle means that the alignment overlies the streams in several locations and requires the re-alignment of several segments of the streams.

Through Battle Hill Farm Forest Park and the SH58 area the terrain is flat enough for the consideration of grassed swales and wetlands to be used for the collection, conveyance and treatment of highway stormwater runoff.

Lanes Flat is part of the estuary flood plain and requires careful consideration.

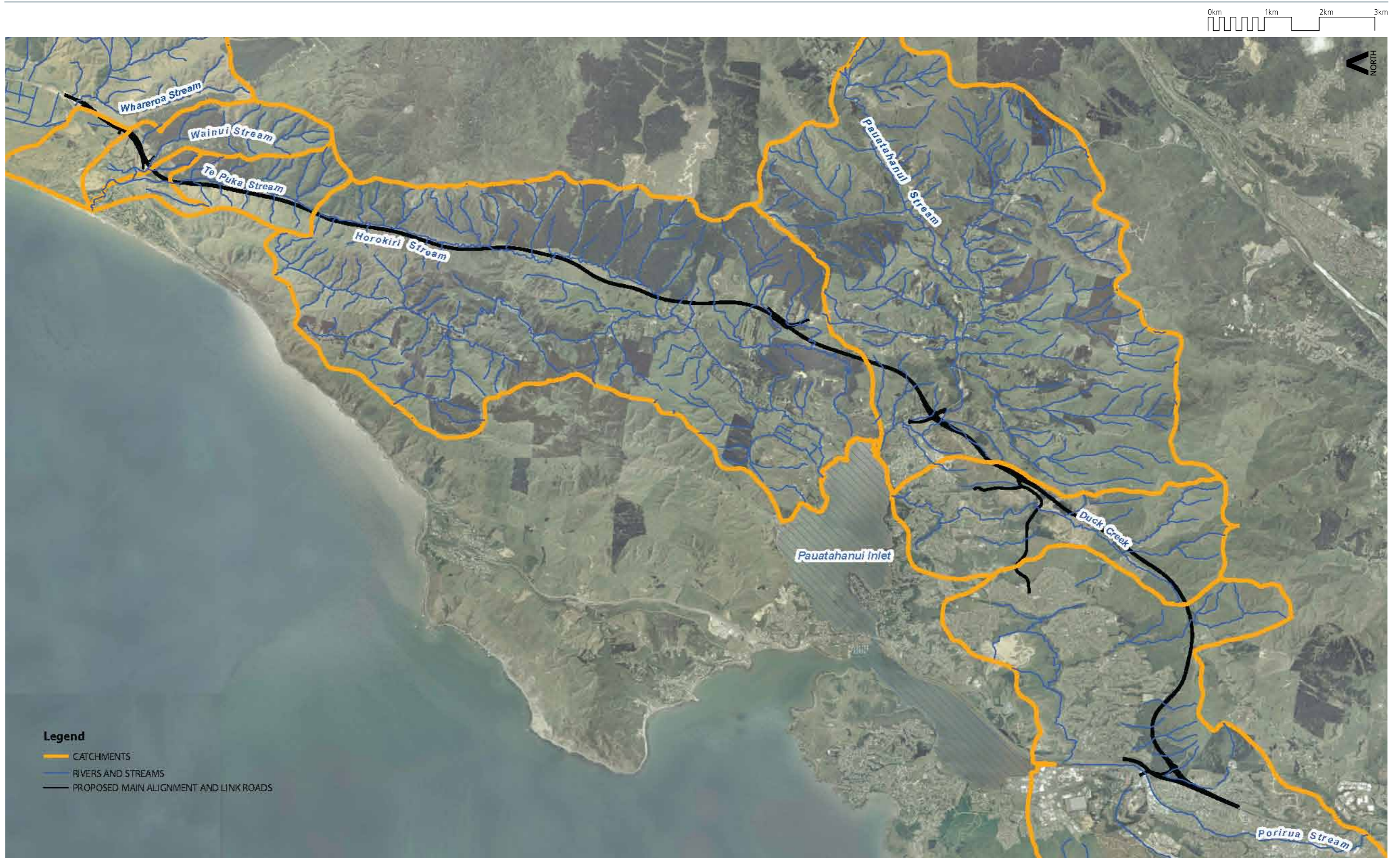


Figure 3.3: Hydrology

### 3.3 Existing vegetation and land use patterns

The area traversed by the route has mostly been cleared and converted to exotic vegetation including pasture and pine plantation. There are occasional remnant pockets of indigenous vegetation, mainly in the upper reaches of Te Puka Stream valley, areas of regenerating forest such as Cannons Creek, and areas of regenerating former pasture characterised by gorse, tauhinu and mahoe. The area surrounding the proposed Transmission Gully Project alignment is characterised by the following land use patterns:

- **Extensive pastoralism:** Areas of extensive grazing land are located on the steeper hill country in Te Puka Stream and Horokiri Stream area and the Duck Creek Catchment south of SH58. It also includes the lower lying valley occupied by Battle Hill Regional Park;
- **Indigenous Bush:** There are remnant patches of indigenous bush, including areas in Te Puka Stream and Duck Creek tributaries. There are areas of regenerating second growth bush, notably in the Cannons Creek catchment. There are also extensive areas of former pasture that are reverting to natural vegetation largely characterised by gorse, tauhinu and other small leafed species such as twiggy coprosma, manuka and kanuka. The other notable indigenous vegetation is the wetland area (wildlife refuge) at the head of Pauatahanui Inlet adjacent to Pauatahanui village;
- **Exotic Plantation:** There are extensive areas of commercial pine plantation on the hills east of Horokiri Stream (Akatarawa Forest), and smaller areas scattered through the remainder of the route;
- **Rural lifestyle:** This is located in the middle part of the route accessed mainly from Flightys Road, Paekakariki Hill Road, and Bradey Road. The area has a more gently rolling topography and is characterised by a closer settlement pattern; a patchwork pattern of boundary shelter planting and differing land management; a wide variety of vegetation including exotic shelter trees, small plantations, amenity trees, and areas of native re-vegetation;

- **Rural Village:** Pauatahanui located adjacent to the alignment at SH58 is a small rural village at the head of Pauatahanui Inlet. It has a linear form, strung out along SH58 and the Paekakariki Hill Road. There are a number of historic buildings and sites. (Further discussion on the history of the settlement is included in Chapter 3.5);
- **Urban Periphery:** The area between Linden and the Cannons Creek bridge comprises rural fringe land. The hills form the backdrop to the Porirua East urban area, and comprise a mosaic of former pasture that has reverted to gorse and mahoe shrubland; rough pasture on the ridgelines; small pine plantations; areas of remnant or regenerating indigenous forest; and peri-urban activities;
- **Urban Areas:** Only the southern most connections to the existing SH1, and the connecting link roads, traverse urban areas; and
- **Peri-urban Activities:** The area is also characterised by activities typically found on the outskirts of urban areas, including the Pauatahanui Golf Course, the two regional parks (Battle Hill and Belmont), the Porirua Gun Club, and a regional electricity substation at Takapu Road (as well as the smaller substation at Pauatahanui).

Figure 3.4 illustrates the existing vegetation and land use patterns.

#### Land use issues influencing the design

The route passes through existing rural and rural-residential areas potentially severing existing land use and impacting on amenity values. The Project seeks to minimise the overall footprint of the route; maintain and/or reinstate existing adjacent land cover and land use opportunities; and develop design responses that address amenity effects on adjacent properties.

The main alignment and link roads either skirt or run near to existing and planned urban areas. The road components (earthworks, structures, interchanges, noise barriers, etc) have the potential to negatively impact on the amenity of these areas. The design seeks to minimise the visual, noise and air quality effects of the road on the surrounding communities, and to maintain the usability and amenity of public open spaces, pedestrian, cycle and vehicle links which adjoin or cross the highway corridor.

#### Vegetation/Ecology issues influencing the design

The Project requires some vegetation removal for road construction and operation. This has the potential to change the landscape character and ecology values of parts of the route. The design seeks to minimise the removal of indigenous vegetation through sensitive route alignment and construction methodology, including the careful location of haul roads and construction tracks.

The Project has the potential to impact on the natural environment including: ecologically important vegetation communities; habitat for terrestrial fauna; high value streams; and neighbouring estuarine environments. The Project seeks to support natural processes by:

- Designing planting to improve water quality and habitats along streams
- Designing stormwater flow and treatment devices to minimise impact on water quality
- Restoring connections between areas of native vegetation to increase habitat and biodiversity levels
- Making use of natural regeneration processes

The Project requires stream works including culverting and diversions which may alter some of the existing stream habitat. The Project seeks to minimise the loss of in-stream habitat through sensitive route alignment and to provide for fish passage through appropriate design of culverts and stream diversions.

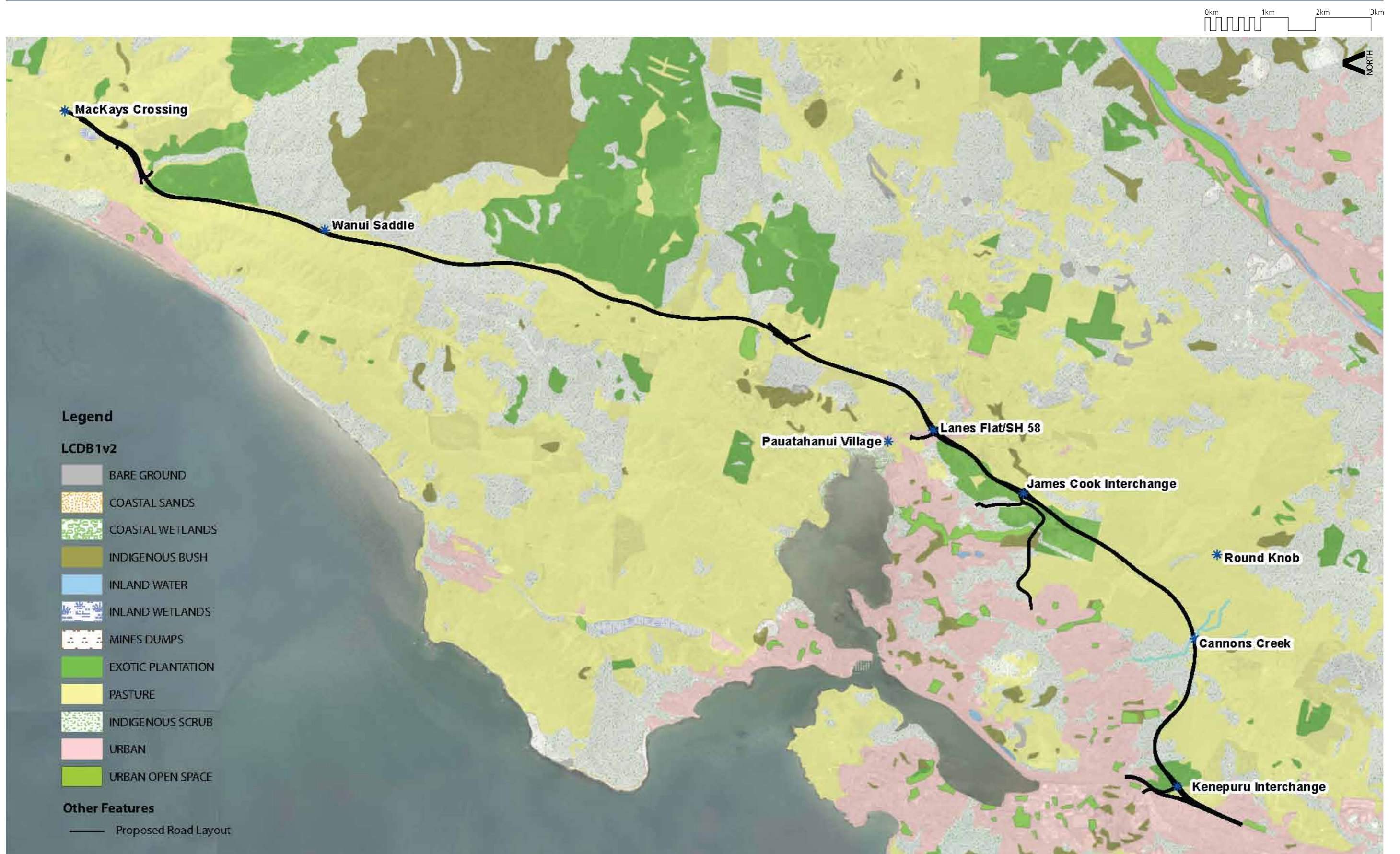


Figure 3.4: Existing vegetation and land use patterns

### 3.4 Landscape character

The route traverses nine landscape character units:

**Unit 1 Kapiti Coastal Plains:** Characterised by the alignment of SH1 along the toe of the fault escarpment and inland dune fields.

**Unit 2 Te Puka and Horokiri Stream Valleys:** Comprising Te Puka Stream, Wainui Saddle and the upper part of Horokiri Stream. The area has a wilderness character typified by the steep narrow valley and 'mountain' stream; steep hill faces; and lack of human settlement. Land use comprises extensive (i.e. low intensity) stock grazing, exotic pine forest, regenerating native forest and fragmented native and exotic scrub.

**Unit 3 Battle Hill Farm Forest Park:** The lower valley of the Horokiri Stream within the Battle Hill Park has a softer rural character. The valley is wider and has more rolling topography and higher quality pasture. The Horokiri Stream follows a more meandering course along its small flood plain which is used for crops such as hay. The land use patterns are expansive, comprising broad scale pasture on the west bank of Horokiri Stream and extensive plantation forest on the steeper backdrop hills on the east bank, but also including areas of native restoration.

**Unit 4 Pauatahanui Rolling Hill Country (Flightys Road Lifestyle Area):** The area between Battle Hill Farm Forest Park and SH58 has a 'lifestyle' landscape character including lifestyle properties and the Pauatahanui Golf Course. It has a more fragmented rolling topography and a complex patchwork of property boundaries; diversity of rural land uses; wider range of trees including a high proportion of exotic trees; and a relatively close settlement pattern. It is a semi-enclosed landscape.

**Unit 5 Pauatahanui Stream Flats:** Formerly the inland extent of the Pauatahanui Inlet, the valley now forms a flood plain for an extensive catchment of the Belmont and Akatarawa hills. Pauatahanui Village is located adjacent to the Pauatahanui Stream bridge downstream from the proposed Transmission Gully Project alignment. Otherwise the valley floor has an open pasture character with some artificial drains. The enclosing hills include a stand of kanuka, the suburban fringes of Whitby, and lifestyle properties.

**Unit 6 Bradey Road Lifestyle Area:** The area between Pauatahanui Valley and the proposed James Cook Interchange has a 'lifestyle' character. As with the Flightys Road area, it is characterised by fragmented rolling topography and a complex patchwork of property boundaries; diversity of rural land uses; wider range of trees; and a relatively close settlement pattern clustered along Bradey Road. The main difference is that the edge of the Whitby suburban area (Silverwood subdivision) is subject to a wide viewing audience extending to the top of the hills on the west overlooking the lifestyle area.

**Unit 7 Duck Creek Valley (Belmont Hill Country):** The valley has a remote character. It is characterised by the strong topographic patterns of the Moonshine Fault escarpment on Duck Creek's west bank and the bold hills of Belmont Regional Park to the west; steep gullies, round spurs and footslopes; simple land use pattern of expansive pastoralism, and the absence of human settlement. As with Te Puka Stream / Upper Horokiri Stream, the area has a relatively wild and dramatic natural character. The most prominent structures are transmission lines converging on the Takapu Road substation.

**Unit 8 Porirua East Basin:** The area between the Linden connection and Cannons Creek bridge forms a backdrop to the urban basin. It is characterised by reasonably bold topography and a mosaic of pine plantation, rough pasture, and areas of reverting gorse/mahoe shrubland. Structures are limited to occasional buildings and transmission lines.

**Unit 9 Linden:** The small area between the Linden connection and the tie-in to the existing SH1 is the only urban section of the route. Aside from the large pine plantation forming a backdrop on the hills, the area is characterised by its residential suburban character and the existing motorway and rail corridors.

Figure 3.5 illustrates the landscape character units and key features.

#### Landscape issues influencing the design

There are significant earthworks, structures, carriageways and road furniture that will impact on landscapes of various character and quality along the route. The Project seeks to integrate the road with the surrounding landscape, principally through:

- Recognition of and reference to key natural landscape patterns;
- Selection of a road alignment that retains key features (e.g. landform, waterways, vegetation, historic sites, etc) along the route.;
- Consideration of the natural topography in the development of cut and fill profiles; and
- Selection of design treatments (e.g. materials) that reinforce landscape character and limit visual effects.

The strongest characteristics of the area traversed by the alignment are the expressive landforms (bold hills, sharp escarpment, straight fault-line valleys) resulting from active tectonic processes, and a natural remoteness. The design seeks to reflect these characteristics and allow road users to experience and appreciate the expressive landform and natural characteristics of the Project area.

The Project will create previously unobtainable, new public views to isolated and remote areas and the broader landscape. The design seeks to ensure distinctive views from the highway to the Kapiti Coast and Kapiti Island, to Pauatahanui Inlet and hill backdrop, Wainui Saddle and Belmont Hills are not lost.

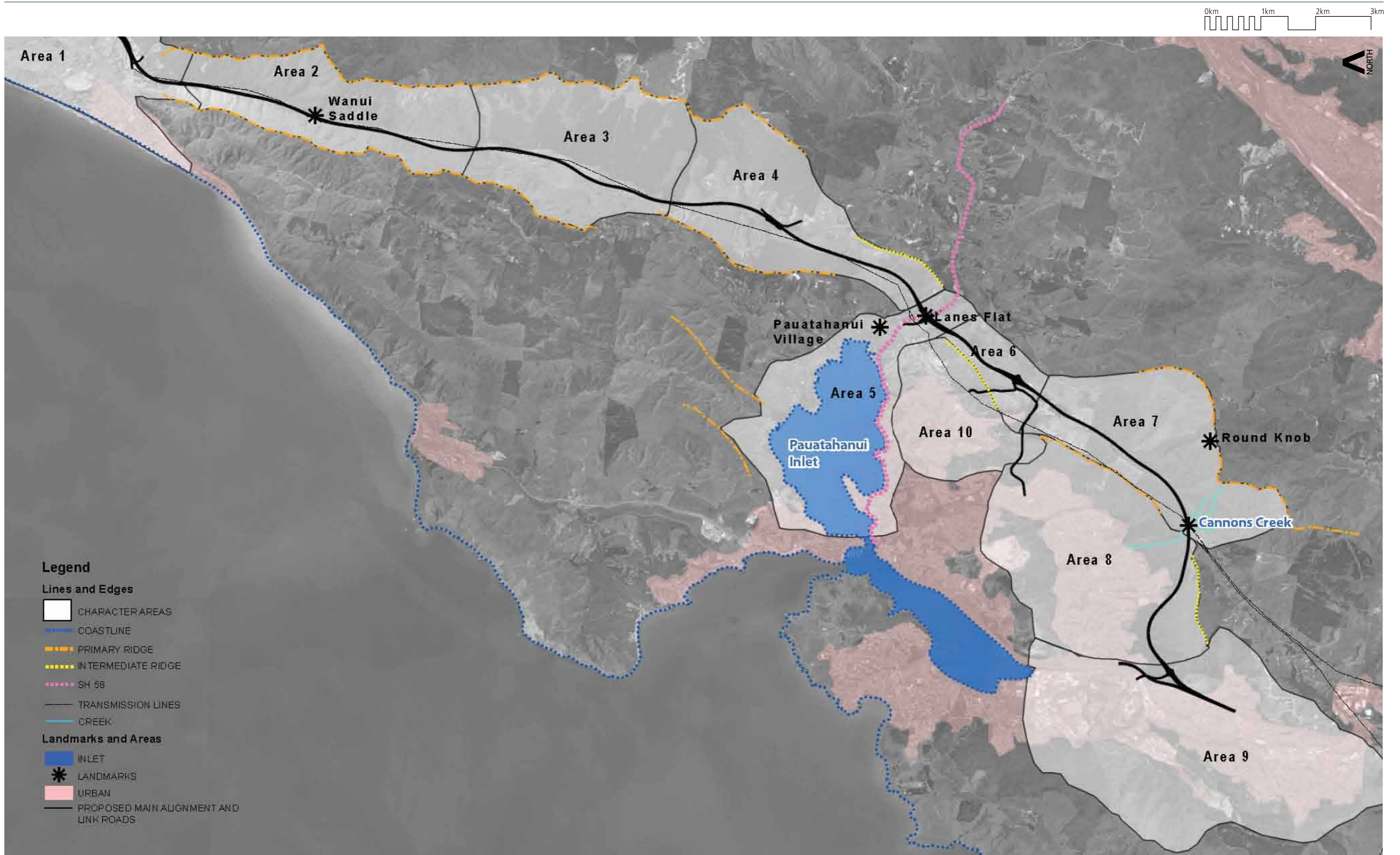


Figure 3.5: Landscape character units



### 3.5 History

The following elements along the route are of historical value:

- The northern end of the route is rich in cultural heritage for Europeans and Maori alike. Maori occupied both Queen Elizabeth Park (QEP) and Whareroa Farm, where Pa were established after the Battle of Waiorua in 1824. European cultural presence in the park is also strong, it having been a site where early settlement, particularly sealers and whalers, took place. For many, the most notable reminder of European activity is that of the US Marines at Camp Paekakariki and Camp Russell during 1942 and 1943 (Photo 3.1). The camp was divided into three sections and was located on flat land now within Queen Elizabeth Park and on the coastal terrace above and to the west of SH1. Another point of cultural significance is the Tramway Museum in QEP which commemorates the importance of this type of transportation to the region;
- Battle Hill was the last engagement of a series of skirmishes fought during 1846 in Wellington Region as part of the New Zealand Wars. Ngati Toa chief Te Rangihaeata had built a pa, Matautaua, at Pauatahanui commanding the Pauatahanui Inlet. However it was vulnerable to overland attack from the rear and was abandoned following an attack by Governor Grey with British troops. Te Rangihaeata retreated and built a pa on a spur above the Horokiri Stream from where he fought a rear-guard action over several days before abandoning the site and withdrawing to the north. The battle site is on a ridge approximately 1km west of the proposed Main Alignment;
- Pauatahanui has a rich history. British troops established a garrison settlement on the site of Te Rangihaeata's pa immediately following the action in 1846 discussed above. Troops then constructed the Paekakariki Hill Road for military purposes, after which Pauatahanui became an important coaching and staging settlement on the main road north from Wellington. The route north from Tawa was by way of the southern shores of the inlet and the

Paekakariki Hill Road. The heyday of the village was during the 1870s and 1880s when it supported a range of businesses, the settlement gradually declining after it was bypassed first by the railway (1886) and eventually the coastal main road route (1939). As well as its garrison and staging history, Pauatahanui acted as a service centre for surrounding rural areas, supported a sawmilling industry at one time, experienced a minor gold rush, and was a service centre for military camps located in the surrounding area during the Second World War. There are a number of historic buildings and sites, most of which are within the village precinct west of the proposed Transmission Gully Project alignment. St Joseph's Catholic Church (Photo 3.3) and historic cemetery is on a hill immediately east of the proposed SH58 interchange;

- Whitby is a comprehensively planned suburb built in the 1970s to an innovative and high quality design. The suburb has a high level of amenity, extensive walkways and bush and open space reserves. A feature of its identity is the street naming derived from a nautical theme associated with Cook's voyages; and
- At the southern end of the route, Porirua is a planned post World War II urban development. The proposed Transmission Gully Project alignment circles the Porirua East basin (i.e. south of Ranui Heights, Cannons Creek and Waitangarua) which was developed as a state housing area.

Two recognised buildings of cultural heritage value are in close proximity to the Project:

- St Joseph's Church near Pauatahanui registered category I with the New Zealand Historic Places Trust
- Petrol storage tank listed on the KCDC District Plan. This brick structure (Photo 3.2) was built during WW2 and is one of three in the country according to KCDC heritage building list. It is the only intact surviving American built structure from the period of the American camps.

**Source:** *Transmission Gully Project: Built Heritage (2010)*

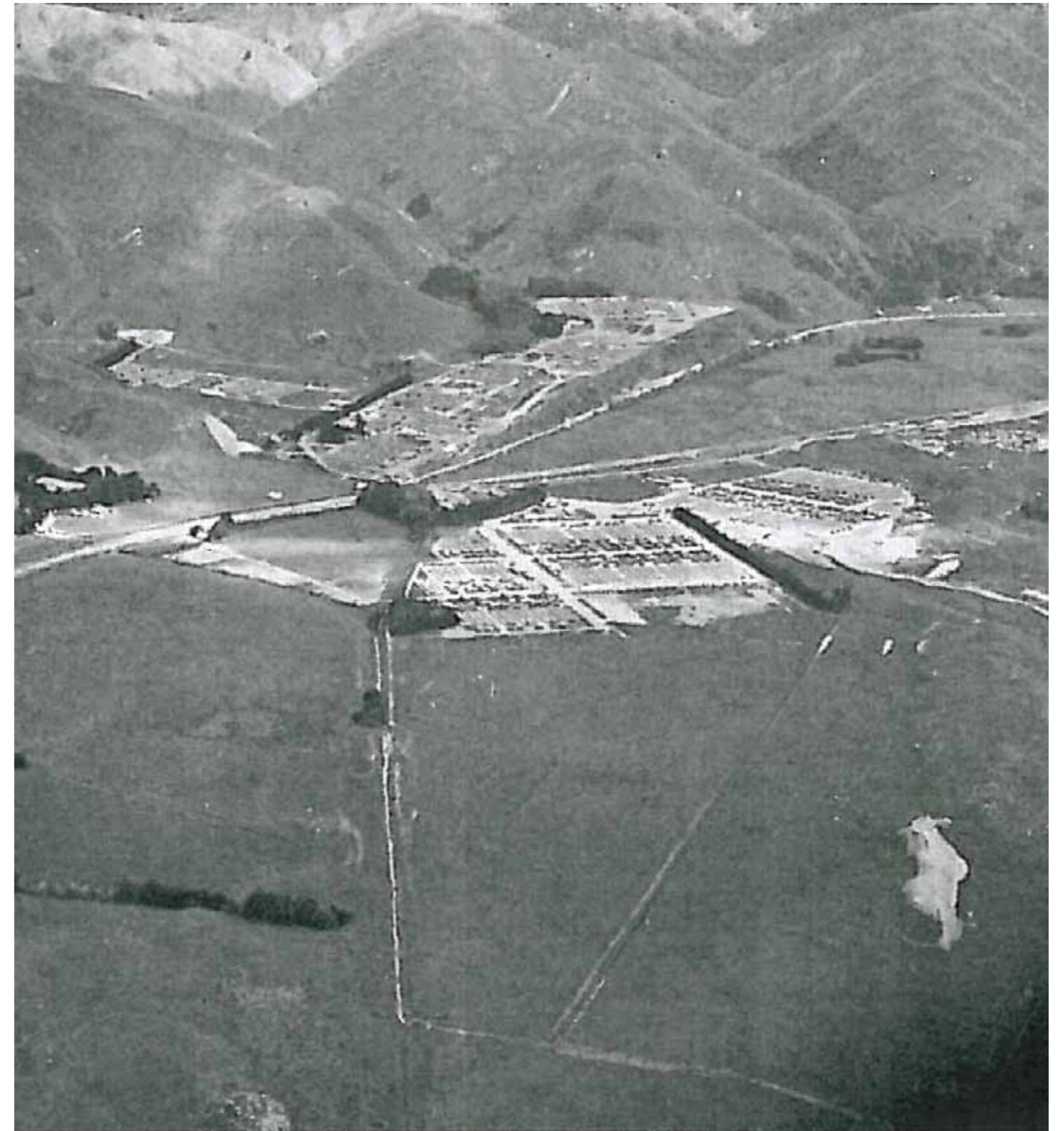


Photo 3.1: Detail of aerial photo of US Servicemen's camps at MacKays Crossing, Nov 1943  
Alexander Turnbull Library: PAColl-0783-2-0288



Photo 3.2: WW2 Petrol storage tank

### Tangata Whenua issues influencing the design

- Large earthworks and the associated need for sediment control in order to prevent significant sedimentation entering watercourses which could affect aquatic life and ecosystems (ie. the mauri of the stream);
- Request to limit diversions because of concerns about loss of habitat and effect on the mauri of the streams
- Biodiversity in particular maintaining fish passage, protecting water quality and restoring habitats where stream diversions occur;
- Habitat protection including planting of native species, particularly in riparian margins, and re-planting of areas of indigenous forest which need clearing to reinstate habitat for native birds; and
- Sites of cultural significance in close proximity to the route.



Photo 3.3: St Joseph's Church

### Historical issues influencing the design

The Project passes near several areas with rich and diverse human history. However, the Project does not directly impact any of the historical sites and there are no known archaeological sites within the proposed road alignment itself.

The Project seeks to respond to its local context. In some areas, this may involve selecting detailed design solutions which suit the historical context in which it sits.

## 3.6 Value to Tangata Whenua

### Archaeology

The vast majority of evidence for Maori occupation around the Project area is along or near the coastal edge, reflecting the importance of the coast for both resources and transport. Maori fished in the sea, and gathered shellfish from the beaches. The coast has always been important for Maori, as a route for travelling, as a source of kaimoana, and as a cultural and spiritual reference point. They also utilised the coastal swamps for eels, birds and flax, and planted crops in the friable coastal soils. This subsistence pattern is especially prevalent along the Kapiti Coast, but can also be seen further south around the Porirua Harbour and Pauatahanui inlet. The hills immediately adjacent to the coastal flats were used for crop storage and for the strategic advantage their height allowed. South of Pauatahanui, very little information about the Maori occupation and use of the area has been identified. This is consistent with the focus of Maori settlement along the coast.

**Source:** *Transmission Gully: Archaeological Assessment of Proposed Roadway (2010)*

### Iwi values

The predominant Iwi with Tangata Whenua status in the Transmission Gully Project area is Ngati Toa Rangatira.

Ngati Toa Rangatira had settlements at either end of the Transmission Gully Project, at Whareroa in the north and Pauatahanui in the south. However Ngati Toa Rangatira settled predominantly in coastal locations, such as Wainui (Paekaakaariki), Pukerua, Taupo (Plimmerton), Paremata and Porirua. The environs of the Pauatahanui Inlet and Porirua Harbour also provided attractive locations for settlement and facilitated access to the coast for fishing and gathering kaimoana.

The importance of the Transmission Gully Project to Ngati Toa Rangatira was primarily as an area of plentiful natural resources that were vital to the Iwi's health and cultural wellbeing. Large areas of forest sustained important native plants that were used for medicinal purposes as well as food sources. The catchment is characterised by a network of streams that feed into the Pauatahanui Inlet. These streams supported significant populations of native fish and were highly valued by Ngati Toa Rangatira as important sources of kaiawa. The Inlet itself was a key attraction to the area given its close resemblance to the estuary at Kawhia which sustained Ngati Toa Rangatira for generations prior to their migration to the Cook Strait region.

Ngati Toa Rangatira's main issue of concern in relation to the Project is the discharge of large volumes of sediment to the environment and the potential effects on waterways, the Pauatahanui Inlet and Porirua Harbour. They are also concerned about adjacent sites of cultural significance including Queen Elizabeth Park (early settlement, urupa, pa and kainga sites), Whareroa Farm (early settlement and urupa), Battle Hill Farm Forest Park (site of 1846 battle and grave site), Pauatahanui Wildlife Reserve, Horokiri Wildlife Reserve (early Ngati Ira settlement and pa) and Porirua (Onepoto) Harbour (early settlements, pas and kainga sites).

**Source:** *Transmission Gully: Cultural Impact Assessment Report (2010)*