Resource Consent Applications to the Bay of Plenty Regional Council for Construction and Operational Activities Associated with the Tauranga Northern Link

Construction and Operation of the Tauranga Northern Link

Application for Regional Resource Consents

NZTA 2/16-007/501

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NEW ZEALAND TRANSPORT AGENCY

RESOURCE CONSENT APPLICATIONS FOR CONSTRUCTION AND OPERATIONAL ACTIVITIES ASSOCIATED WITH THE TAURANGA NORTHERN LINK

ASSESSMENT OF ENVIRONMENTAL EFFECTS REPORT

1. INTRODUCTION

1.1 The New Zealand Transport Agency (Transport Agency) is a Crown entity focused on creating transport solutions for a thriving New Zealand through our four core business functions:

- Planning the land transport networks;
- Investing in land transport;
- Managing the State Highway network; and
- Providing access to and the use of the land transport system.

1.2 The Transport Agency's statutory objective is to undertake its functions in a way that contributes to an affordable, integrated, safe, responsive and sustainable land transport system. The Transport Agency is also a Requiring Authority under s.167(3) of the Resource Management Act 1991 (RMA).

1.3 The prime function of the State Highway network is to provide a convenient, efficient and safe route for the inter-regional transportation of goods and people. To be effective in its role, the State Highway network should have an alignment that is direct, minimises road accident potential and generally bypasses urban areas. Currently, the section of State Highway 2 (SH2) from Waihi to Tauranga meets few of these criteria.

1.4 There is growing concern as to the safety of SH2 and the route's ability to meet future growth and transport demands. The population of areas served by SH2 is growing and a large amount of goods are transported via SH2 to the Port of Tauranga for export. Considerable agriculture-related growth is expected over the next 30 years and, by 2031, traffic numbers are predicted to increase to over 30,000 vehicles per day. That growth is expected to exacerbate safety and congestion issues, as well as increase costs for freight operators.

1.5 From what was once a rural road passing through country settlements, SH2 has developed into a busy commuter, agribusiness and regional freight route, local road, and a popular tourist link between the Bay of Plenty and the Coromandel Peninsula. The Tauranga Northern Link (TNL) is a proposed four-lane relocation of SH2 between Te Puna and Tauranga. It is intended to reduce deaths and serious injuries, reduce the corridor crash risk, increase travel time reliability and increase capacity.

1.6 The following key terms are used throughout this Assessment of Environmental Effects (AEE):

TNL – refers to a 6.8 kilometre inland part of SH2, extending from the Takitimu Drive Toll Road to Loop Road just west of Te Puna.

Designation – refers to the corridor of land designated for the construction and operation of the TNL (notated in the Tauranga City Plan and the Western Bay of Plenty District Plan as Designations NZTA15 and D180 respectively).

1.7 This application is for the purpose of securing resource consents from the Bay of Plenty Regional Council (BOPRC) for a range of activities associated with the construction and operation of the TNL. Specifically, resource consents are being sought for the following:

- To undertake earthworks, vegetation clearance, overburden disposal and disturbance and remediation of contaminated land;
- To install culverts within the road and within the beds of watercourses;
- To erect structures over the bed of a watercourse (Wairoa River & Minden Gully Bridges);
- To dam and divert surface water;
- To take and use surface water;
- To undertake drilling within the bed of a watercourse;
- To undertake drilling below the water table;
- To divert groundwater;
- To take and use groundwater;
- To divert and discharge sediment-contaminated stormwater and surface runoff to land and water;
- To install discharge structures;
- To discharge proprietary products for sediment and dust control to land;
- To install intake structures;
- To modify, destroy or disturb wetlands.

1.8 This report provides background and supporting information, including an Assessment of Environmental Effects in accordance with Schedule 4 of the RMA. The report includes an assessment of the application against the relevant rules, objectives and policies of the Bay of Plenty Regional Water and Land Plan (RWLP) and the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Soil Contamination). As required, the Bay of Plenty Regional Policy Statement (RPS) and the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) are also considered.

1.9 This report is supported by Appendices which provide a detailed description and plans of the site, the proposed activities, their potential effects and how these effects will be avoided, remedied or mitigated. The report should be read and considered in conjunction with all of the supporting documents contained within the Appendices.

2. PROJECT BACKGROUND

2.1 The Bay of Plenty is part of New Zealand's 'Golden Triangle', where much of the nation's economic and population growth is occurring. The Port of Tauranga is New Zealand's largest export port by volume and the second largest container port, contributing 8.6% of the national GDP[1]. It renders the port one of New Zealand's major international gateways, which in turn relies upon an efficient and effective regional transport system.

2.2 The Bay of Plenty has the 5th largest population of New Zealand's 16 regions and continues to grow. The region accounts for 80% of the country's largest agricultural export value product – kiwifruit– and 68% of the nation's avocado crop. As with the port, industries such as these are reliant upon the efficiency of the road transport network, not only to ensure that products reach export markets, but to ensure that industries are connected with workers.

[1] Bay of Plenty Regional Land Transport Plan 2015-2045.

2.3 In addition to being an important freight route, SH2 is a key commuter link for people travelling to Tauranga from Katikati and outer lying urban areas. These roles give rise to competing and growing demands on the corridor from locals travelling into urban centres, agricultural vehicles servicing the horticultural sector and local freight moving to and from the Port of Tauranga.

2.4 SH2 also serves a tourist function as it forms part of the 'Pacific Coast Highway' between Auckland and Napier, via Whitianga. Specifically, it is a connector between the tourist centres of Waihi and Tauranga, as well as being a connector between the Waikato and the Bay of Plenty regions.

2.5 SH2 between Te Puna and Tauranga is at or near capacity during peak periods. In 2015, approximately 20,540 vehicles travelled across the Wairoa River bridge each day, approximately 8% of which were heavy commercial vehicles. Traffic volumes in this section have increased rapidly due to the extent of development occurring on the fringes of Tauranga, particularly in the Omokoroa, Bethlehem and Te Puna areas.

2.6 The need to access an increasing number of residential and commercial properties means that local traffic is generally slower moving than through-traffic. This is because localised traffic turns onto and off the highway more frequently than through-traffic and over shorter distances. Those characteristics are in contrast to commuter and through-traffic which requires quicker access to the Port and to Tauranga City's Central Business District.

2.7 SH2 between Te Puna and Tauranga has a particularly poor safety record, caused in part by the conflict between modal use. That conflict is expected to worsen as traffic numbers increase on SH2. Other contributory factors to the high crash rate are the large numbers of intersections, the unforgiving roadside environment, inconsistent speeds and poor road geometry.

2.8 In the early 1990s, Transit NZ (now the NZ Transport Agency) was considering highway bypasses for both Bethlehem and Te Puna due to the capacity problems on SH2. From these initial studies, a further 21 options for network improvements along this northern corridor were investigated and these are detailed in the *Options Report – State Highway 2 Northern Arterial Roading* (Beca, June 1997). The 1997 report identified options for both a northern and a southern corridor. This led to designation of the favoured southern corridor in 2001, though development in Bethlehem and areas further north subsequently influenced the alignment of the Northern Arterial (now TNL).

2.9 From the above Options Report, an Assessment of Environmental Effects (AEE) was prepared for the designation of a relocated SH2 issued in February 1998 as detailed in the *Assessment of Environmental Effects: Requirement by Transit New Zealand for Designation of State Highway 2 Relocation* (Tauranga Northern Arterial) (Beca, February 1998).

2.10 The designation for the Tauranga Northern Arterial was confirmed in January 2001 with conditions for a lapse period of 20 years. The designated TNL is shown within the Tauranga City Plan and the Western Bay of Plenty District Plan as designations NZTA15 and D180 respectively. The designated TNL further ties in to Designation D181 (Road Purposes – SH2 Four-laning) at Loop Road and will give effect to that designation once built.

2.11 In February 2009, the TNL alignment was reassessed in terms of scope, cost, economics and staging options, as discussed in the *Tauranga Northern Arterial – Project Feasibility Report* (February 2009). The report recommended additional investigations to optimise the scope, reduce risks and provide improved knowledge of the likely cost, benefit cost ratio (BCR) and possible construction timing.

2.12 In addition to the designated TNL, the transport network includes a designated connection from 15th Avenue to Takitimu Drive, providing westbound access to Takitimu Drive and the TNL. This connection

was investigated in the *15th Avenue to Takitimu Drive Project Feasibility Report* (June 2010) which identified that the construction of this connection would improve the overall operation of the transport network and enables more traffic to use the TNL rather than the existing SH2 route. The report recommended that the 15th Avenue connection be advanced to Scheme Assessment and be included within the scope of this Secondary Investigation. Also in 2010, to recognise the outcome that the project provides for the region, the Northern Arterial was renamed as the Tauranga Northern Link (TNL).

2.13 In January 2012, Beca completed a Secondary Investigation Scheme Assessment on behalf of the Transport Agency, the purpose of which was to determine an optimal form of the TNL and 15th Avenue Connection, to understand its cost and BCR and to identify when it would most likely need to be implemented. The investigation identified that making limited changes to the form of the designated TNL and 15th Avenue Connection would result in an improved ability to manage the forecast traffic flows and would provide a more affordable solution for the initial construction phase. The Secondary Investigation confirmed the preferred form of the TNL and 15th Avenue Connection as:

- A four-lane median divided road, based on a 100km/h speed environment design;
- Grade-separated interchange located at Minden Road;
- An underpass at Wairoa Road and at Cambridge Road; and
- A roundabout connection to Takitimu Drive.

2.14 In March 2013, the Transport Agency applied for an alteration to designation D180 for the grade-separated interchange at Minden Road, in order to provide access from the TNL to the Te Puna community. As a result, the designation for the Clark Road on / off ramps was to be uplifted and the designated intersection at the western end of TNL was modified as part of the Te Puna – Omokoroa designation. The alteration was granted by WBoPDC on 5 August 2013.

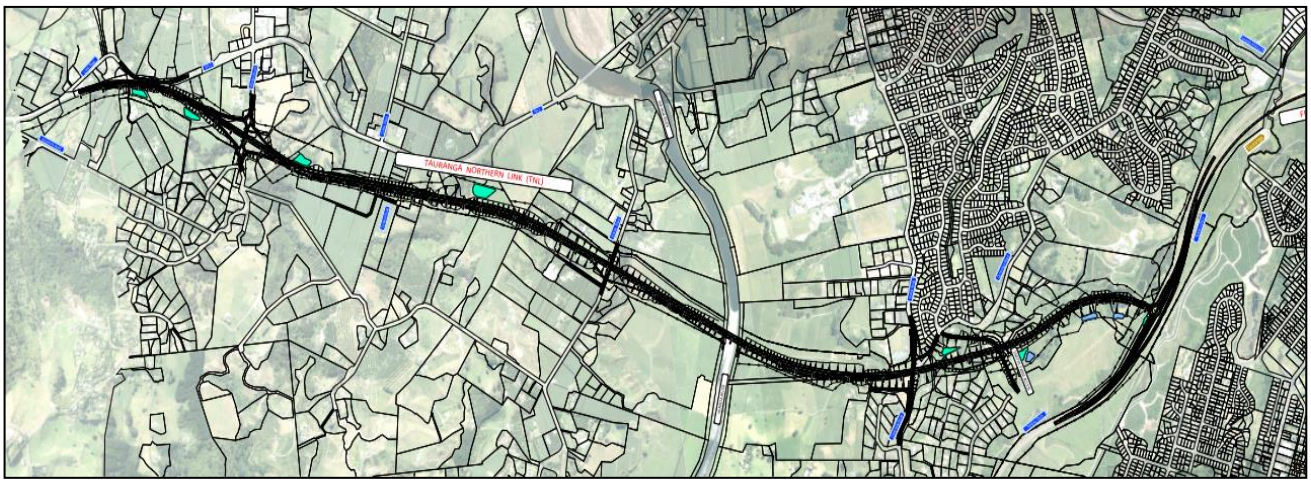
2.15 Construction funding for the TNL was granted in April 2016 as part of the $520 million Waihi to Tauranga Corridor programme to improve road safety, support economic development and regional growth. The construction objectives are:

- To improve travel time and trip reliability on this major transport link between Tauranga, the northern Bay of Plenty and the Coromandel Peninsula, and improve the tourist route being part of the Pacific Coast Highway;
- To improve network resilience and travel time reliability through provision of a second crossing of the Wairoa River.
- To reduce the crash rate and social cost along this section of SH2.

3. LOCALITY AND SITE DESCRIPTION

3.1 The Tauranga Northern Link is a proposed 6.8km inland route extending from Loop Road to the west of Te Puna to the Takitimu Drive Toll Road, southwest of Tauranga. A locality plan showing an overview of the TNL is provided in **Figure 1** below.

Figure 1: Tauranga Northern Link Locality Plan



3.2 The following sections of this report provide a general description of the TNL locality from west to east including existing topography, land use and ecological features. For the purposes of corridor description, the route is split into western and eastern sub-sections. The western section extends from Loop Road to the central Wairoa River. The eastern section extends from the central Wairoa River to Takitimu Drive. The following description should be read in conjunction with the site **Specimen Design Drawings** included as **Appendix A**. A more detailed description of the existing environment including a detailed assessment of ecological values throughout the project area is provided within the supporting documents contained within the Appendices to this report.

Western Section (Ch. 0 – 4000m)

3.3 From its northern connection to SH2, the TNL follows a north-eastern alignment for approximately 400m before curving south-east as it heads towards the Minden Road interchange at Ch. 1000m. The alignment extends through this section as a large cutting up a moderate slope. Existing land use comprises a combination of open farmland and avocado orchards. The alignment cuts through an avocado orchard between Ch. 450m and Ch. 650m on the approaches to the Minden Road Interchange.

3.4 Drainage from the majority of this section falls back to the low point near the SH2 tie-in where two localised stream catchments pass under the alignment, converge directly below SH2 and enter a large on-line dam/pond within the L'Anson Reserve. Runoff from the upper sections of the slope towards Minden Road occurs to two separate tributary gullies. All watercourses through this section converge to form the Oturu Creek which flows northward through intensive agricultural land to enter the Waikaraka Estuary of Tauranga Harbour around 3km north of the TNL site.

3.5 The alignment straightens for 800m past the Minden Road Interchange and proceeds as a large cutting (15m) through the Minden Road ridgeline before crossing the steep sided, incised Minden Road gully via a proposed bridge crossing. The bridge crossing avoids the need for earthworks within the floor of this gully feature. The Minden Road Gully watercourse (also known as the Hakao Stream) is a narrow stream draining northward via a culvert beneath the existing SH2 alignment, before continuing as a straightened drainage channel prior to entering the Wairoa River near the railway bridge crossing at Te Puna Station Road.

3.6 To the southeast of the gully, the TNL crosses a large flat terrace as a shallow cutting through land currently used as a kiwifruit orchard. The southern side of this bisected orchard is to be used as a large-scale borrow site to win fill material required for the TNL construction activities. The northern part of the

orchard will continue in agricultural use. Runoff from the majority of this terrace area occurs either to the Hakao Stream directly upstream of the proposed gully crossing or southward (from the borrow area) to the modified drainage channels within the low gradient valley floor below Oliver Road.

3.7 Between Ch. 2400m and Ch. 2650m, the TNL extends across the main valley floor as a large fill embankment with fill depths of up to 7m. A large stormwater wetland excavation is proposed within the valley floor area immediately to the north of the embankment. Drainage through this valley floor is via a series of watercourses comprising straightened drainage channels extending northwards through the low-lying pasture before again passing via a culvert beneath the existing SH2 alignment. These drainage channels enter the Wairoa River near the Waipuna Hospice facility on Te Puna Station Road.

3.8 From the valley floor fill embankment, the alignment extends eastward between Ch. 2800m and Ch. 3250m initially as fill through a wide basin area and then as a significant cutting up the valley slopes towards Wairoa Road. Kiwifruit orchards are the predominant land use through this section. The cutting extends to depths of up to 13m over a width of over 100m as it approaches Wairoa Road.

3.9 From Wairoa Road, the alignment immediately drops over a steep escarpment before entering the wide Wairoa River valley. The change in topography corresponds with a change in land use activity, with agricultural farming giving way to pastoral land use. The earthworks extend northward from Wairoa Road as a large fill embankment over 100m wide and up to 14m high raising the design road level above the surrounding low lying/low gradient flats which form the Wairoa River flood plain. The valley floor through this area comprises the low gradient floodplain of the Wairoa River and is serviced by a network of constructed farm drainage channels draining both surface and groundwater flows to the Wairoa River. These drains will require either culverting or diverting as part of the embankment construction activities.

3.10 The road embankment stops approximately 70m west of the Wairoa River channel with TNL crossing the river via a proposed bridge structure. The Wairoa River marks the territorial boundary between Tauranga City Council (TCC) and Western Bay of Plenty District Council (WBOPDC). At approximately 14km in length the Wairoa River is the largest freshwater tributary to Tauranga Harbour.

3.11 With the exception of the flats on the approach to the Wairoa River, the landscape in the western section is heavily characterised by agricultural farming interspersed with lifestyle blocks. The predominance of shelterbelts and trees means that open vistas and views are somewhat restricted along this section of the alignment.

3.12 Land adjoining the western section is variously zoned Rural or Lifestyle by the Western Bay of Plenty District Plan.

Eastern Section (Ch. 4000 – 6500m)

3.13 From Ch. 4000m to Ch. 4750m the TNL follows a generally straight alignment crossing river flats to the east of the Wairoa River, before climbing in a north-easterly direction towards the Cambridge Road overbridge at Ch. 5050m. The alignment through the eastern section proceeds initially as a large fill embankment (approximately 4m high) to carry the road over the low lying, low gradient flood plain. As before, there are a number of existing drainage channels within the low gradient floodplain area which will require either diverting or culverting as part of the works.

3.14 As the alignment leaves the low gradient Wairoa River valley floor it proceeds initially as a large fill embankment over 100m wide and up to 16m high extending up a small side gully of the wider floodplain area. It then proceeds as a significant cutting over 100m wide and 20m deep into the northern face of the Cambridge Road ridgeline. Although this section is still generally rural in outlook, it is markedly different from the western section because orchards are no longer a prominent feature of the landscape.

Cambridge Road follows a ridge which allows westerly views, in places, back towards the Wairoa River. The road marks the third of the terraces intersected by TNL and also marks a transition point as the semi-rural environment gives way to an urban landform.

3.15 From Ch. 5050m for a distance of approximately 500m, the TNL turns gently north-east until it crosses beneath the 'Smiths Farm' access at Ch. 5550m. The alignment through this section is complex due to realignment of the Cambridge Road / Moffat Road carriageway and intersection, the relocation of the Harrison Road cul de sac and the construction of the Cambridge Road overbridge.

3.16 From the Cambridge Road ridgeline, the TNL cutting proceeds eastward entering a new smaller valley system which is drained by an unnamed tributary of the Kopurererua Stream. The Kopurererua Stream drains a large catchment extending back into the Mamaku plateau and discharges flows to the Waikaraeo Estuary of Tauranga Harbour near Tauranga City. The cut quickly transitions to a large fill embankment extending through the valley floor area, directly across the existing tributary stream alignment. As described later in this report, it is proposed to construct a stormwater wetland at the head of this gully system.

3.17 From here, TNL proceeds eastwards generally following the gully alignment as a series of cuts and fills and crossing two small, steep side gully catchments where small diameter culvert crossings are proposed. The TNL alignment connects with Takitimu Drive via a proposed roundabout at Ch. 6550m.

3.18 Land adjoining the eastern section of TNL is variously zoned Rural, Rural Residential and Passive Open Space in the Tauranga City Plan.

Ecology

3.19 The **Assessment of Ecological Effects** report attached as **Appendix I** includes a detailed description of site ecological values which has been developed through the review of publicly available literature and databases and field assessments undertaken between February 2017 to July 2017.

3.20 The TNL is situated within the Tauranga Ecological District (ED) (New Zealand Biological Resource Centre, 1987). The ED contains several Special Ecological Areas that have been identified by Bay of Plenty Regional Council (BOPRC). However, no special features aside from the Wairoa River, are directly impacted by the TNL. Many streams and rivers flow into Tauranga Harbour from the western section, including the Wairoa River. Most of these streams and rivers originate outside the ecological district, on the heavily forested higher slopes of the Kaimai and Mamaku ranges. The lower slopes of the hills have had much of their native vegetative cover removed, which has resulted in an increase in erosion, especially along the banks of the watercourses in the district. The resulting increase in waterborne sediment has had an impact on the water quality and hence the wildlife within the streams and rivers, as well as increasing sedimentation in the estuaries.

3.21 The alignment crosses 11 identified streams as well as several additional modified and artificial water bodies and water courses. The stream surveys confirm that those in the steeper or upland areas of the alignment have higher habitat and water quality than those in the lower lying areas, which have typically been highly modified for the purposes of land drainage associated with pastoral land use.

3.22 Stream surveys confirm that dissolved oxygen is depleted at four of eight sites, with percentage saturation below 80%. These sites are typically in the lower laying sections of the route, exhibiting little to no flow, and generally containing algal and macrophyte growth. Macroinvertebrates have also been sampled at five sites, indicating varying conditions along the alignment. The Hakao Stream metrics are particularly high, exhibiting good to excellent water and habitat quality.

3.23 Watercourses within the route are known to contain both indigenous and exotic fish species, and this has been confirmed with fish surveys. 'At Risk' indigenous fish species included inanga (Galaxias maculatus) and redfin bully (Gobiomorphus huttoni). Previous surveys in the catchments within the general proximity of the alignment also identified several more indigenous and exotic fish species, including the 'At Risk' longfin eel (Anguilla dieffenbachia) and giant kokopu (Galaxias argenteus).

3.24 With respect to terrestrial ecology, the majority of the alignment comprises exotic grasslands and orchards, with plantings of exotic trees comprising the next most abundant vegetation type. There are 5.17 hectares of ecologically significant vegetation within the TNL alignment, with wet grassland, rushes, and raupo reedland being significant components. The ponds and streams within the alignment are also considered an ecologically significant land cover class. Indigenous-dominated scrub (comprising indigenous restoration plantings) cover an area of approximately 0.55 hectares, situated mainly along stream and road margins. Some areas of exotic shrub contain indigenous understorey vegetation including mahoe, wheki, and ponga.

3.25 The field survey confirms a number of birds in the project alignment including introduced (11 total) and indigenous species (11 total) that are commonly found in pasture and open country habitats. The surveys also detected black shag ("At Risk"), and New Zealand dabchick ("At Risk") in association with freshwater habitats at the Takitimu Drive Wetland. Additionally, North Island kaka ("At Risk") were observed near pine and macrocarpa plantings close to the Takitimu Drive Wetland. Several other indigenous species, including threatened species, are likely to be present based on existing literature.

3.26 Over 336 detector-nights of long-tailed bat surveys, a total number of two confirmed, and seven potential bat passes were detected by acoustic recorders. The confirmed bat passes were detected near Minden Road in tall eucalypt and pine vegetation surrounding the Hakao Stream, as well as along the gully margin near shelterbelt plantings.

Geotechnical

3.27 Given the lineal nature, significant length and variable topography of the TNL, there is significant variation in site geology and subsoil materials throughout the alignment. The project crosses four main terrace features elevated 30 to 50 metres above intervening low-lying valley floors separated by steeply inclined natural escarpments. To reach design subgrade levels, cut and fill depths of up to approximately 23m and 20m respectively will be necessary.

3.28 The ground model is complex and broadly comprises a sequence of Late Quaternary Volcanic Airfall overlying older weathered volcanic ashes (Pahoia Tephras) and volcaniclastic sediments of the Matua Subgroup followed by non-welded and partially welded ignimbrites at depth. Additionally, there is up to 20m of weak alluvial sediment across the valley floors.

Ground Contamination

3.29 A **Preliminary Site Investigation** (PSI) has been undertaken along the length of the TNL alignment which is attached within **Appendix H**. The report identifies 50 locations throughout the alignment where historic land uses are known which may have given rise to ground contamination effects. These land use activities include the application of pesticides by agricultural activities, historical landfills (the Cambridge Road Landfill), mechanical and agricultural workshops including the use of hydrocarbons, the presence of an identified methamphetamine impacted dwelling, agricultural buildings and buildings which may consist of asbestos containing materials. Disturbance/ remediation of all identified sites will be subject to resource consent authorisation (presently lodged with TCC and WBOPDC) under the Resource

Management (National Environmental Standards for Assessing and Managing Contaminants in Soils to Protect Human Health) Regulations 2011.

Archaeology

3.30 A detailed **Archaeological Effects Assessment** (**Appendix J**) has been undertaken of the entire TNL alignment. The Archaeological Assessment confirms that the land designated for the TNL project forms part of a larger pre-European Māori archaeological landscape. A total of 34 recorded archaeological sites are within or immediately adjacent to the designation corridor. At least 20 of the sites were identified during the Tauranga County Archaeological Survey by the New Zealand Historic Places Trust in 1982 and only 4 of these have updated site record forms on the ArchSite database (sites U14/1073-U14/1076). Remaining sites were identified by contractors during surveys and have all been recorded based on surface observations. There is a high probability that unrecorded archaeological sites will be present within the TNL alignment.

4. DESCRIPTION OF PROPOSED ACTIVITIES

4.1 Specimen Design

4.1.1 It is a key aspect of the TNL project that the current 'specimen design' is of a preliminary nature with the potential for design modifications to occur later through the detailed design process which is likely to occur through a Design and Construct contract with the successful Contractor. Hence, while this application aims to outline as much detail as possible regarding the proposed activities, a level of flexibility is being sought to allow for future design modifications and innovations which may result in some adjustments/ deviation from the Specimen Design. Nonetheless, all current and future works will be limited to the footprint of the designation and thus are unlikely to result in any significant additional effects from those described and assessed within this application.

4.2 General Description of the Activities

4.2.1 Construction of the TNL will require land disturbance activities along the 6.8km lineal alignment and across, on average, an approximate 50 – 100m wide corridor to form the 4-lane Expressway carriageway. In addition to the main Expressway alignment bulk earthworks, several additional areas of earthworks/structural projects will be undertaken as part of the overall project to establish the necessary traffic linkages and to integrate both existing and proposed local roads with the TNL. The general extent of works including areas of cut to fill and drainage installations are outlined on the **Specimen Design Drawings** attached as **Appendix A** and are summarised on a section by section/north to south basis as follows:

Northern SH2 Connection to Minden Road: Ch. 0 – 1000m

- Moderate fill embankment to depths of around 4m as the alignment leaves SH2 and crosses the low-lying land opposite Loop Road;
- Construction of a new culvert and associated stream diversion works to convey three existing watercourses under the TNL alignment and the existing SH2 formation near Loop Road;
- Excavation/ construction of a stormwater management wetland within the low-lying land opposite Loop Road;
- Moderate cutting to depths of around 4m as the alignment climbs the slopes eastward through an existing avocado orchard towards Minden Road;
- Excavation/ construction of a stormwater wetland on the moderate sloping pasture land around Ch. 650m;

- Large scale cutting of depths of around 15m for the formation of a large diamond interchange and local road overbridge at Minden Road.

Minden Road to Wairoa Road: Ch. 1000 – 3200m

- Crossing of the deeply incised Minden Road Gully immediately eastward of Minden Road via a viaduct bridge type structure approximately 170m long by 50m in width;
- Moderate cuts and fills to depths of 4-6m as the alignment sidles across an elevated low gradient terrace currently comprising a kiwifruit orchard;
- Moderate filling to depths of around 5m as the alignment descends from Te Mete Road across a series of first order gully features including infilling of an existing farm dam and installation of a culvert to convey the tributary gully flows through the site;
- A localised large scale cutting around Ch. 2250m to depths of around 15m as the alignment passes through an elevated spur feature;
- Construction of an extended fill embankment to depths of 9m as the alignment crosses a low-lying, low gradient pasture valley floor area below Oliver Road;
- Installation of two culvert crossings to convey the existing catchment drainage channels below the embankment and associated stream diversions;
- Excavation/ construction of a stormwater wetland on the low gradient pasture land around Ch. 2400m;
- Large scale cuttings to depths of around 20m as the alignment climbs the slope eastward through areas of kiwifruit orchard to pass below Wairoa Road;
- Construction of the Wairoa Road overbridge.

Wairoa Road to Cambridge Road: Ch. 3200 – 5050m

- Large scale filling to depths of around 13m as the alignment enters the low-lying, low gradient, pastoral Wairoa River valley to form an elevated/ extended fill embankment across the river floodplain;
- Installation of multiple cross culverts below the fill embankment to connect existing farm drainage channels and balance flood flows;
- Diversion of an existing watercourse and associated farm drainage channels around the fill embankment within the floodplain;
- Construction of the Wairoa River Bridge comprising two piers within the Wairoa River set at a span of 35m apart and two piers 17m either side of the riverbank, with a soffit set 6m above natural bank height at a soffit RL level of 7.85 and a total bridge length of 385m;
- Large scale cuttings to depths of around 20m as the alignment climbs the slope eastward up the existing Harrison Road alignment to pass below Cambridge Road;
- Realignment of Cambridge Road immediately west of the existing alignment, formation of the Cambridge Road overbridge and relocation of Harrison Road approximately 60m south of its current alignment.

Cambridge Road to Takitimu Drive: Ch. 5050 – 6550m

- Large scale filling to depths of around 17m as the alignment enters the tributary gully to the east of Cambridge Road;
- Excavation/ construction of a stormwater wetland in the gully head area directly below Cambridge Road;
- Realignment of the Richards Way local road as a fill embankment extending from the Cambridge Road/ St Andrews Drive roundabout into the tributary gully passing under the TNL via a bridge crossing;

- Diversion of a number of sections of the gully stream channels to alignments outside of the proposed earthworks footprint along with multiple culvert installations to convey the tributaries under the fill embankments;
- Excavation/ construction of a stormwater wetland in the gully floor immediately downstream of the existing Richards Way alignment;
- A series of moderate scale cuts and fills as the alignment sidles along the southern side of the gully, crossing two small side gully features where smaller culvert installations are proposed.

4.2.2 In addition to the above works associated with the main TNL alignment, a number of additional areas of localised works are proposed outside of the main road corridor in association with the construction and establishment of the new Expressway. These include:

- Establishment of a large borrow site to source additional good quality fill material for use within the Expressway construction. The proposed borrow site comprises the remaining area of kiwifruit orchard directly south of the TNL alignment as it passes across the elevated terrace between Ch. 1300 – 1900m;
- Formation of the TNL/ Takitimu Drive tie-in comprising a large roundabout installation and widening of the existing Takitimu Drive formation over a length of around 2,300m;
- Construction of a new 140m long, four-span bridge over the proposed Takitimu Drive roundabout to carry Takitimu Drive northbound vehicles;
- Formation of a new on-ramp to Takitimu Drive from 15th Avenue comprising construction of a piled bridge on-ramp and widening of the existing Takitimu Drive formation over a length of around 800m.

4.2.3 Further detail of the specific construction activities for which authorisation is being sought through this application are provided within the following sections.

4.3 Earthworks, Vegetation Removal, Overburden Disposal and Disturbance of Contaminated Land

4.3.1 Construction of the TNL will comprise major earthworks through a variety of terrains and ecological environments for the formation of the road carriageway. Earthworks volumes required throughout the site have been estimated as follows:

- 3.1 million m^3 of cut materials (includes 1.1 million m^3 of imported cleanfill materials);
- 2.8 million m^3 of fill (includes 1.1 million m^3 of imported cleanfill material); and
- 0.9 million m^3 of surplus unsuitable materials for disposal and/ or landscaping fill.

4.3.2 The excess of cut materials (approx. 0.3 million m^3) compared with the total fill volume is directly resultant from cut materials losing volume once compacted as fills.

4.3.3 The extent of the proposed cut to fill earthworks activities is shown on the plans contained within the **Specimen Design Drawings** attached within **Appendix A**.

4.3.4 In general, the earthworks will commence with stripping of topsoil's and organic materials, followed by a series of cut and fill operations, with material cut from areas where the alignment passes through elevated slopes or ridges being used to fill the adjacent areas where it passes through or across gullies, low lying land or watercourses.

4.3.5 Preliminary geotechnical investigations indicate that site soils from the elevated cut areas will generally be appropriate for placement as engineered fill and will stand up through the large batters' subject to finalised geotechnical assessment and design.

4.3.6 Earthworks will be undertaken by a variety of machinery including hydraulic excavators, bull dozers, motor scrapers, scoops, dump trucks and rollers.

4.3.7 Areas are identified through the site where ground improvements will likely be required to provide a stable platform for the road embankment including through the low-lying valley floor areas around Ch. 2500m and through the Wairoa River valley floodplain. Within these areas, methods such as preloading, wick drains or undercutting may be employed to provide a stable surface for the Expressway earthworks.

4.3.8 The main cuts and sources of fill material for the project will comprise the elevated ridgelines and terraces including the Minden Road, Wairoa Road and Cambridge Road ridgelines where the alignment extends through these ridgeline features as a large box cutting. Cuts through these areas will extend to widths of around 150m and depths of around 20m.

4.3.9 Material cut from these more elevated slopes/ridges will typically be loaded into large capacity dumpers and hauled to the locations where filling is required to achieve the design Expressway levels/gradients. As described, some locations will require initial ground improvement works following which the cut material will be placed as engineered fill, being placed and compacted in layers up to design levels.

4.3.10 In addition to localised, intensive areas of filling, more extensive areas of filling are proposed where the alignment crosses the low lying, low gradient valley floor areas with the most prominent area of this type of construction comprising where the alignment extends across the broad Wairoa River valley floodplain. Through this section, filling is proposed at depths of up to 16m and widths of 150m to form a large embankment where the alignment extends off the adjacent elevated Wairoa Road/Cambridge Road ridgelines. The embankment extends across the floodplain towards the Wairoa River at lesser depths to form an elevated embankment maintaining the road carriageway above maximum river flood levels through this area.

4.3.11 As noted above, the calculated earthworks cut/fill volumes for the project have identified a shortage of fill material of approximately 300,000m^3 to achieve the design road geometry. Hence, there is a requirement to secure an additional supply of suitable fill material within direct proximity to the alignment to make up the necessary fill shortage. A proposed location for this fill supply has been identified comprising an approximate 15ha area upon the elevated terrace area between the Minden Road Gully and Te Mete Road within the existing area of kiwifruit orchard immediately southward of where the TNL alignment passes through this terrace. Up to 500,000m^3 of material is proposed to be excavated from this location, comprising the 300,000m^3 required once compacted. Geotechnical investigations within this area have confirmed that the elevated volcanic ash materials within this location provide a suitable supply of material to be utilised as engineered fill for road construction purposes. Initially topsoil will be stripped from the active works zone with the upper 3-4m material then being excavated as a quarry type operation and loaded directly into dump trucks for hauling to fill areas within the TNL alignment. The borrow area will be utilised until sufficient volumes have been excavated to make up the necessary fill deficit within the TNL alignment. On completion of works within the borrow site, backfilling of the cut and creation of an earth bund with up to 750,000m^3 of unsuitables extracted from larger cuts within the alignment will be undertaken.

4.3.12 Additional to the Specimen Design earthworks shown on the plans attached within **Appendix A**, areas of enabling works will be required on site during the site establishment phase with some of these works expected to occur outside the design earthworks corridor (but within the designation). The types of earthworks activities to occur as part of enabling earthworks will likely include establishment of initial site access tracking, site compounds/works depots, geotechnical investigations, vegetation clearance, erosion and sediment control installation and service relocations.

4.3.13 Given the basic and temporary nature of the enabling works, and dependence of the enabling works design upon finalised construction methodologies, specific earthworks design for these activities has not been undertaken as part of the specimen design process however will be included within the finalised site earthworks plans as required.

4.3.14 All earthworks activities will include implementation of specifically designed erosion and sediment control measures to manage potential sediment runoff effects during the construction period. In this respect, **Appendix C** includes a preliminary **Erosion and Sediment Control Plan** (ESCP) for the site which aims to confirm how the proposed earthworks can be managed in accordance with best practice to minimise the potential erosion and sedimentation effects of the project. It is anticipated that a finalised ESCP will be developed for the site as part of the detailed design and construct process to ensure that best practice erosion and sediment controls are implemented over the duration of the earthworks. In each works area, implementation of the approved ESCP will comprise the first phase of works to ensure that any potential sediment runoff from disturbed surfaces is appropriately controlled and treated prior to discharge.

4.3.15 Additionally, implementation of robust dust control methods will be required particularly where works will occur in proximity to sensitive receiver properties. In this respect, **Appendix D** includes a preliminary **Dust Management Plan** (DMP) which has been prepared to outline best practice dust management methods which can be implemented throughout the works to ensure that these potential effects are managed to avoid any adverse impacts upon adjacent parties.

4.3.16 It is notable that both the ESCP and DMP propose the use of specific technologies which utilise manufactured chemical products to maximise the proposed environmental management efficiencies of the proposed site management measures. For the ESCP this comprises the use of chemical flocculants to assist the settlement of sediment particles within sediment control devices. For the DMP, this comprises the use of dust suppressant measures in the form of polymers or similar binding products to seal soil surfaces and prevent dust mobilisation.

4.3.17 Within each works area, removal of the existing vegetation cover will be required to clear the site prior to commencing the earthworks activities. The **Ecological Effects Assessment** contained in **Appendix I** has undertaken an assessment of vegetation cover throughout the entire designation area of which an approximate 5.17ha of vegetation cover is considered to be of ecological significance based upon the Bay of Plenty Regional Policy Statement criteria. These areas include localised stands of vegetation containing native specimen trees, areas of regenerating scrubland, wet exotic grassland, a pond feature and willow treeland. The largest area of vegetation considered to be of ecological significance under this criterion comprises an area of wet grassland located within the incised gully features near the end of Harrison Road which has been deemed to be of significance based upon its hydraulic functions and potential for restoration.

4.3.18 Vegetation clearance will be undertaken prior to earthworks through either simple stripping/excavation methods (grass/scrublands) or via felling and removal with removed vegetation expected to be either chipped on site and stockpiled for later use in stabilisation of landscape batters or, in the case of trees, cut and distributed as firewood.

4.3.19 Upon completion of each area of earthworks, the finished surfaces will typically be topsoiled and grassed (or planted in accordance with approved landscaping plans) for lower gradient surfaces, or hydroseeded (for steeper cut/fill batters). Where immediate stabilisation of surfaces is required, this will typically be implemented through hay mulching or similar, approved rapid stabilisation methods.

4.3.20 As described, a PSI has been undertaken which has identified that the proposed earthworks will result in the disturbance of land and structures which comprise the historic locations of Hazardous Activities and Industrial List (HAIL) activities creating a potential for adverse land contamination effects. The identified locations will be subject to a further DSI to confirm the presence/absence of contamination in these areas and the planned land disturbance works through these areas will be undertaken in accordance with an approved Remedial Action Plan to manage any potential contamination effects of these activities.

4.3.21 While a programme for construction of the TNL is yet to be developed, the earthworks are currently expected to commence within the 2018/19 construction season and are expected to take approximately 4 years to complete. Through this application approvals for winter works are sought for localised earthworks, bridge construction and general ground improvement during the restricted operational winter works period between 1 May to 15 September.

4.4 Culverts

4.4.1 Temporary and permanent culvert installations will be required as part of the TNL construction project to both establish initial construction access into the site as part of the enabling works and to convey the permanent Expressway carriageway across a number of watercourses throughout the alignment.

4.4.2 Temporary construction access culverts will be required where existing access track crossings are not present or are inadequate to provide construction access. Temporary culverts will likely comprise low specification concrete pipes, plastic stormboss pipes or steel piling casings to convey catchment flows below construction access routes. In some instances, temporary culvert installations will simply comprise the extension of existing farm culverts to provide for large construction traffic access through the site.

4.4.3 The permanent culvert installations will comprise high specification concrete culvert pipes or larger box structures designed to convey catchment flows below the Expressway during large storm events.

4.4.4 The Culvert Summary Design Table included within the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** attached as **Appendix F** outlines a list of the permanent culvert installations to be undertaken for the TNL project. Of those culverts, those that are considered to be located within the bed of a watercourse for which consent authorisation is required, are summarised in **Table 1** below.

Table 1: Culverts Subject to Resource Consent Authorisation Under the RWLP.

Culvert ID (Culvert Number/CH/Watercourse)	Catchment Area (ha)	Culvert Diameter	Culvert Length (m)
CU01/0290/ Oturu Stream Trib	143.96	4.5 x 2.5m & 2 x 2.5 x 2.0m	130m (including replacement length)
CU02/2120/ Te Mete Gully Tributary	31.18	1050mm	105m
CU03/2400/ Te Mete Valley Stream 1	235.20	3.0m x 3.0m & 2x 3.0m x 2.0m	105m
CU04/2600/ Te Mete Valley Stream 2	5.00	2.0m x 2.0m & 2.0m x 1.5m	105
CU06/3500/ West Wairoa Flats 1	5.97	1500mm	115m
CU07/3710/ West Wairoa Flats 2	Wairoa River floodplain	1500mm	73m
CU08/3850/ West Wairoa Flats 3		1500mm	86m

CU09/4200/ East Wairoa Flats 4	Wairoa River floodplain	1500	70m
CU10/4350/ East Wairoa Flats 5		1200mm	74m
CU11/4500/ East Wairoa Flats 6		1200mm	108m
CU12/4750/ Wairoa Flats 7	9.99	1500mm	120m
CU13/5610/ Kopurererua Trib	7.76	1350mm	98m
CU14/5570 / Kopurererua Trib	32.29	3.0m x 2.0m & 2.0m x 1.5m	118m
CU15/6040/ Smiths Farm Trib	6.07	2x 1050mm	53m
CU16/6245/ Smiths Farm Trib	5.23	1050mm	60m
CU17/5400/ Smiths Farm Trib	1.47	750mm	84m
CU18/5550/ Smiths Farm Trib	5.12	1200mm	34m
CU19/5575/ Smiths Farm Trib	32.39	2.0m x 1.5m	60m

4.4.5 As identified within **Table 1**, the proposed culvert crossings provide a mix of smaller diameter, round concrete culvert installations to convey the smaller catchment flows below the alignment, along with a number of larger multi cell box culvert installations where larger catchment flows pass below the alignment.

4.4.6 The proposed design approach for all culverts is based upon ensuring no increase in upstream, backwater flooding effects. In this respect, catchment runoff calculations undertaken for culvert sizing purposes have also incorporated any known areas of future upstream land development (residential/ rural residential) along with climate change adjustments to ensure any anticipated flood increases in flows are incorporated.

4.4.7 Furthermore, the hydraulic design approach for the smaller diameter round culverts is based upon NZ Transport Agency culvert design specifications which outlines the following requirements for culvert hydraulic design capacity at Expressway sites:

- Passing the 10% AEP flow full to top of pipe;
- Passing the 1% AEP flow with a headwater depth of less than twice the culvert diameter; and
- Ensuring a minimum 500mm freeboard between the 1% AEP flood flow level and the Expressway edge of seal.

4.4.8 For the larger box culvert installations, the design requirements default to the requirements of the NZ Transport Agency's Bridge Manual document which outlines the following requirements for box culvert hydraulic design capacity:

- For catchments with no debris risk – maintain 600mm of freeboard to the top of the culvert during the 1% AEP flow;
- For catchments with debris risk – maintain 1200mm of freeboard to the top of the culvert during the 1% AEP flow; and
- Large multi-cell culverts will typically comprise a low-level culvert for conveyance of typical flows with additional culverts set at an elevated invert above the lower culvert to provide the required additional capacity during elevated flood flows.

4.4.9 In addition to these hydraulic design specifications applied to the proposed culverts the following additional design considerations have been incorporated into the preliminary culvert designs to manage additional potential environmental effects of these structures:

- The detailed design for all culverts will incorporate best practice inlet/ outlet design factoring the need for specific erosion control measures including provision of inlet/ outlet headwall/ wingwalls, aprons and flow dissipation/ armouring measures;
- Where necessary (i.e. where upstream habitats exist) the detailed culvert design will incorporate best practice measures to enable fish passage including:
    - All culverts will be generally laid out at low gradients consistent with the existing stream channel inverts and will be embedded below upstream/ downstream stream inverts to maintain a depth of flow under all conditions;
    - Culverts will be designed to maintain mean/ perimeter velocities during key catchment events to enable fish passage; and
    - Where necessary, additional measures will be incorporated within the culverts to assist fish passage including mussel spat rope installations for the smaller culverts or fabricated side baffles for the larger culverts – refer to the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** attached as **Appendix F** for further detail of the proposed measures.

4.4.10 The **Streamworks Management Plan** (SMP) attached as **Appendix E** also includes specific details of the proposed culvert installation works requirements including methods to minimise adverse water quality and ecological effects over the construction period. Generally, this will comprise implementation of either an off-line or on-line dam and diversion construction methodology to isolate the construction zone from catchment flows and to manage resident fish populations prior to culvert installation or stream channel backfilling works.

4.5 Stream Diversions/Diversion of Surface Water

4.5.1 Construction of the TNL will require both the temporary (during construction) and permanent diversion of surface water associated with both stream flow diversions and within existing flood storage areas.

Stream Diversions

4.5.2 A number of permanent stream diversions are proposed throughout the TNL where either ephemeral or permanent stream channels are required to be diverted from their current alignments. This may occur where stream channels can be diverted around an area of construction earthworks (e.g. Ch. 6200m) or where stream diversions are required in conjunction with a proposed culvert to divert the stream channel either into or out of a new culvert structure (e.g. Ch. 350m).

4.5.3 The locations of the proposed stream diversion works are outlined on the **Culverts and Streams Plans** contained in **Appendix F** and further information outlining the features that will be incorporated into the diversions is provided within the SMP attached as **Appendix E.** In general, the watercourse locations where diversions are proposed comprise sections of highly impacted stream habitat due to past modifications associated with agricultural land use activities. The proposed diversion will typically be configured to replicate the existing stream channel profile at each location however, where appropriate the works will aim to enhance the ecological/natural values of the stream channel section through the proposed channel design and riparian planting.

4.5.4 The SMP also includes specific details of the proposed stream diversion construction methodologies including methods to minimise adverse water quality and ecological effects over the construction period. Again, this will comprise implementation of either an off-line construction methodology or alternatively the damming and temporary diversion of stream flows to isolate the construction zone from upstream/downstream flows. Hence this application also seeks authorisation for these temporary diversions where required for any in-stream culvert or stream diversion construction works.

Floodwater Diversion

4.5.5 Additional to the proposed stream diversion activities, the proposed works will result in the diversion of surface water in situations where construction of the Expressway displaces existing flood storage or creates an impediment to flood flows through infilling of floodplain surfaces. In particular, the following locations are identified where works are proposed outside of standard culvert crossing installations with bulk filling occurring within identified floodplain locations which will result in the loss of existing floodplain storage and/or impediments to flood flows:

- Ch. 3350-4600m: Construction of the proposed TNL embankment across the Wairoa River floodplain resulting in the loss of existing flood storage across the proposed embankment footprint and the impediment to flood flows across the floodplain;
- Takitimu Drive carriageway widening works resulting in the loss of existing flood storage capacity within the Kopurererua Stream Valley.

4.5.6 Within these locations the earthworks and associated drainage systems have been designed to minimise any flood impacts to the greatest extent possible to avoid any adverse increases in catchment flooding effects or flood flow velocities. The proposed design measures and impacts of these activities are addressed within the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** included within **Appendix F.**

4.6 Bridges

4.6.1 The TNL alignment comprises two locations where construction of significant bridge structures are proposed to convey the carriageway over watercourses.

Minden Gully Bridge

4.6.2 The first location along the alignment comprises the proposed Minden Road Gully crossing where consent authorisation is being sought for a large-scale viaduct type bridge crossing to traverse this deeply incised gully.

4.6.3 The proposed bridge structure at this location will comprise an approximate 170m long by 50m wide viaduct structure with multiple pier supports extending down the gully slopes and across the gully floor to support the bridge structure. The gully edge bridge abutments and gully piers will be constructed through initial piling works to establish the subsurface foundations. Once established, the bridge piers will be formed upward from these foundations followed by formation of the pier crossheads and placement of the bridge beams and deck. The bridge piers within the gully floor area will be located outside of the Hakao Stream channel and the stream can be maintained on its existing alignment through the centre of the gully floor throughout and following the bridge construction works. Although outside of the channel, the bridge piers closest to the stream channel will incorporate provision of appropriate scour protection measures to protect the structure from any adverse erosion/scour effects during large scale flood events.

4.6.4 In addition to the permanent TNL viaduct/bridge structure at Minden Gully site, a temporary bridge crossing will also be required within the gully floor area over the duration of the permanent bridge construction activities to provide access to both sides of the Hakao Stream channel during these works. The temporary bridge will be established within the immediate vicinity of the permanent structure (likely just downstream) and will be formed through placement of compacted aggregate approach embankments on either side of the stream followed by placement of a temporary single span deck structure across the narrow channel within this area. The temporary bridge crossing is likely to be in place for a maximum period of 2 years to allow for establishment of the permanent bridge crossing.

Wairoa River Bridge

4.6.5 A bridge crossing is proposed to convey the TNL carriageway over the Wairoa River and its immediate floodplain margins. The river channel at the proposed location is around 70m wide and is located at the centre of the broad (approximately 1.2km wide) Wairoa River floodplain/valley.

4.6.6 The proposed bridge structure has not yet been fully developed due to the specimen design nature of this application. Specific details will be subject to amendment by the Contractor through the Design and Construct specifications of the contract. In this regard, the specimen design provides an indicative design for the purpose of assessing its effects on the environment. The specimen design of the bridge comprises the use of pre-cast pre-tensioned concrete 1.2m deep Super-T units. Super-T units generally have a maximum span of 35m which would dictate the placement of further piers within the Wairoa River floodplain (if this bridge form were adopted by the Contractor). The bridge length and span configuration itself is governed by a combination of vertical and horizontal clearances, including the provision for navigation clearance, flood passage, location of piers within the Wairoa River waterbody and slope stability at the riverbank. The specimen design configuration allows for the provision of an access track under the bridge at either bank of the river if required for future maintenance purposes. This combination of requirements is expected to result in an overall bridge length of 385m.

4.6.7 Although the bridge design is unknown, through hydraulic modelling and consultation the Transport Agency is proposing the bridge has a single span across the Wairoa River, being 35m between piers. Each of the two piers will be further situated at least 17m into the waterbody either side of the riverbank. Those requirements are set by the draft conditions of consent within **Appendix M** of this report.

4.6.8 The bridge soffit level has been set at a level of RL 7.85, approximately 6m above the natural ground level of the riverbank. This level is based upon the Transport Agency's Bridge Manual, which specifies a requirement for maintaining 1200mm of freeboard to the bridge soffit during the 1% AEP flow for catchments with debris risk.

4.6.9 Construction of the bridge abutments and those piers located outside of the river channel can be undertaken using typical piling construction methods and erosion and sediment controls within the river margins. For the piers located within the bed of the Wairoa River, a temporary access across the river is proposed in the form of a temporary steel pile supported staging crossing, which will allow access to the permanent pier sites to undertake the piling and pier formation works within the river bed. In addition, this temporary river bed structure will be constructed to span the entire river channel in this location to establish an initial river crossing allowing construction traffic to traverse the river channel early in the project thereby allowing for construction efficiencies and to avoid the use of public roads.

4.6.10 This temporary bridge will comprise localised earthworks to the Wairoa River bank to establish rock based crane platforms either side, the sinking of multiple temporary steel tube driven piles, placement of steel beams to support upper platform placement and the installation of a combination of concrete and steel running boards for machinery movements either side of the alignment. The temporary access bridge will be engineered in a manner to enable laden articulated Moxy's and other cranes/ machinery to either cross or establish a stationary work position on the bridge. An example of a temporary staging bridge is shown in **Figure 2** of this report.

4.6.11 Further details of how both the permanent and temporary bridge structures at both the Minden Gully and Wairoa River sites will be established and proposed environmental management provisions are outlined in detail within the **Erosion and Sediment Control Plan** attached within **Appendix C**.

Figure 2: Temporary Staging Bridge and Access Haul Road

4.7 Drilling and Piling Below the Water Table

4.7.1 Drilling/piling activities which are likely to extend below the water table will be required for the TNL construction activities typically associated with installation of bridge piles or for ground improvement works around bridge crossings or within areas where existing soils require treatment for road construction.

4.7.2 Drilling/piling operations will be required for both the local road and river bridges on the TNL at the following locations:

- Minden Road Overbridge;
- Minden Gully Bridge;
- Wairoa Road Overbridge;
- Wairoa River Bridge;
- Cambridge Road Overbridge;
- Richards Way Underpass;
- Takitimu Drive Overbridge; and
- Fifteenth Avenue On-ramp.

4.7.3 **Preliminary Bridge Design Plans** for the Minden Gully Bridge and the Wairoa River Bridge are included within **Appendix A**, with each bridge design outlining installation of a series of piles to support the bridge beams/deck.

4.7.4 A summary of pile numbers and piling depth at each of the bridge sites based upon the preliminary design is outlined in **Table 2**.

Table 2: Bridge Piling Details (Specimen Design)

Piling Location	Number of Piles	Approx Piling Depth at Location (m)
Minden Road Overbridge	12	15m – 30m
Minden Gully Bridge	23	10m – 35m
Wairoa Road Overbridge	6	10m – 15m
Wairoa River Bridge	21	25m – 35m
Cambridge Road Overbridge	6	18m – 22m
Richards Way Underpass	8	15m – 20m
Takitimu Drive Overbridge	10	25m – 30m
Fifteenth Avenue On-ramp	10	25m – 35m

4.7.5 While the bridge construction methodology generally anticipates the use of bottom driven tube piles, the finalised design may utilise alternative piling methods including top driven steel tubes or bored piles which may also dictate the use of drill fluids (bentonite or polymer). Finished pile/drill excavations will typically be backfilled with concrete and reinforcing steel to form the bridge structure foundation.

4.7.6 Additional to the immediate bridge piling activities, ground improvement works may also be required at these locations and throughout the site which require drilling below the water table for installation of stone columns or similar ground strengthening techniques.

4.7.7 Piling operations will be undertaken by either a large piling or drill rig operating from a specific piling platform established within the site perimeter controls.

4.8 Divert, Take and Use Groundwater

4.8.1 The proposed earthworks include numerous large scale cuts throughout the site with the potential for some of the cuts to extend below groundwater levels resulting in the interception and drainage of groundwater flows within these areas. Groundwater drainage from these areas will typically initially occur into the proposed sediment control devices (sediment retention ponds/decanting earth bunds) from which it can be harvested for use within construction activities including for dust suppression or sub grade/pavement preparation works. In the long term, any remaining seepage flows will occur to the permanent TNL drainage system which will convey flows to the site outlet points.

4.8.2 Additional to these operations, other activities are anticipated within the site which will require excavations and temporary dewatering below the groundwater table (e.g. stormwater wetland excavations). Dewatering from these operations will potentially be required in these areas to maintain a dry working site with dewatering occurring via pump out to a nearby sediment control device or in accordance with an approved dewatering methodology to prevent any sediment contamination effects.

4.8.3 Water take volumes associated with these activities are not known as these will be dependent upon the finalised design of cuts, the water table levels at the time of construction and whether these are encountered during excavations.

4.9 Take and Use Surface Water

4.9.1 Large volume surface water take is required to provide the main water supply option for dust suppression, earthworks construction, pavement construction, concrete batching and the irrigation of re-vegetation and landscape planting during the construction phase of the TNL Expressway.

4.9.2 Within the designation, the only waterbody capable of providing a reliable, large volume, sustainable water supply for the construction activities is considered to be the Wairoa River.

4.9.3 It is reasonably difficult to accurately estimate the required water take volumes for a large-scale construction project as this will be dependent upon multiple factors including weather conditions, moisture content of site soils, extent and duration of open exposed surfaces and proximity of works to sensitive receivers. In this respect, consideration has been given to previously consented water take volumes established for a number of other largescale Expressway construction projects undertaken by the Transport Agency including the Ngaruawahia, Cambridge, Rangiriri and Huntly sections of the Waikato Expressway which were also reliant upon temporary surface water takes for construction water supply. These projects obtained consented water take volumes of between 300 – 600m^3/day which has proven to provide sufficient water supply volume for these previous/current Expressway construction projects. It is noted that these previously consented projects have generally comprised greater lengths of Expressway construction works and in some cases, requiring much larger bulk earthworks operations than the proposed TNL activities. However, in the case of the TNL, it is notable that the alignment passes in close proximity to numerous residential dwellings as well as extensive areas of orchards which is considered to present a heightened risk for adverse dust effects than these previous projects and a subsequent increased demand for water cart deployment for dust control works.

4.9.4 On this basis, and considering the significant volume flow of the Wairoa River at this point at the bottom of its catchment, a water take volume of 800m^3/day is proposed for construction water supply purposes for the TNL project. It is expected that this maximum daily water take will not be required to reach a maximum value every day over the 4-year estimated construction programme. As such, the volume of the water take will vary dependent on the weather conditions of the site and the subsequent Contractor's requirements dependent on works area i.e. the extent of works and proximity to neighbours will dictate the required daily volume of water take and application rate.

4.9.5 The proposed water intake at each site will likely comprise a 150mm intake pipe floated on the river surface and will be configured to maintain a maximum intake velocity of 0.3 metres per second and with an intake screen aperture not exceeding 1.5mm in accordance with Regional Water and Land Plan requirements. Water will likely be pumped directly to an elevated hose outlet for filling of water tankers. Based on previous water takes for Expressway construction projects, a maximum rate of take from the Wairoa River may be operated at a maximum capacity of 90l/s.

4.9.6 The water take will incorporate an appropriately calibrated water measuring system to quantify the daily take volume to ensure this does not exceed consented volumes.

4.9.7 Additional to this primary water take location, secondary water supply is proposed to occur from all sediment control devices throughout the site. Water within sediment control devices may comprise either groundwater flows intercepted through site excavations or surface runoff following a rain event.

4.9.8 Water take from these devices will provide a more practical option for low volume water supply requirements particularly for areas within the western/eastern parts of the alignment, distant from the primary Wairoa River supply location and in terms of cultural and sustainability principles they will be used as much as practicable. However, given the lower/uncertain volumes available within these devices and seasonal limitations for runoff into these devices, they are unlikely to provide a reliable water supply during the summer months and thus cannot be solely relied upon as a construction water supply option.

4.9.9 Additional water supply options may also be established throughout the site either via existing consented groundwater or surface water takes or via establishment of new consented takes. It will be

the responsibility of the Contractor to either vary resource consents held by the Transport Agency for TNL or to seek additional new consented takes from BOPRC where additional water takes are deemed necessary for dust control and construction activities.

4.9.10 In any case, the proposed construction water take activities will comprise temporary activities over the approximate 4-year construction period for the TNL with usage generally occurring on an intermittent basis focusing over the drier summer months.

4.10 Divert and Discharge Stormwater

4.10.1 Construction of the TNL will result in the creation of significant lengths/areas of new pavement resulting in the generation of permanent stormwater runoff from the pavement surfaces. Runoff will be captured and conveyed within the proposed stormwater management systems to discharge points to the adjacent waterbodies.

4.10.2 The philosophy behind the proposed stormwater design is based upon the management of potential downstream water quality and quantity effects to ensure that potential effects from the new pavement surfaces within the receiving watercourses are no more than minor. In this respect, the proposed design considerations are outlined within the **Stormwater Management Report** attached as **Appendix G** with the preliminary stormwater design outlined upon the preliminary Drainage Plans contained therein.

4.10.3 The key features of the proposed Expressway stormwater management system are summarised as follows:

- Installation of a stormwater drainage system comprising either open swales or piped reticulation capable of capture/ conveyance of the 10% AEP event;
- Provision of overland flow paths for conveyance of flows in excess of the primary drainage systems capacity up to the 1% AEP event;
- Conveyance of almost all runoff from the Expressway surfaces to nine proposed wetland devices designed in accordance with the NZ Transport Agency's '*Stormwater Treatment Standard for State Highway Infrastructure*', dated May 2010;
- Six of the proposed wetland devices are designed to provide for water quality treatment, peak flow attenuation (flood control) and extended detention (channel erosion control) in accordance with the Transport Agency's standard mentioned above;
- Two of the proposed wetland devices comprising wetlands 005, 006 (Wairoa River floodplain) and 009 (Takitimu Drive) are designed to provide for water quality treatment only in accordance with the Transport Agency's standard based upon their locations within the identified floodplains of the adjacent watercourses along with discharges occurring to the tidal reaches of these larger watercourses;
- Wetland 009 at Takitimu Drive is identified as being located within the floodplain of the Kopurererua Stream. Water quantity design requirements for this wetland are still subject to further discussion with TCC and BOPRC;
- Runoff from the final 600m length, northern half of the TNL at Takitimu Drive will discharge via a proposed treatment swale designed in accordance with the Transport Agency's '*Stormwater Treatment Standard for State Highway Infrastructure*', dated May 2010;
- Stormwater management methodologies resulting from the widening of the Takitimu Drive embankment and construction at Fifteenth Avenue are still subject to development of a mitigation plan with TCC and BOPRC and those effects will be mitigated through ongoing discussions.

4.10.4 Preliminary Design Calculations and Design Plans for the Specimen Design stormwater management devices are outlined within the **Stormwater Management Report** within **Appendix G**.

4.10.5 All stormwater discharge outlets will include provision of appropriate erosion and scour protection measures including provision of wingwalls, aprons and rock armour as required to address any potential erosion and scour risks at discharge outlets to the receiving environment. Typical details confirming the types of outlet controls to be implemented throughout the site is provided within **Appendix G**.

4.10.6 It is important to note that the Stormwater Design provided within **Appendix G** outlines one methodology by which the potential stormwater quality and quantity effects associated with the TNL can effectively be managed in accordance with best practice methods to manage any potential downstream effects of these activities. However, through the detailed design process, alternative methods should also be anticipated which may vary from the exact methods outlined within the Specimen Design documents. Nonetheless, the Applicant is committed to maintaining the same stormwater management objectives in-line with their best practice guideline document to ensure that any potential stormwater quality and quantity effects are avoided.

4.11 Discharge Structures

4.11.1 Stormwater discharge outfalls from the proposed wetland devices are typically expected to occur to a length of constructed outlet channel prior to entering any watercourse hence avoiding the requirement for installation of outfall structures within natural watercourses. However, some discharge structures may be installed within the bed of watercourses where discharges will occur directly into permanent waterbodies.

4.11.2 As described above, while site specific design of discharge outlets has not been undertaken they will incorporate appropriate design measures to avoid any potential adverse effects as indicated upon the generic outlet plans contained within **Appendix G**.

4.12 Ecological Mitigation

4.12.1 Despite the degraded and potentially declining nature of ecological habitats within the site, the direct and indirect ecological effects of the project are acknowledged. In response to these effects, part of the project proposal as outlined within the application documents comprises the development and implementation of an Ecological Mitigation Plan which includes the following mitigation activities:

- Development/ implementation of a number of additional species specific Ecological Management Plans which outline specific methodologies to minimise ecological impacts on these species over the construction period (e.g. Lizard Management Plan etc.);
- Establishment of new areas of stream channel/ wetland habitat of a greater quality than existing; and
- Extensive areas of wetland, riparian and terrestrial planting based upon the extent and nature of the ecological disturbance resulting from the project.

4.12.2 The proposed Ecological Mitigation Plan is described further within the **Ecological Effects Assessment** report attached as **Appendix I** and is discussed further within Section 12 of this report.

5. STATUS OF ACTIVITIES UNDER THE BAY OF PLENTY REGIONAL WATER & LAND PLAN

Resource consent authorisation is required under the following provisions of the Bay of Plenty Regional Water and Land Plan (RWLP):

5.1 Earthworks, Vegetation Clearance, Overburden Disposal & Disturbance of Contaminated Land

5.1.1 Construction of the TNL Expressway will require significant areas/ volumes of earthworks within the 'Riparian Management Zone' and land areas not otherwise covered by (a) to (e) of Rule 1 which are unable to comply with the permitted activity standards of the RWLP and are considered potentially unable to comply with the standards for controlled and restricted discretionary activities in Rules 1A and 1B. A precautionary approach is subsequently being undertaken to obtain authorisation for bulk cut and fill earthworks.

5.1.2 The proposed earthworks are to be considered as a Discretionary Activity in accordance with Rule 1C of the RWLP.

5.1.3 Construction of the TNL Expressway will further require land and soil disturbance authorisation due to vegetation clearance for site preparation works and earthworks which are considered to be unable to comply with the permitted standards in Rule 2 of the RWLP. Again, a precautionary approach has been adopted to obtain authorisation for bulk vegetation clearance.

5.1.4 The proposed land and soil disturbance associated with vegetation clearance may be considered as a Discretionary Activity in accordance with Rule 2C of the RWLP.

5.1.5 The proposed land and soil disturbance activities associated with earthworks and vegetation clearance works may result in the discharge of contaminants to land or water and/or remediation of identified contaminated sites in accordance with the requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. Those land disturbance activities will further require concurrent consents from TCC and WBoPDC. Remediation and disturbance of contaminated land for construction of the TNL Expressway will require resource consent as a Restricted Discretionary Activity in accordance with Rule 35 of the RWLP.

5.2 Discharges to Land and Water – Dust Suppressants

5.2.1 In order to prevent the discharges of dust and other particulate matter during the course of the earthworks activities, the application of best practice proprietary sediment and dust suppressants (i.e. flocculants and dust suppressant polymers) is necessary. Those discharges are to be assessed against Rule 37 of the RWLP. The discharge of contaminants to land where they may enter water is a Discretionary Activity under that rule, therefore the proposed use of dust suppressants is considered accordingly within this report.

5.3 Culverts

5.3.1 A total of 25 culverts (box, pipe and multi-barrel) are identified as required throughout the TNL; subject to resource consent authorisations. Details of those culverts are included within the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** attached within **Appendix F** of this report. The total contributing catchment areas for the TNL are noted as being in excess of 10km^2 (1,000ha).

5.3.2 The use erection and placement of culverts in, on or under the bed of streams, rivers and lakes and associated bed disturbance for the TNL are not covered by Territorial Authority and Transport Agency specific rules (Rules 58 – 58B) of the RWLP on the basis construction and maintenance of those structures will not be made either under the Local Government Act 1974 or the Transit New Zealand Act 1989 (i.e. they will be authorised under the RMA). Therefore, Rules 59 – 59D are applicable for assessment of those culverts.

5.3.3 As with other required consents, the Transport Agency has adopted a precautionary approach to assessment of those required culverts. To that effect, it is anticipated that culverts may exceed the maximum depth of fill, maximum diameter, location (including distance from Urban Areas or Settlements) and the length of the construction period for the works. Therefore, culverts required for the TNL will require resource consent authorisations as a Discretionary Activity under Rule 71 of the RWLP.

5.4 Diversion of Streams/Surface Water

5.4.1 Diversion of stream flows and surface flood water will occur in association with the following activities associated with the TNL Expressway:

- Temporary stream flow diversions associated with streamworks construction activities such as culvert installations;
- Permanent stream diversion where required to divert stream channels around the Expressway embankments; and
- Permanent surface water diversions where the Expressway embankments are located within existing flood ponding areas or major overland flow paths.

5.4.2 The damming of surface runoff water is a permitted activity under Rule 46 of the RWLP and where compliance cannot be met with conditions (a) to (g) the activity defaults to a restricted discretionary activity under Rule 46A. The damming of water within the bed of a river or stream is additionally a permitted activity where undertaken in accordance with Rule 47 of the RWLP, and where compliance cannot be met with conditions (a) to (q), defaults to a Restricted Discretionary Activity under Rule 47B.

5.4.3 While the RWLP provides for the damming of surface runoff water and water within a river or stream on a permanent basis; diversion as a direct result of that damming requires assessment of compliance under Rule 48 of the RWLP. As the precautionary principle has been adopted for this compliance assessment, the permanent damming and diversion of any stream or surface floodwaters associated with the TNL Expressway are bundled as Discretionary Activities in accordance with Rule 48 of the RWLP.

5.5 Structures within the Bed of a Stream, River or Lake (Wairoa River & Minden Gully Bridges)

5.5.1 The RWLP contains two sets of rules regulating the construction of single span bridges within the beds of streams, rivers and lakes. Rule 58 of the RWLP permits the construction of single span bridges by a local government authority or the Transport Agency within or 1km upstream of urban areas as a Permitted Activity. Urban areas are defined within the RWLP as follows:

> *"Urban area or settlement – an area which contains an aggregation of more than 50 lots or sites of an average size of no more than 1,000m².”*

5.5.2 Hence, as the application proposes the construction of the Wairoa River and Minden Gully Bridges outside of an area classified as an urban area under the RWLP, the proposed bridges cannot be considered in accordance with Rule 58.

5.5.3 Single span bridges outside the scope of Rule 58 are thereby required to be assessed against Rules 60 – 60B of the RWLP. Detailed design of the Wairoa River Bridge has not been formalised as of yet and as such it is difficult to confirm compliance of the bridge with those identified conditions of Rules 60 – 60B. On that basis, a precautionary approach has been adopted to consenting of the structure within the bed of the Wairoa River. A similar approach has been adopted for the Minden Gully Bridge. While it

is highly likely that this bridge will be single span, it is unlikely all other conditions will be met by the design.

5.5.4 Where any bridge is proposed that is not single span or cannot comply with those above conditions, Rule 71 must apply to the activity. Resource consent is therefore sought as a Discretionary Activity overall under Rule 71 of the RWLP.

5.6 Bridge Pile Installation & Drilling within the Bed of a Stream, River or Lake

5.6.1 Rule 40 of the RWLP provides for the drilling of land where the activity does not intercept a water table or aquifer as a permitted activity. Where the activity does intercept a water table or aquifer and includes the associated discharge of drilling fluids for purposes other than construction of a bore, Rule 40A (Controlled – Drilling) reserves the control of the BOPRC to the following:

(a) Location and depth of the drilling.
(b) The method of drilling.
(c) Management of the drilling hole on completion.
(d) The proximity of the hole to surface water, potential sources of groundwater contamination, and existing bores.
(e) Measures to avoid, remedy or mitigate the adverse effects of the activity on groundwater quality and quantity and pressure.
(f) The duration of the resource consent.
(g) Information and monitoring requirements.
(h) Administration charges under Section 36 of the Act.
(i) Decommissioning requirements.

5.6.2 The proposed drilling activity to install bridge piles within the bed of the Wairoa River may intercept a water table, will disturb the bed of the Wairoa River and is expected to discharge fluids other than drilling fluids for purposes other than the construction of a bore. The activity therefore requires consideration under Rule 71(2) (Discretionary – Activity in the Beds of Streams, Rivers and Lakes) of the RWLP. Consent is subsequently sought as a Discretionary Activity for drilling associated with pile installation in the bed of the Wairoa River.

5.6.3 It is noted that the drilling activity will be further required outside the bed of a watercourse where pile installation for the bridge abutments or for the installation of soil strengthening structures is required throughout the Designated Corridor. That drilling is addressed in Section 5.7 below.

5.7 Drilling of Land

5.7.1 The drilling of land outside of the bed of a watercourse as described above where pile installations for bridge abutments at several overbridge locations within the alignment, and for the installation of soil strengthening structures, is required is subject to an assessment under Rules 40 and 40A of the RWLP. As described, Rule 40 of the RWLP provides for the drilling of land where the activity does not intercept a water table or aquifer as a permitted activity. Where the activity does intercept a water table or aquifer and includes the associated discharge of drilling fluids for purposes other than for the construction of a bore Rule 40A – Controlled applies.

5.7.2 Drilling for the placement of overbridge abutment piles and the installation of soil strengthening structures is expected to intercept the water table during the works. As such, drilling works, and the associated discharge of drilling fluids, will be subject to compliance with the conditions of Rule 40A. It is expected that those conditions can be adhered to by the Contractor and as such consent for all drilling other than in the bed of a stream, river or lake will be a Controlled Activity.

5.8 Diversion and Take of Groundwater

5.8.1 Rule 38 of the RWLP allows for the take and use of up to 35m^3 of groundwater per day per property as a Permitted Activity. The taking of groundwater anticipated at the site from the site earthworks cuts, ponds and within areas of ground improvement works is expected to be significantly greater than this permitted volume. That take also includes the use of dewatering mechanisms within areas susceptible to groundwater seepage. The proposed take is thus to be considered as a Discretionary Activity in accordance with Rule 43 of the RWLP.

5.8.2 Rule 48 of the RWLP allows for the damming or diversion of water not identified as a permitted, restricted discretionary or prohibited activity within the RWLP. Subsequently, resource consent is sought for the diversion of groundwater as a Discretionary Activity under Rule 48 of the RWLP.

5.9 Surface Water Take

5.9.1 Rule 41 of the RWLP allows for the taking of up to 15m^3 of surface water per day per property as a Permitted Activity. It is proposed to take water from the Wairoa River and other ephemeral stream sources at a significantly greater allowance with a proposed maximum daily take volume of 800m^3. It is further expected the proposed take will not comply with Controlled Activity Rule 41A and thus the proposed take is to be considered as a Discretionary Activity in accordance with Rule 43 of the RWLP.

5.9.2 The take of surface water further requires authorisations for the use and placement of intake structures within the bed of a stream, river or lake to be assessed primarily under permitted activity Rule 52. The use of intake structures is not expected to comply with permitted conditions (a) to (x) of Rule 52, therefore consent will be required for those structures in accordance with discretionary activity Rule 71 of the RWLP.

5.10 Diversion and Discharge of Stormwater

5.10.1 Rule 44A of the RWLP allows for the diversion of stormwater (surface runoff) as a Permitted Activity subject to compliance with conditions (a) and (b). It is noted that this rule does not provide for the discharge of that stormwater to surface water or land soakage as authorised under Rules 30-31 and 37 of the RWLP.

5.10.2 Given the scale of the works proposed and requirements for the installation of erosion and sediment controls for land disturbance, it is deemed difficult to confirm compliance with conditions (a) and (b) of Rule 44A at all stages of the works. Precautionary resource consent authorisation is hence being sought for stormwater diversion as a Discretionary Activity in accordance with Rule 48 of the RWLP.

5.10.3 Rules 30 and 30A of the RWLP provide for the discharge of stormwater to surface water as Permitted and Restricted Discretionary Activities respectively, subject to compliance with those specified conditions of each rule, and the requirements of those rules within Section 9.4 of the RWLP. Further, Rules 31 and 31A of the RWLP allow for the discharge of stormwater to land soakage as Permitted and Restricted Discretionary Activities also subject to compliance with those relevant specified conditions and the requirements in Section 9.4 of the RWLP.

5.10.4 Similar to the above diversion assessment, the scale of the proposed works are such that detailed requirements for discharge of stormwater to either surface water or land soakage and those associated construction requirements are difficult to confirm until Design and Construction documents are finalised and released for construction. It is again proposed that the precautionary approach to an assessment of the activity be adopted. Subsequently consent authorisation is sought as a Discretionary Activity in accordance with Rule 37 of the RWLP.

5.11 Discharge Structures

5.11.1 While detailed drainage design has not yet been undertaken, there is a high likelihood that the finalised design will include installation of stormwater discharge structures within the bed of the river, streams and watercourses within the site.

5.11.2 Rule 53 provides for the installation of discharge structures in, on, under or over the beds of rivers and streams, and associated bed disturbance, as a permitted activity where the activity meets the conditions under (a) to (u). As compliance with those conditions cannot be guaranteed before construction commences, a precautionary approach is being undertaken to obtain consent authorisation for any discharge structures. These activities are therefore considered to be Discretionary Activities in accordance with Rule 71 of the RWLP.

5.12 Wetlands

5.12.1 The TNL site covers areas identified in the **Ecological Effects Assessment** (**Appendix I**) as areas of saturated ground populated by exotic pastoral groundcover and the presence of sedges and rushes. Modification and destruction of those areas are required in order to undertake earthworks activities, including construction of stormwater attenuation ponds and wetland creation. The RWLP states that consent is required for the modification or destruction of wetlands where the environment falls within the definition of wetlands in the RWLP. That definition is as follows:

> *"Wetlands – Includes permanently or intermittently wet areas, shallow water, and land margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.*
>
> *For the avoidance of doubt, the term 'wetland' applies to water bodies and intermittently wet areas. The term does not apply to dry land that does not support a natural ecosystem of plants and animals that are adapted to wet conditions, and that occurs within an area commonly referred to in its entirely as a wetland.*
>
> *For the purposes of this reginal plan, 'wetland' excludes:*
>
> *a) Wetted pasture and pasture with patches of rushes;*
> *b) Oxidation ponds;*
> *c) Artificial waterbodies used for wastewater or stormwater treatment. This includes wetlands that have been developed primarily for effluent or stormwater treatment for disposal, but are managed to appear 'natural';*
> *d) Artificial farm dams and detention dams;*
> *e) Land drainage canals and drains;*
> *f) Artificial reservoirs for firefighting, domestic or municipal water supply;*
> *g) Temporary ponded rainfall over areas that would otherwise not be considered a wetland; and*
> *h) Artificial waterbodies that are not in the bed of a stream, river or lake; and are not degraded natural wetlands that have been modified. This includes artificial waterbodies that are managed to appear 'natural'.*

5.12.2 Conclusions reached within the Assessment of Ecological Effects confirms those areas of saturated ground within the alignment of TNL as falling under the exceptions to the definition listed above. Nevertheless, a precautionary approach has been applied to works within wetted pasture areas, in particular within the Kopurererua Stream tributary proximity and the Wairoa River floodplains. Construction of the TNL will facilitate the introduction of indigenous plant species within those areas

to be redeveloped as wetlands adjacent to the alignment with species sourced from the Tauranga Ecological District (permitted under Rule 79 of the RWLP), will require the movement of non-hand-held machinery within the wetted pasture areas to remove existing plant species including potentially indigenous plant species and requires the overall modification of wetland areas. The activity accordingly requires resource consent for the modification, destruction or disturbance of wetland areas as a Discretionary Activity under Rule 85 of the RWLP.

6. PROPOSED PLAN CHANGE 9: REGION-WIDE WATER QUANTITY

6.1 Proposed Plan Change 9 (Region-wide Water Quality) to the RWLP introduces a comprehensive new set of issues, objectives, policies, methods and rules relating to the allocation, take and use of surface water and groundwater in response to Councils obligations under the National Policy Statement for Freshwater Management 2014. Plan Change 9 has now passed the close of submissions with hearings scheduled on submissions in November 2017. Section 86B of the Resource Management Act 1991 states rules within a proposed plan have immediate legal effect from the date of public notification of the rule where the rules relate to or protect water, air or soil, significant areas of indigenous vegetation, significant areas of indigenous fauna, protect historic heritage or relate to aquiculture (s86B(3)(a)-(e)). Rules within Plan Change 9 relating to the take and use of water sought by the Transport Agency require a further assessment for compliance under TNL.

Take and Use of Groundwater

6.2 Rule WQ R1 of Plan Change 9 allows for the take and use of groundwater with a temperature less than 30° Celsius, where the property size is less than 5 hectares, the rate of take does not exceed 2.5 l/s and quantity of water taken does not exceed 15m^3 per day per property as a permitted activity. Where the take and use of groundwater exceeds any of those criteria under Rule WQ R1 of Plan Change 9 and below 35m^3 per day per property the activity is a controlled activity. As stated in Section 5 above, the taking of groundwater anticipated at the site from earthworks cuts, ponds and within ground improvement areas is expected to significantly exceed both permitted and controlled volumes under Rule WQ R1. The take also includes the use of dewatering mechanisms within areas susceptible to groundwater seepage. Restricted Discretionary Rule WQ R10 of the Plan Change requires the take and use of groundwater to be monitored via the use of water meters, to not exceed interim limits set by Policy WQ P5 and to not be a prohibited activity under Rule 49 of the RWLP. Groundwater seepage from earthworks cuts may exceed the interim limits set by Policy WQ P5 and will not be monitored by a water meter, therefore the activity defaults to a Discretionary Activity under Plan Change 9.

6.3 The proposed take and use of groundwater for the TNL construction activities will require resource consent as a Discretionary Activity under Rule WQ R11 of Proposed Plan Change 9 (Region-wide Water Quality).

Take and Use of Surface Water

6.4 Rule WQ R3 of Plan Change 9 allows for the take and use of surface water as a permitted activity where the temperature of the water does not exceed 30° Celcius, the rate of take does not exceed 2.5 l/s and the quantity taken does not exceed 15m^3 per day per property. TNL requires a maximum daily surface water take from the Wairoa River of 800m^3 per day and therefore defaults to an assessment as a restricted discretionary activity under Rule WQ R10. As outlined in below in Section 12 (Assessment of Environmental Effects) of this report, the Wairoa River has an available allocable daily take of 1,210m^3 per day below the 10% Q_5 7-day low flow period, capable of accommodating the proposed take over a temporary period. Water takes from the Wairoa River will be monitored via use of meters attached to the intake structures and associated pumps.

6.5 The proposed take and use of surface water for the TNL construction activities will require resource consent as a Restricted Discretionary Activity under Rule WQ R10 of Proposed Plan Change 9 (Region-wide Water Quality).

7. CONSENT DURATIONS

Separate consent durations are sought for the various activities being dependent upon either the temporary (construction works) or permanent (structural) nature of the activity as follows.

7.1 Temporary/Construction Activities

7.1.1 A consent duration of 10 years is being sought for the temporary activities associated with construction of the TNL Expressway including the following activities/consents:

- Earthworks, Vegetation Clearance, Overburden Disposal and Contaminated Land Disturbance;
- To install Intake Structures;
- Take and Use Groundwater;
- Take and Use Surface Water;
- To undertake drilling within the bed of a watercourse;
- To undertake drilling below the water table;
- To discharge contaminants to land and water;
- To divert and discharge sediment-contaminated stormwater and surface water to land and water; and
- To modify, destroy or disturb a wetland.

7.1.2 This duration is being sought based upon the significant scale of the proposed activities and the lengthy construction programme duration (4-5 years) and the potential for project delays both in terms of construction commencement dates (being subject to government funding/priority and contract processes) and over the construction phase (unforeseen circumstances and weather conditions).

7.1.3 It is noted that while a duration of 10 years is being sought for the construction activities, any associated effects will be limited to the 4 to 5-year construction period only.

7.2 Permanent Activities/Structures

7.2.1 A consent duration of 35 years is being sought for the permanent activities/structures associated with the TNL Expressway including the following activities/consents:

- To install Culverts within the road and within the beds of watercourses;
- To install Discharge Structures within the Beds of Streams, Rivers or Lakes;
- To permanently discharge stormwater to water, to land and to land where it may enter water;
- To divert Surface Water;
- To divert Groundwater; and
- To erect structures over the bed of a watercourse (Wairoa River and Minden Gully Bridges).

7.2.2 It is considered appropriate that the duration of the consent authorisations for these activities is 35 years in accordance with the provisions of section 123 of the RMA. This duration is recommended based upon the permanent nature of these activities and represents the maximum allowable consent duration under the RMA.

8. SUMMARY OF CONSENTS REQUIRED

8.1 The RWLP describes the consent requirements for the construction and operation of the TNL Expressway. Consent requirements have been determined in consultation with BOPRC staff and are summarised in **Table 3** below.

Table 3: Summary of TNL Consent Requirements

Consent	Rule (RWLP)	Plan Change 9 Rule	Activity Status (RWLP)	Plan Change 9 Activity Status	Phase	Period Sought
Earthworks, Vegetation Clearance, Overburden Disposal	1C, 2C	-	Discretionary	-	Construction	10 years
Contaminated Land Disturbance	35	-	Restricted Discretionary	-	Construction	10 years
Install Intake Structures	71	-	Discretionary	-	Construction	10 years
Take and Use Groundwater	43	WQ R11	Discretionary	Discretionary	Construction	10 years
Take and Use Surface Water	43	WQ R10	Discretionary	Restricted Discretionary	Construction	10 years
Drilling within the Bed of a Watercourse	71	-	Discretionary	-	Construction	10 years
Drilling below the Water Table	40A	-	Controlled	-	Construction	10 years
Discharge Contaminants to Land and Water	37	-	Discretionary	-	Construction	10 years
Divert and Discharge Sediment Contaminated Stormwater to Land and Water	37 & 48	-	Discretionary	-	Construction	10 years
Modify, Destroy or Disturb Wetlands	85	-	Discretionary	-	Construction	10 years

Install Culverts	71	-	Discretionary	-	Long-term	35 years
Install Discharge Structures	71	-	Discretionary	-	Long-term	35 years
Surface Water Diversion	48	-	Discretionary	-	Long-term	35 years
Groundwater Diversion	48	-	Discretionary	-	Long-term	35 years
Erect Structures over the Bed of a Watercourse	71	-	Discretionary	-	Long-term	35 years

8.2 Overall, the bundling of activities required under these resource consent applications requires the construction and operation of TNL to be a Discretionary Activity.

9. CONSENT LAPSE PERIODS

9.1 A consent lapse period of 10 years is sought for all consents contained within **Table 3** above pursuant to s.125(1A)(b) of the RMA. It is considered to be appropriate for the consent authority to exercise its discretion and grant an extension to that lapse period under subsections (i) – (iii) on the basis that the Applicant, through this application, has made substantial progress to obtaining all necessary authorisations to progress construction activities, the extensions shall better align with the designation lapse date of 2026, all potentially affected parties will be advised of the extensions sought through the public notification process requested by the Applicant, and for the alignment of the activity with the objectives and policies of both the RWLP and the Regional Policy Statement.

10. CONSULTATION

10.1 Introduction

10.1.1 Engagement and consultation is an important element of Transport Agency projects and is undertaken with integrity, across key stakeholders and the community, beyond the legal requirements of the RMA. For the TNL expressway, engagement and consultation with the community and key stakeholders has been undertaken at each stage of the project completed to date. Community and stakeholder feedback has been integrated through the specimen design and this resource consent phase, wherever practicable aligning the project with the needs of the community and key stakeholders.

10.2 Background

10.2.1 Engagement and consultation was initially undertaken when the Designation was publicly notified through RMA processes in 1998 – 2001.

10.2.2 In 2012 the Transport Agency prepared a further 'Secondary Investigation and Scheme Assessment Report'. That report reviewed and updated all previous work that had been undertaken on the preferred (designated) route. Further engagement and consultation was undertaken at this time, including two public open days with the wider community, and targeted consultation with key stakeholders. Newsletters were also published to keep people informed of progress on the project.

10.2.3 Key stakeholders consulted at that time included tangata whenua (meetings were held with Pirirakau, Ngāti Kahu, Ngāti Pango, Ngāti Rangi, Ngāti Hangarau and Ngāi Tamarāwaho), Tauranga City Council, Western Bay of Plenty District Council, Ports of Tauranga, Department of Conservation, Bay of Plenty Regional Council, Heritage NZ, Road Transport Association and Cycle Action Tauranga. Stakeholder feedback was incorporated within the report.

10.2.4 This resource consent application takes into account previous engagement and consultation.

10.3 Consultation Objectives

10.3.1 The overarching public engagement and consultation objective of the TNL is to:

"*Ensure correct and timely flow of communication throughout the life of the project, fostering and maintaining strong relationships with key stakeholders and the wider community, to ensure not only the project's success but enhancing the reputation of the organisations involved.*"

10.3.2 On this basis, the public engagement and consultation objectives for this resource consent application were:

- To make all potentially affected people and organisations and other stakeholders aware of TNL and the reasons for it;
- To encourage participation and comment;
- To increase the likelihood of mutually accessible outcomes and better decisions;
- To obtain information and local knowledge that would assist in the design;
- To engender support or non-opposition for resource consents;
- To undertake consultation in order to meet the Transport Agency's internal guidelines;
- To nurture relationships with key stakeholders to ensure their ongoing support through to completion of construction of TNL;
- To identify any risks resulting from engagement, and implementation of appropriate treatment for those risks; and
- To provide clear, consistent and easily accessible information on the project.

10.3.3 Section 36A of the RMA makes it clear that there is no duty on an applicant to consult. However, it is recognised good practice to consult affected parties to help inform resource consent applications. Schedule 4 of the RMA also requires 'applicants to identify the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted'. These matters are outlined in the following parts of this section of the Assessment of Effects.

10.4 Parties Consulted

10.4.1 Based during previous work and background documents the following parties were consulted in the preparation of this application for regional resource consents:

Table 4: Summary of Parties Consulted

Key Stakeholders	
– Tauranga City Council (Property, Statutory, Transport and Stormwater); – Western Bay of Plenty District Council (Property, Statutory, Transport and Stormwater);	– Forest and Bird; – Horticulture NZ; – NZ Kiwifruit Growers Inc; – Zespri Group;

– Department of Conservation; – Fish and Game NZ – Heritage New Zealand; – Cycle Action Tauranga/ Cycle Advocates; – NZ Road Transport Association; – Road Transport Forum; – Heavy Haulage NZ; – Port of Tauranga; – NZ Avocado Growers Association;	– Bay of Plenty Regional Council (Property, Statutory, Waterways, Harbourmaster and Public Transport); – Wairoa River Users (Bay of Plenty Coast Rowing Club, Waimarino Adventure Park); – Automobile Association; – Te Puna Heartlands Association; – Federated Farmers; – Bay of Plenty District Health Board; – Priority One Western Bay of Plenty.
Tangata Whenua	
– Pirirakau; – Ngati Kahu; – Ngati Pango;	– Ngati Rangi; – Ngati Hangarau; – Ngai Tamarawahao.
Network Utility Operators	
– PowerCo; – Chorus; – Vodafone; – Ultrafast Fibre;	– First Gas; – Telstra Clear; – Trustpower; – Vocus Communications (FX Networks).
Directly Affected Landowners	
Those directly affected by the proposed activities: – Property owners and residents within the TNL designation and those potentially subject to property purchase and alteration to designation; – Lessees and residents of Transport Agency owned property; – Tauranga Adventist School.	
Other Affected Parties	
Owners, business and residents of property immediately adjacent to the existing TNL designation.	
Wider Community	
– Road users/ commuters; – NZ Police; – NZ Fire Service; – St John Ambulance; – Tauranga BMX Club;	– Bethlehem College; – Bus operators; – Recreational groups; – Media.

10.5 Consultation Methodology

10.5.1 Consultation in its widest sense refers to ensuring that genuine dialogue and exchange of information takes place over matters of interest with all potentially affected and interested parties and other stakeholders.

10.5.2 A range of methodologies were employed for engagement and consultation purposes. The preferred method of consultation has been individual meetings with potentially affected parties and other stakeholders at their residence or business. Other methodologies have included 'media releases', 'newsletters', regular updates to the Transport Agency's 'SH2 Waihi to Tauranga Corridor' website and attendance at the SH2 Waihi to Tauranga Corridor open days.

10.6 Consultation Summary

10.6.1 A summary of the consultation undertaken to date with the above parties is summarised within the following parts of this section of the Assessment of Environmental Effects. Due to the nature of some issues, consultation is still on-going with a number of people and organisations, and where this is the case, this is identified.

Landowner Consultation

10.6.2 A number of meetings have been held with those identified directly affected landowners along the TNL corridor. The preferred method of consultation was individual meetings at their residence or business. The purpose of the meetings in terms of these applications has been to discuss the actual environmental effects, the potential effects of the works and to discuss mitigation measures.

10.6.3 Land acquisition meetings have also been held with the landowners under the Public Works Act 1981. Those discussions are ongoing.

10.6.4 The key themes raised by directly affected landowners during consultation included:

- Impacts upon individual properties;
- Construction effects including noise, dust, vibration and sedimentation of waterways;
- The potential for earth cuts and fills to impact on groundwater bores;
- The visual effects associated with the TNL Expressway;
- Potential impacts upon flora and fauna; and
- Potential flooding effects.

10.6.5 Insofar as practicalities permit, the issues raised by directly affected landowners have been variously incorporated into the resource consent application, and/ or can be addressed by way of consent conditions. Noise and visual effects are effects managed by Tauranga City and Western Bay of Plenty District Council, and as such are addressed under the TNL designation. They are not addressed through these regional resource consents.

Tangata Whenua

10.6.6 The hapū groups of Ngāi Tamarāwahao, Ngāti Hangarau, Ngāti Kahu, Ngāti Pango, Ngāti Rangi and Pirirakau were identified as having a customary land interest and/or a specific interest in an aspect of the TNL Corridor and were the initial points of contact for tangata whenua consultation.

10.6.7 An outcome of the initial consultation with the above six hapū groups was agreement that tangata whenua would be integrated into the project as a partner, with access to investigation and design information and involvement as a member of the project team. This was achieved through the establishment of a single consultation group, the Hapū Advisory Group. The Hapū Advisory Group comprises mandated representatives of the various hapū.

10.6.8 The Hapū Advisory Group is the collective forum that has been established to consult with tangata whenua on various environmental and cultural issues. Whilst it is acknowledged that the Hapū Advisory Group cannot override the individual rights and responsibilities of individual marae, the Hapū Advisory Group has reported back a collective position on environmental and cultural issues.

10.6.9 Consultation with the Hapū Advisory Group has focused on identifying:

- Any areas of cultural importance and significance to tangata whenua that exist in the TNL works area, including waahi tapu sites;

- Any issues or adverse effects of the TNL on tangata whenua values, interests and associations which tangata whenua indicate are a concern to them; and
- Measures to avoid, remedy or mitigate any adverse effects of the TNL project on identified cultural values, interests and associations.

10.6.10 The Hapū Advisory Group has been involved in the TNL investigations and specimen design preparation through site visits, regular meetings, involvement in Transport Agency project meetings and reviews of technical reports.

10.6.11 The consultation undertaken with the Hapū Advisory Group has resulted in the Transport Agency gaining a better understanding of matters of importance to local Māori and it has ultimately resulted in a proposal which fosters a culturally safe environment.

10.6.12 Through the consultation process, *Mauri* has been identified as a very important concept for the Hapū Advisory Group. Mauri is the life force of both the whenua (land) and awa (river) through which the project is to be constructed. Mitigation is proposed to protect, enhance, preserve and manage the mauri to recognise the special customary relationship of the local hapū. The location of bridge piers in the Wairoa River have a significant impact on the mauri of the river.

10.6.13 The Transport Agency and tangata whenua are continuing to work together to ensure that any concerns are avoided, remedied or mitigated to the greatest extent practicable for the TNL project. This consultation will be ongoing throughout the detailed design and construction phases of the project and a number of mitigation proposals will be undertaken through agreement with tangata whenua outside of the consenting process. The draft conditions of consent (refer to **Appendix M**) includes conditions that ensure the on-going involvement of tangata whenua throughout the project.

Stakeholder Meetings

10.6.14 Consultation meetings have been held with the various key stakeholders identified as having an interest in the TNL project.

10.6.15 Key stakeholders include Bay of Plenty Regional Council staff, Western Bay of Plenty District Council staff and Tauranga City Council, Bay of Plenty Coast Rowing Club and the New Zealand Historic Places Trust. Discussions with those parties have focused on each organisations individual area(s) of interest. A brief summary of that consultation is provided below.

- *Bay of Plenty Regional Council*

10.6.16 Consultation with BOPRC has focused on a wide range of issues affecting the TNL project. This ranged from drainage and flood levels to ecology and resource consent requirements. This resource consent application covers the resource consents required to be obtained under the RWLP.

- *Tauranga City Council*

10.6.17 Regular monthly meetings have been held with Tauranga City Council (TCC) staff since February 2017. Consultation with TCC staff has focused on the impact to the local road network, cycle facilities, utility services, impacts on the former Cambridge Road landfill and land drainage both during construction and from the completed Expressway. Consultation also focused on the resource consent and alteration to designation processes. The majority of these identified issues relate to the designation and have accordingly been addressed in that process.

10.6.18 Consultation has also been had with TCC about the construction of Richard's Way to provide access to the Smith's Farm Special Housing Area, and how to integrate the two projects. Consultation is continuing between the two parties to ensure development efficiencies and co-operation regarding the Smiths Farm development.

- *Western Bay of Plenty District Council*

10.6.19 Regular monthly meetings have been held with Western Bay of Plenty District Council (WBOPDC) staff since February 2017. Consultation with WBOPDC staff has focused on the impact to the local road network, cycle facilities, utility services and land drainage both during construction and from the completed Expressway. Consultation also focused on the resource consent and alteration to designation processes. Most of these identified issues relate to the designation and have accordingly been addressed in that process.

- *New Zealand Historic Places Trust*

10.6.20 Archaeologist, Warren Gumbley, completed an archaeological review of the TNL Corridor. The review confirmed the preliminary findings of the **Archaeological Assessment of Effects** report (refer to **Appendix J**), the findings being that there are numerous archaeological sites and potential archaeological sites along the entire designation.

10.6.21 A copy of this report was forwarded to Heritage New Zealand (HNZ) for its information, review and comment. HNZ staff, having reviewed the report, have confirmed an authority to destroy the affected sites will be required for the TNL project. The archaeological authority application is being lodged with HNZ concurrently with this resource consent application.

10.6.22 The archaeological authority application includes an accidental discovery protocol for the entire project area in case any archaeological site or item of historic significance is uncovered during construction.

- *Bay of Plenty Coast Rowing Club*

10.6.23 It is unavoidable that during the construction of TNL, use of the Wairoa River will be restricted (at times). The Bay of Plenty Coast Rowing Club use the Wairoa River extensively within the vicinity of the project area and they are concerned that their activities may be restricted. The Transport Agency has agreed to manage the effects on the rowers during construction, although temporary restrictions will be required to ensure the safety of the rowers by limiting their proximity to the works at certain stages of construction. These restrictions are to include installation of temporary signage upstream and downstream of the works to warn river users of construction activities and to advise users of any specific navigational safety restrictions (bridge piles, anchored barges, etc.), and the installation of temporary lighting for night-time navigation through the works site. Work hours will also be restricted at certain times to permit users of the river to navigate safely (this is expected to be when the temporary staging is being constructed). The draft consent conditions relevant to the Wairoa River Bridge (refer to **Appendix M**) ensure those effects are managed accordingly.

10.6.24 The resource consents seek to locate piers within the Wairoa River. The piers will be located 35m apart, and be located approximately 17m from the river banks. The Club has advised that a rowing skiff requires 7m clearance. Accordingly, the piers will not impact on the rowers' ability to navigate the river once the bridge is constructed.

11. NOTIFICATION

11.1 Sections 95A to 95F of the RMA set out the following general process for determining whether or not notification of a resource consent application is required:

- The consent authority must decide whether or not an activity will have or is likely to have more than minor adverse effects on the environment;
- When making that decision, the consent authority must disregard any effects on persons who own or occupy the land in, on, or over which the activity will occur, or any land adjacent to that land;
- If the consent authority decides that the activity will have or is likely to have more than minor adverse effects on the environment, it must publicly notify the application;
- If the consent authority decides that the activity will not be publicly notified, it must decide whether there are any affected persons in relation to the activity;
- A person will be an affected person in relation to the activity if the activity's adverse effects on the person are minor or more than minor;
- If the consent authority decides that there are affected persons in relation to the activity, the consent authority must give limited notification of the application to those persons.

11.2 The assessment contained in Section 12 of this report concludes that the potential effects of the proposed activities, in particular the permanent diversion of surface water and stormwater, may be more than minor in nature. Potentially affected parties have not provided their agreement to the proposal as these have not been sought during consultation by the Transport Agency. For these reasons, the Transport Agency requests that the applications be publicly notified in accordance with Section 95A of the RMA.

12. ASSESSMENT OF ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

12.1 Introduction

12.1.1 The broad scale of construction activities and significant geographic extent of the TNL project site creates the potential for a wide range of potential environmental effects. In accordance with the Fourth Schedule of the RMA, this section provides an assessment of the actual and potential effects on the environment associated with the proposal (in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment).

12.1.2 The effects on the environment relevant to an assessment of the proposed activities have been identified as including:

- Earthworks
  - Vegetation Clearance Effects;
  - Erosion and Sediment Effects;
  - Dust Effects;
  - Machinery Effects
  - Soil Contamination Effects;
  - Flocculant/ Dust Suppressant Effects;
  - Archaeological Effects
  - Cultural Effects;
  - Enabling Works Effects.

- Culverts
  - Construction Effects;
  - Aquatic Habitat Effects;
  - Fish Passage;
  - Hydraulic Effects;
  - Erosion and Scour Effects.

- Surface Water Diversion Effects
  - Construction Effects;
  - Aquatic Habitat Effects;
  - Flood Water Displacement Effects.

- Wairoa River and Minden Gully Bridges
  - River/ Streambank Effects;
  - Hydraulic Effects;
  - Earthworks/ Construction Effects;
  - Navigational Safety/ Public Access Effects.

- Drilling below the Water table
  - Contamination Effects;
  - Aquifer Effects.

- Ground Water Diversion and Take
  - Drawdown/Interference Effects;

- Surface Water Take
  - Sustainability/Allocation Effects;
  - Intake Effects;
  - Ecological Effects.

- Stormwater Discharge Effects
  - Water Quality Effects;
  - Water Quantity Effects;
  - Stormwater Operation and Maintenance.

- Discharge Structure Effects
  - Erosion Effects;
  - Habitat Effects.

- Ecological Effects
  - Ecological Management Protocols;
  - Bats;
  - Birds;
  - Lizards;
  - Fish;
  - Vegetation;
  - Ecological Mitigation;
  - Riparian Restoration;

- Westland Creation;
- Terrestrial Restoration.

- Positive Effects

12.1.3 These potential effects are identified and assessed for the proposed activities within the following sections.

12.2 Construction Environmental Management Plan Approach

12.2.1 A key aspect of this assessment of environmental effects and the overall approach to environmental management for the TNL is the preparation of a Construction Environmental Management Plan (CEMP) which outlines the various methods and details of how the potential environmental effects of the project will be addressed throughout the construction period. The CEMP will comprise the overarching environmental document for the project and will be supported by the various sub-plans which contain the specific details of how each of the potential environmental issues will be managed (e.g. Erosion and Sediment Control Plan, Dust Management Plan etc.).

12.2.2 The CEMP will be developed by the successful construction team prior to commencement of the bulk construction activities and will be based upon the finalised design and the planned construction programme and processes. In this respect, while this assessment of environmental effects refers to a number of preliminary management plan documents which are attached as appendices to this report, the aim of these plans is to provide confidence that best practice environmental management methods can and will be implemented on site over the construction period to ensure that potential effects are avoided, remedied or mitigated. However, the intention is that these plans will be subject to adjustment and modification through development of the finalised CEMP prior to commencement of construction activities.

12.2.3 Once the finalised/approved CEMP is in place, the bulk construction activities will be able to commence on site subject to submission/approval of any required site-specific management plans (e.g. detailed ESCP for a certain area of works). In this respect, a staged approach is proposed for submission/approval of any detailed, area specific management plans which will only be required to be approved prior to works commencing within the relevant construction area.

12.3 Earthworks

Vegetation Clearance Effects

12.3.1 The initial phase of earthworks activities within parts of the site will require clearance of existing areas of vegetation resulting in the direct loss of local habitat values and effects upon local biodiversity including a number of potentially present, threatened/notable species and with around 5.17ha of habitats identified as being of significance based upon Bay of Plenty Regional Policy Statement (RPS) criteria.

12.3.2 As these effects are unavoidable as part of the TNL construction activities, the proposed management approach is to mitigate these effects through implementation of the proposed Ecological Mitigation Plans. For the purposes of this report, these effects are identified and assessed within the ecological effects assessment included within Section 12.12 below.

Erosion and Sediment Effects

12.3.3 The proposed earthworks activities will result in the creation of large scale areas of exposed soil and the associated potential for erosion and sediment runoff from these surfaces during rain events. Sediment mobilised within site runoff then has the potential to enter the downstream aquatic receiving environment.

12.3.4 Within the receiving environment these discharges have the potential to result in adverse effects on water quality and aquatic ecology including the abrasive and smothering effects of fine sediments on aquatic organisms and habitats and the discolouration of water affecting visual feeder species as well as aesthetic, cultural and recreational values.

12.3.5 In consideration of the significant scale and duration of the TNL earthworks along with the nature of site topography, soils and receiving environments, the potential for the sediment effects to occur as a result of the site earthworks is considered to be significant. Thus, there is a need for implementation of robust control measures and rigorous site management to ensure that these potential effects are minimised to the greatest extent possible.

12.3.6 **Appendix C** contains the preliminary site **Erosion and Sediment Control Plan** (ESCP) which outlines the proposed erosion and sediment control measures and methodologies that will be implemented on site over the course of the site earthworks activities. The proposed controls have been designed in general accordance with BOPRC's '*Erosion and Sediment Control Guidelines for Land Disturbing Activities, 2009 (TR: 2010/10)'* which sets out the general methods that the Regional Council advocates to address the above-mentioned erosion and sedimentation effects and is considered to represent best practice methods within the Bay of Plenty Region.

12.3.7 Furthermore, the ESCP outlines a number of additional measures over and above the standard practices outlined within the 2010/10 guideline which are considered to further enhance sediment control efficiencies and have become standard best practice procedures on large earthworks sites including:

- Use of floating T-bar decant outlets on all decanting earth bund (DEB) treatment devices;
- Implementation of rain activated flocculant dosing systems upon site sediment retention ponds (SRPs) and extending to DEBs with initial flocculant bench testing of site soils indicating positive results in enhancing sedimentation;
- Use of containment and cut and cover methods wherever possible to avoid the potential for any adverse erosion and sediment effects;
- Implementation of innovative practices where a high risk of erosion and sedimentation may exist such as back sloping SRP/ DEB inverts, silt fence baffles within SRP's/ DEB's, and a strong focus on erosion control implementation to minimise on-site sediment mobilisation and device loading;
- Identification/ implementation of contingency methods for any earthworks catchments where insufficient erosion and sediment treatment is being achieved, including:
  - The addition of chemical flocculant via batch dosing in accordance with an approved Flocculation Management Plan;
  - Lifting T-bar decants to allow for prolonged retention of runoff and increased settlement with decants only being dropped to discharge level once pond water quality has improved;
  - Increasing device storage volumes beyond guideline specifications;
  - Stabilisation of areas with hay mulch; and
  - Installation of additional sediment pits, hay bale barriers, contour drains and other erosion control measures within device catchment areas beyond guideline specifications.

12.3.8 Another key component of the ESCP is establishment of a capable Sediment Control Team as part of the construction team who will be focused on vigilant monitoring and maintenance of all erosion and sediment control devices over the earthworks duration, particularly immediately preceding and following any major storm events to ensure optimal function of these devices. This will ensure that any potential erosion and sediment control issues are rapidly identified and remedied and that device treatment capacities are maximised at all times.

12.3.9 Overall it is considered that the ESCP confirms that best practice erosion and sediment control methods can and will be implemented throughout the TNL for the duration of the earthworks activities. As this ESCP is of a preliminary nature only, being relevant to the Specimen Design, consent conditions are anticipated requiring development, submittal and approval of a finalised ESCP for the finalised TNL earthworks design. The finalised ESCP will be developed by the successful construction team following detailed design and site assessment as part of the overall site CEMP and will allow for any further innovations and developments within the erosion and sediment control field at the time of construction commencement. Furthermore, the ESCP documents are likely to be subject to numerous revisions and changes as the works progress within the site and in all instances any changes will be undertaken in agreement with BOPRC site monitoring staff.

12.3.10 While the proposed ESCP confirms that best practice environmental control and site management measures can and will be implemented on site, this does not guarantee that the environmental effects of sediment discharges from control devices within receiving watercourses will be no more than minor. In this respect, it is noted that the ESCP document outlines that:

'the significant scale of the TNL project and multiple, large scale earthworks catchments within the site creates a significant potential for cumulative adverse sediment effects on the receiving watercourses during and following rain events.'

12.3.11 This comment is supported by the outcomes of the Universal Soil Loss Equation (USLE) calculations included within the ESCP document which identifies that while proposed sediment control devices will result in a significant reduction in site sediment discharges from earthworks catchments, they will still be significantly (up to 16 times) greater than baseline levels with these effects further exacerbated by the multiple discharges from the various sediment control devices within these catchments.

12.3.12 In this respect, it is considered that despite the proposed implementation of best practice erosion and sediment control measures, the proposed earthworks activities within the steeper sections of the site where major cut and fill activities are proposed, will result in adverse water quality and potential ecological effects.

12.3.13 Water quality effects will be of an intermittent nature during and immediately following rain events within the earthworks catchment however stream flows are expected to clear as currently happens during storm events which result in erosion and sedimentation from the existing agricultural/horticultural catchments. Furthermore, aquatic ecology within these catchments are expected to be tolerant to these short duration sediment influxes from the existing unstable catchments.

12.3.14 Benthic stream habitat is likely to be affected by increased sedimentation effects occurring within lower velocity channel sections and pool areas which will result in some adverse effects upon aquatic ecology through smothering of benthic habitats within these areas. However, areas of sedimentation will likely be limited to the lower gradient, lower velocity channel sections within the lower part of the catchments which already comprise soft bottom type stream habitats and where existing water quality

is already likely to be compromised by high turbidity and suspended solids during/following storm events.

12.3.15 In the long term it is considered that the retirement and protection of large parts of these catchments from agricultural uses, the installation of stabilised drainage systems to convey Expressway runoff through these catchments and the proposed significant areas of restoration planting (including areas of terrestrial, riparian and wetland plantings as described within the **Assessment of Ecological Effects** (**Appendix I**), will result in a reduction in sediment loading into catchment watercourses and an overall net improvement in water quality and aquatic habitat values within these catchments.

12.3.16 Within the western most part of site, from which discharges will occur to the Oturu Stream catchment, it is noted that discharges from sediment control devices will occur directly to the existing culvert under SH2 and then into the large on-line dam structure located within the L'Anson Reserve which contains extensive growths of aquatic weeds. Further detention of flows within the dam will result in increased settlement of sediments within catchment flows with eventual discharges from the dam outlet to the Oturu Stream and Tauranga Harbour downstream expected to be minor.

12.3.17 Within the Wairoa River and Kopurererua Stream receiving environments which comprise the eventual receiving environment for all runoff from the remainder of the site catchments, it is considered that the temporary and intermittent influxes in sediment inputs from the site over the construction period will be easily assimilated within the large volume river flows without causing any adverse effects. Again, the long-term implications of the TNL for water quality within these watercourses along with the overall Tauranga Harbour receiving environment is considered to be a net improvement based upon the proposed catchment stabilisation and habitat enhancement measures.

Dust Effects

12.3.18 The scale of the proposed TNL earthworks and anticipated intensity of site construction activities creates a high potential for mobilisation of exposed soil particles into the air during dry, windy conditions and a potential for adverse off-site dust effects. Potential effects from site dust discharges may include settlement of dust upon nearby dwellings, vehicles and property resulting in increased cleaning requirements and roof water supply effects as well as adverse effects upon residents' health through breathing in dust particulate. In addition, sections of the site are identified as passing through horticultural land where dust settlement may present a risk to the health and growth of plants and fruit resulting in potential adverse effects upon these commercial operations.

12.3.19 The preliminary **Dust Management Plan** (DMP) attached as **Appendix D** identifies that while large portions of the alignment are through relatively isolated/remote farmland, there are a number of locations where earthworks will occur within proximity to residential dwellings, horticultural operations as well as other activities including commercial operations such as a bee keeping operation around Ch. 3350 and a school at Ch. 5000; all of which are considered to be sensitive receivers to potential dust effects. Based upon previous Expressway project experience, sensitive receivers are identified as any dwelling/property within 250m of the Expressway centerline which is considered to present a relatively conservative approach to identification of sensitive receiver properties. The greatest number of sensitive receivers are generally encountered where the alignment crosses the existing local roads where dwellings are accessed from these roads and located upon elevated ridgeline areas. Furthermore, as the alignment enters the Tauranga City urban boundaries at Cambridge Road, a significant number of residential dwellings are located within proximity to the alignment which presents a high risk for adverse dust effects.

12.3.20 The preliminary DMP outlines proposed site management procedures and control methods that will be implemented over the course of the site earthworks to ensure that potential dust effects upon these sensitive receivers and any other surrounding properties are avoided. The proposed dust management methods are summarised as follows:

- Staging of earthworks activities as much as possible and progressive stabilisation of completed surfaces to ensure that exposed areas at any one time are minimised;
- Planning of earthworks activities to avoid high risk activities (stockpiling/lime stabilisation etc.) in proximity to any sensitive receivers particularly during windy conditions;
- Controlling the route and speed of vehicles traversing the site taking into account potential dust mobilisation and effects on sensitive receiver properties;
- Stabilisation of key haul routes to minimise dust generation;
- Implementation of robust dust monitoring procedures with a focus on proactive identification of dust risk and implementation of control measures prior to dust becoming an issue. Monitoring will also be focused around sensitive receiver properties;
- Establishment and implementation of best practice dust control systems on site including:
  - Multiple watercarts to be stationed on site over the summer months and establishment of a suitable large volume water supply (Wairoa River) to maintain damp earthworks surfaces;
  - A commitment to the use of dust suppressant agents for employment within critical areas to provide immediate suppression of dust effects as required.

12.3.21 While a significant number of dwellings are identified as being sensitive receivers to potential dust effects associated with the Expressway earthworks, the specific and generally clustered location of sensitive receivers will provide clear locations where dust management methods can be focused and targeted with a reduced need for such intensive dust management throughout the remaining lengths of the site where adjacent land is generally limited to open pasture with a significantly reduced potential for any adverse dust effects.

12.3.22 It is recommended that a finalised DMP is developed and implemented by the construction team as part of the overall CEMP outlining a commitment to best practice dust management and building on those methods outlined within the preliminary DMP document and to confirm the specific details of how dust management methods will be managed/deployed throughout the duration of the project.

Machinery Effects

12.3.23 The establishment of large numbers of construction plant from various locations around the country creates the potential for adverse environmental effects including both potential biosecurity effects and hydrocarbon effects.

12.3.24 Potential biosecurity effects include the potential introduction of invasive weed species and organisms not currently present within the site such as Myrtle Rust, Alligator Weed or Didymo through plant propagules or seed sources attached to machinery from previous work sites. These potential effects will be addressed through a requirement that all plant delivered to site is appropriately cleaned of residual soils and plant materials prior to being established for construction activities.

12.3.25 Potential hydrocarbon effects include the potential for the inappropriate use or maintenance of construction machinery to result in the discharge of hydrocarbons including fuels and oils to either soil or water receiving environments where they have the potential to cause significant contamination, toxic or ecological effects. In regard to these potential effects all construction plant employed on site will be required to be maintained in optimum working order to reduce the risk of any malfunctions

or damage which could result in a hydrocarbon spill. Furthermore, re-fueling or on-site maintenance of plant will be restricted from occurring within 100m of any flowing watercourse.

12.3.26 In the unlikely event that an accidental discharge of hydrocarbon liquids occurs either to ground or to any watercourse, it is proposed that a detailed Spill Response Plan is established at the outset of the project as part of the site CEMP which outlines the specific protocols and equipment to be established at the site to ensure that any accidental spill is quickly and effectively ceased, contained and remedied to ensure that any potential environmental effects are minimised.

Soil Contamination Effects

12.3.27 As described, a PSI has been undertaken which has identified that the proposed earthworks will result in the disturbance of land and structures which comprise the historic locations of HAIL activities creating a potential for adverse land contamination effects. The majority of these sites comprise activities associated with historic farming and orchard activities including old sheds and rubbish piles which may comprise areas used for storage or disposal of chemicals. Furthermore, it is noted that the alignment passes in proximity to the former Tauranga City Municipal landfill at its eastern end. Of the areas investigated, the PSI identifies 50 sites where further investigations are recommended to better characterise the presence and levels of any contamination occurring to enable appropriate remedial strategies to be developed for these sites.

12.3.28 The disturbance of these areas through the proposed earthworks activities creates a potential for adverse environmental effects including the potential for any contaminants within these areas to become mobilised in site runoff during rainfall events with the possibility of discharges occurring into downstream waterbodies where it could lead to adverse water quality or toxic ecological impacts. Furthermore, the exposure of these materials through earthworks activities creates a potential for contaminant particulate to be mobilised as dust during dry windy conditions creating a potential for air borne contaminants to result in potential adverse health effects for both site staff and nearby residents.

12.3.29 In response to these potential effects and as noted above, the PSI recommends further investigations in the form of a Detailed Site Investigation (DSI) of the 50 HAIL sites which will incorporate the following items:

- Soil sampling at surface and at depth as required;
- Targeted sampling of groundwater;
- Assessment of risks to human health and/ or the environment based on expanded results from the detailed investigation;
- Preparation of a DSI Report detailing findings and making recommendations going forward.

12.3.30 Following completion of these investigations and the DSI report the Applicant will be better informed to develop appropriate remedial action strategies to ensure that any identified areas of contamination are appropriately managed over the duration of the works to avoid any adverse effects associated with the discharge of land contaminants. This will occur in the form of a Remedial Action Plan which outlines the specific remediation methodologies required for each suite based upon type/levels and extent of the contaminants. For any significant areas of contamination, these remedial strategies may comprise the direct excavation and disposal of contaminated materials at a registered landfill or for lower level areas of contamination may be able to be managed within the site to mitigate any potential discharges of contaminants.

12.3.31 The Applicant is committed to the implementation of the above processes for the further assessment and remediation of any areas of site contamination to avoid any potential adverse contaminant discharge effects upon both the downstream receiving environments as well as site staff and neighbouring residents. Furthermore, the disturbance of the identified HAIL site locations is also subject to resource consent applications to the relevant territorial authorities under the NES – Soil Contamination which will also reiterate the proposed methods for management of these sites.

12.3.32 Subject to adherence to these processes it is considered that all identified areas of potential soil contamination will be appropriately managed and remediated through the proposed earthworks activities to ensure that any potential soil contamination effects will be less than minor.

Flocculant/ Dust Suppressant Discharge Effects

12.3.33 As described, the proposed sediment and dust control methodologies have proposed the use of manufactured proprietary products to maximise the effectiveness and efficiencies of these methodologies in minimising the anticipated environmental effects of the earthworks. These comprise the use of chemical flocculants in maximising settlement of mobilised sediment particles within sediment control devices and chemical dust suppressants for suppressing dust particulate on site.

12.3.34 Flocculant use has become a common best practice methodology for maximising sediment treatment efficiencies on earthworks sites throughout New Zealand and is commonly promoted by Regional Councils including within the BOPRC 2010/10 Guideline. The most common and effective flocculant chemical used for sediment treatment comprises the aluminum based coagulant Poly Aluminium Chloride (PAC). While the PAC dose levels required for enhancement of settlement are very low, the chemical contains high concentrations of the toxic ionic form of aluminium. At low levels and with moderate pH, PAC is considered to present little risk of toxicity within receiving environments. However, at lower pH levels, toxicity increases with the major concern being the coagulation of mucus on the gills of fish species.

12.3.35 Hence, it is critical that wherever flocculation is proposed, it is implemented in accordance with an approved Flocculant Management Plan which establishes the following protocols in implementation of the system:

- Initial bench testing of site soils to ensure that the addition of flocculant is actually beneficial in reducing sediment levels in site discharges, to establish the appropriate dosing rates for the site soils and to identify any potential pH effects of the chemicals in combination with site soils. Typically, this is based upon ensuring that pH levels do not drop below pH 5.5 within site discharges;
- Establish the design requirements of the rain activated flocculant dosing system including tray sizes and tank levels/capacities;
- Establish best practice monitoring and maintenance procedures including pH monitoring throughout the duration of the systems operation.
- Methods for storage and handling of the flocculant chemicals on site to avoid any spills.

12.3.36 Based upon appropriate design of the proposed flocculant systems in line with the above procedures, the systems will result in very low concentration discharges of these chemicals into the site treatment systems with the mobilised aluminium typically being bound up with the coagulated sediment particles within the base of the sediment ponds from which it can be readily removed into the site earthworks areas.

12.3.37 Significant numbers of flocculant dosing systems have been implemented upon earthworks sites throughout New Zealand based upon the above procedures with no known residual toxic effects having arisen from any of these sites.

12.3.38 It is noted that a number of organic/biodegradable flocculant products are now also available on the market which may be able to be utilised at the TNL site however the PAC product is generally considered to be the most effective across the broadest range of soil types and hence is considered likely to be the preferred option for the TNL works.

12.3.39 In this instance, the Applicant is committed to implementation of these measures in accordance with the above methods and based upon this proposal, it is considered that these activities can occur without any adverse contamination effects and in fact will lead to enhanced discharge quality through reduced sediment levels in site runoff.

12.3.40 Similarly, dust suppressants have become a relatively common method for managing potential dust effects on construction sites throughout New Zealand including on numerous subdivision developments. While resource consent approval is not typically required for use of these measures, it is noted that the Canterbury Regional Council has issued a blanket consent to allow for the regular use of dust suppressant chemicals across the numerous demolition sites associated with the Christchurch earthquake remediation works.

12.3.41 Probably the most commonly used form of dust suppressant chemicals used is in the form of acrylic copolymer. These chemicals are diluted with water at low concentrations and can then be applied across earthworks surfaces either by standard dust cart sprinkler applications or by hosing on to steeper batters or stockpiles. Upon drying, the product forms a thin surface film, binding the soil particles and preventing dispersion by air or water.

12.3.42 Product suppliers have outlined that typical practice for application of the product is that this occurs under dry conditions, allowing the product to set on the surface. Hence, the only risk for any discharge of the product is if application is undertaken under wet conditions or the product is over applied, leading to saturation and surface runoff.

12.3.43 In regard to any potential environmental effects of these products, the following technical documents have been reviewed:

- Review of Aquatic Ecosystem Risks Associated with the Use of Dust and Erosion Control Products in South Western Queensland, Gauge Industrial & Environmental, 2014;
- Environmental Assessment of Vital Bon-Matt Stonewall, Simmonds & Bristow, 2012.

12.3.44 The following key findings are reported from these documents:

- Gauge Industrial & Environmental, 2014

These polymers are expected to be inert in the environment and if released to surface water would initially remain dispersed, but eventually settle into the sediments.

Based on data from similar emulsion polymers, the acute toxicity would be expected to be low to fish and other aquatic organisms.

Due to their high molecular weight and low water solubility, the polymers would not be expected to accumulate in the food chain.

Under normal conditions of use Vital Strike is expected to present a low environmental risk in terms of aquatic impacts. The ingredients are generally low in toxicity and/or in such low concentrations that exposure is unlikely to cause harm.

In the event of a spill reaching a waterway, the impacts are expected to be minimal provided there is reasonable dilution at the site of release. The product may contribute to eutrophication if released to low flow or stagnant waterways.

- Simmonds & Bristow, 2012

Leaching of polymers and suspending agents through disturbed or sandy soils may occur but the binding nature of this mixture with soil surfaces would inhibit losses to groundwater.

From current knowledge, there appears to be no undesirable persistence or concentration of these polymers or breakdown products in the environment.

Large molecular weight compounds such as polyacrylics are not expected to bioconcentrate in organisms from residues in waters or soils.

Potential breakdown products such as acrylic acid (monomer) and acrylic esters can readily biodegrade, have a low potential for persistence or bioaccumulation in the environment, and have low to moderate toxicity to aquatic organisms.

If released to waterways, lakes or dams, the biodegradation of dilute concentrations of residues should have little to no impacts on dissolved oxygen levels in receiving waters. Concentrated spills or leaks of formulated or diluted product for application, however, may have the capacity to cause depletion of dissolved oxygen and indirect effects on aquatic life as for discharges of organic matter wastes. The risk of acute and chronic toxicity due to residues in the environment is predicted to be low based on known properties of components, although direct ecotoxicity data on the product is unavailable.

12.3.45 These findings of the technical documents generally confirm that the typically used copolymer based dust suppressant chemicals present a low risk to both site soils and aquatic receiving environments if correctly implemented. In this respect, it is considered essential that application of these measures is undertaken in accordance with manufacturers specifications to avoid any potential risk of surface runoff to waterways within the site.

12.3.46 As the exact product/s to be used by the site construction team is not yet known, it is recommended that the finalised DMP addresses these requirements including identification of the chosen product along with identification of best practice methods for storage and application of the product to ensure that no risk of discharge to any aquatic receiving environments occurs. It is further noted that use of the products comes at a significant cost to the Applicant and hence over application within the site is not anticipated. Furthermore, in the unlikely event that any spillages did occur they would likely be contained at source or within site sediment control measures thus minimising the risk of any offsite discharges. Cleanup of any spillages would be undertaken in accordance with the sites Spill Remediation Plan.

12.3.47 Overall, it is considered that any potential contaminant effects associated with the use of either chemical flocculants or dust suppressants over the duration of the earthworks project can appropriately managed to ensure that they will be no more than minor. Furthermore, the use of these methods is in-line with current best practice methods for managing the potential sediment/dust

effects of the earthworks and overall will contribute to positive environmental outcomes for the project.

Archaeological Effects

12.3.48 Earthworks have the potential to impact upon archaeological remains. Anticipating this, a detailed Assessment of Archaeological Values (AAV) has been undertaken of the entire TNL alignment. The AAV confirms that the land designated for the TNL project forms part of a larger pre-European Māori archaeological landscape. A total of 34 recorded archaeological sites are shown as being within or immediately adjacent to the designation corridor. There is a high probability that unrecorded archaeological sites will also be present within the TNL alignment and the AAV identifies 22 areas of archaeological potential that could also be impacted.

12.3.49 Construction activities are expected to modify or destroy the remains of 34 known archaeological sites and a number of unrecorded sites likely to be within the AAV. The predominant archaeological features are middens, rua and pits.

12.3.50 The condition of existing sites is assessed as variable, ranging from 'good' to 'poor' in integrity. In terms of rarity and uniqueness, midden and storage pits are considered commonplace within the Western Bay of Plenty and they are representative of pre-European Māori settlement patterns. However, former swamplands are also present within the TNL designation, and waahi tapu sites have known to be associated with similar areas along the river system. The anaerobic environment provided by swamplands is conducive to the preservation of organic materials and taonga. The AAE records that, whist unlikely, drained swamplands within the TNL designation have the potential to contain organic materials or taonga. Given the rarity of these finds, they would require acute curation and management if encountered.

12.3.51 A priority-based approach will be used to mitigate archaeological effects and this will primarily take form of archaeological monitoring, recording and targeted investigation. To assist with that process, the NZ Transport Agency will develop an Archaeological Site Management Plan (ASMP) as well as a Research Strategy Methodology (RSM). The Agency anticipates and is prepared to accept consent conditions to this effect.

12.3.52 An authority to destroy, damage or modify the archaeological sites has already been sought from Heritage New Zealand, and that consent will be implemented in accordance with Heritage New Zealand conditions. Excavation works will not commence on site until the authority is fully in place.

12.3.53 As a precautionary measure, the NZ Transport Agency has also adopted accidental discovery protocols in the event that unrecorded taonga or koiwi are unearthed through construction works. As a minimum, the protocols will require:

- The immediate cessation of works within the vicinity of the discovery;
- Isolating the discovery to prevent any further disturbance/ damage;
- Notifying the Hapū Advisory Group and Heritage New Zealand; and
- Recommencement of works only upon receiving approval from these parties.

12.3.54 That accidental discovery protocol is included as a draft condition of consent below:

"*In the event of any archaeological site or koiwi being uncovered during the exercise of this resource consent, activities in the vicinity of the discovery shall cease. The Consent Holder shall contact the Bay of Plenty Regional Council to inform the Council of the discovery. The Consent Holder shall then*

consult with the mandated Hapū Advisory Group, Heritage New Zealand and the New Zealand Police and shall not recommence works within 100m of the discovery until the relevant Heritage New Zealand approvals or other approvals to damage, destroy or modify such sites have been obtained, where necessary."

Cultural Effects

12.3.55 A significant level of consultation has been undertaken with the Hapū Advisory Group to ensure that archaeological and cultural impacts of the TNL project are fully understood. That process is ongoing and will include discussions on the outcomes of the AAE, including proposed measures to avoid, remedy or mitigate archaeological effects.

Enabling Works Effects

12.3.56 As described, enabling works will be required at the outset of the project to establish the contractors' depots and safe access through the site, to undertake further site investigations to assist detailed design (e.g. geotechnical investigations) and to undertake other works considered necessary to facilitate the bulk Expressway construction activities (e.g. service relocations, vegetation clearance and erosion and sediment control installation).

12.3.57 As these works are required at the outset of the project and will comprise minor areas of localised disturbance with minimal potential for any adverse effects outside the boundaries of the designation it is considered appropriate that they can occur without being constrained by the submission/approval process or requirements of the overall CEMP and it's underlying sub-plans (i.e. ESCP, DMP, Spill Response Plan etc.) with a specific exclusion recommended within draft consent conditions for these plans for enabling works activities. This reference to enabling works within the consent conditions is considered to dictate the need for 'enabling works' to be defined within the consent documents to ensure clarity over the types of activities that can be allowed to be undertaken prior to the overall CEMP approval and hence an appropriate description is outlined as follows:

"Enabling Works:
'Enabling Works' shall include the following and similar activities – demolition and removal of buildings and structures, construction of site entrances and minor access tracking, fencing, vegetation removal, relocation of underground and overhead services and establishment of erosion and sediment controls."

12.3.58 While the intention is to allow for commencement of these activities prior to the overall CEMP (and relevant sub-plans) approval, it is considered appropriate that area specific ESCP's for each area of enabling works are developed and submitted to the BOPRC for approval prior to commencement of works to ensure that they are advised of any planned works, that they are consistent with the definition of enabling works and to ensure that appropriate erosion and sediment control measures are incorporated into the activities to prevent any adverse sediment runoff effects. Hence a consent condition requiring submission/approval of area specific enabling works ESCP's is recommended to facilitate these initial small-scale site works.

12.3.59 It is considered that all other potential environmental effects associated with site enabling activities (e.g. dust, contamination, spills, archaeological effects) will be of a minor scale and will be adequately controlled through the general consent conditions relevant to those potential effects.

12.4 Culverts

Construction Effects

12.4.1 Installation of the culvert structures subject to consideration through this consent process will require disturbance activities within and around the stream channels. These construction activities create a high risk for adverse effects over the construction period including stream channel erosion and sedimentation effects as well as direct impacts upon aquatic ecology within the affected stream reaches. Hence, specific construction methodologies are required for the culvert installation activities to ensure that these potential effects are minimised.

12.4.2 The **Streamworks Management Plan** (SMP) attached as **Appendix E** outlines the specific methodologies that can be employed at culvert installation sites to minimise the potential environmental effects. The proposed methodologies promote the use of an off-line installation methodology wherever possible to avoid any direct disturbance of the stream channel over the construction period. Where this is not possible, a dam and divert methodology will be implemented to create an isolated, dry works site to avoid any direct release of sediments to the downstream environment.

12.4.3 Another key aspect of the culvert installation activities to minimise impacts upon aquatic ecology comprises the requirement within the SMP for capture/transfer of any stranded fish from the redundant stream channel section prior to de-watering and either backfilling (off-line methodology) or pipe installation (on-line methodology). This requirement will ensure that any stranded fish are actively searched for, captured and transferred to the downstream reaches thus avoiding direct impacts upon local fish communities within the works and is considered to be of high importance when considering the significant length of the culvert installations and the identification of a number of fish species identified as having a threatened conservation status and thus requiring specific measures to ensure that populations are not adversely affected.

12.4.4 Based upon implementation of the above methods it is considered that the potential construction effects associated with the proposed culvert installation activities can be managed to ensure that they are no more than minor. It is envisaged that a finalised SMP will be developed by the successful construction team prior to commencement of works as part of the overall CEMP to finalise how these methodologies will be employed at each of the key culvert installation sites.

Aquatic Habitat Effects

12.4.5 Installation of the proposed culvert structures will result in the direct loss of aquatic habitat values through the stream reaches at which they are installed with the existing stream habitat being directly replaced by concrete culvert pipe structures. In this respect, the **Assessment of Ecological Effects (Appendix I)** identifies the proposed culvert installation works as resulting in the replacement of 545m of permanent stream channel with culvert structures. The impacted stream habitats comprise a broad range of habitat types ranging from highly modified, straightened channels flowing through open pastoral environments being more characteristic of farm drains to more incised channels with good habitat variability, riparian cover and which have been identified as providing habitat for a number of threatened/notable aquatic species.

12.4.6 As these effects are unavoidable as part of the TNL construction activities, the proposed management approach is to mitigate these effects through implementation of the proposed Ecological Mitigation Plan. For the purposes of this report, these effects are identified and assessed within the ecological effects assessment included within Section 12.12 below.

Fish Passage

12.4.7 The placement, replacement or extension of culvert structures within the site watercourses creates the potential for creation of impediments to fish passage within the catchments restricting the ability for resident fish populations to colonise/utilise upstream habitat and to complete their life cycles. In this instance, a number of the streams within the site have been shown to provide habitat for a range of indigenous fish species and hence maintenance of connectivity through these culvert structures is critical.

12.4.8 Furthermore, it is noted that the NZ Transport Agency's document '*Fish Passage Guidance for State Highways*', August 2013 outlines:

> *"the Transport Agency is committed to ensuring that the successful migration of fish species is not disrupted by its network, through the appropriate design of new culverts, and retrofit of existing culverts to allow for fish passage".*

12.4.9 Hence it has been a key aspect of the culvert design process to assess and provide for (where appropriate) fish passage at the proposed culvert crossings throughout the TNL.

12.4.10 As a rule of thumb, all culverts within the site will be installed with the pipe invert at the inlet and outlet embedded below the adjacent channel inverts as this is a key design feature to minimise potential erosion and scouring effects within these high energy areas. For the majority of the culverts through the site where culverts are to be installed within low gradient channel reaches this design feature in itself will also ensure that a depth of water is maintained within the pipes at all times allowing fish to swim through.

12.4.11 The **Culvert, Stream and Minden Gully Bridge Hydraulics Report** included within **Appendix F** outlines the fish passage design provisions for the culvert crossings throughout the TNL alignment. This comprises:

- All round culverts conveying watercourses below the TNL alignment which maintain areas of upstream fish habitat will be designed to maintain perimeter flows at a mean velocity of less than 0.5m/s while conveying ½ of the 2-year ARI flow. This storm event is considered to be representative of a typical minor flood flow event which could form a trigger for upstream fish migration through the culverts. This mean flow velocity through the culvert is considered appropriate to ensure that appropriate flow conditions are available through the culverts under these conditions to allow fish passage. Reduced flow velocities (below this mean) at the margins of the wetted culvert perimeter are considered appropriate to allow for passage of the majority of native fish. This design philosophy is based upon the fish passage details outlined within the document titled 'Fish Passage at Culverts: A review, with possible solutions for New Zealand indigenous species', Jacques Boube'e et al, December 1999;
- The large box and arch culverts will be designed to flow at velocities slightly lower than the reach average of the stream. This will result in mean velocities within the culvert that are less than 0.5m/s when conveying ½ of the 2-year ARI flow in accordance with the above guideline document;
- A sill combined with a depressed pool can be incorporated on the outlet apron at the downstream end of the culvert. This will raise the culvert tailwater, increasing the depth and decreasing velocity within the culvert during smaller flood flows. This will also provide a large resting area for eels, prior to entering the culvert; and
- If modelling indicates that that the above measures will not reduce velocities adequately, then additional devices that assist fish passage including mussel spat ropes for the smaller culverts

or edge baffles for the larger culverts will be incorporated into the design to ensure that fish passage is maintained through these structures. These devices will be selected to minimise impacts to culvert maintenance.

12.4.12 Further details of these proposed fish passage design provisions are outlined within the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** within **Appendix F**. Furthermore, these provisions have also been assessed by Kessels Ecology as part of the **Assessment of Ecological Effects** included within **Appendix I.** The **Assessment of Ecological Effects** confirms support to the use of these methods to maintain fish passage throughout the sites culverts.

12.4.13 In addition, the **Assessment of Ecological Effects** has identified the potential for the significant culvert lengths proposed throughout the site to create potential deterrents to native fish migration due to the extended dark lengths of the watercourses as they pass through these culverts without any natural light inputs. The role of darkness in influencing upstream passage of native fish species is considered to be largely unclear with the following points outlined with the **Assessment of Ecological Effects** document:

- There is some evidence that upstream movements of fish species active during the day may be restricted in the dark – based upon an Australian study of common smelt;
- Recent New Zealand and Australian studies found that remediation of existing culverts 70m long with baffles improved upstream passage for juvenile galaxids with no modifications for light indicating that culvert velocities are more important than light;
- Given that many native species including eels and kokopu are nocturnal, they could be expected to be less affected by darkness within culverts.

12.4.14 In addition, it is noted that some native fish species can frequently be found living or passing through cave systems or pipe networks suggesting that they are not averse to the effects of darkness in moving through watercourses.

12.4.15 Hence, considering the Transport Agency's commitment to ensuring that the migration of native fish is not impacted through their culvert structures and based upon the proposed design measures to address this potential issue, it is considered that the potential impacts of the proposed activities upon native fish passage will be no more than minor.

12.4.16 Development of an appropriate fish passage method within these culverts will form a requirement of the finalised drainage design and will take into account the multiple factors affecting fish passage at each culvert site including gradient, flow, length, cross-sectional area and species present. A commitment to this design process will ensure that an innovative and appropriate fish passage design is developed by the successful construction team.

Hydraulic Effects

12.4.17 As described above, (refer Section 4.4 of this report and the Culvert Summary Design Table (**Table 1**)) culvert sizes have been sized on the following basis:

Smaller round culverts:

- Passing the 10% AEP flow will not head up to the pipe soffit;
- Passing the 1% AEP flow with a headwater depth of less than twice the culvert diameter;
- Ensuring a minimum 500mm freeboard between the 1% AEP flood flow level and Expressway edge of seal.

Larger box culverts:

- For catchments with low debris potential – maintain 600mm of freeboard to the top of the culvert during the 1% AEP flow;
- For catchments with moderate to high debris potential – maintain 1200mm of freeboard to the top of the culvert during the 1% AEP flow.

12.4.18 This culvert design criteria is considered appropriate to ensure that sufficient capacity is available within the Expressway cross drainage system to convey catchment flows during large scale storm events without resulting in an increase in upstream flooding effects outside of the designation.

12.4.19 During any extreme event (greater than the 1% AEP event), in excess of the cross-drainage system design capacity, backwater flooding effects may occur which extend beyond the designation boundary into private land holdings. However, any effects will be highly infrequent and are expected to be of a temporary nature, short duration and limited to ponding within existing low-lying areas that are likely to be subject to flooding during these extreme storm events in the existing condition. Thus, the TNL should not result in significant adverse effects.

12.4.20 Once again it is noted that the culvert design specifications outlined within the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** (**Appendix F**) are of a preliminary nature, based upon the Specimen Design and will be subject to further refinement through the detailed design process. In this respect, detailed design criteria that the culverts shall not result in any adverse increase in upstream or downstream flooding effects is considered acceptable and can be incorporated as a consent condition and as part of the principal's design requirements.

12.4.21 BOPRC will have the opportunity to review at design process intervals (e.g. 50%, 80% and 90% levels of completion) to ensure that the design meets the BOPRC consent conditions.

Erosion and Scour Effects

12.4.22 The diversion and conveyance of catchment runoff through concrete culvert structures has the potential to increase stream flow velocities through the culvert resulting in high energy discharges at outlet points and subsequent erosion effects. It is appropriate that the conditions require that these erosion and scour effects are appropriately mitigated, using robust methodologies.

12.4.23 The **Culvert, Stream and Minden Gully Bridge Hydraulics Report** (**Appendix F**) outlines a number of FHWA Hydrologic Engineering Circular (HEC) guideline documents that will be used to inform detailed culvert outlet design requirements as part of the detailed culvert design process. Anticipated outlet erosion protection measures will include the provision of appropriately sized headwall and apron structures to manage the transition from the culverts to the downstream channels. In addition, outlet designs will incorporate appropriately sized riprap armouring to dissipate flow velocities and reduce potential scour effects within these high energy areas with the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** also referring to the potential use of soil riprap to enable planting within these areas.

12.4.24 Based upon the implementation of these measures it is considered that potential erosion effects at culvert outlets will be less than minor. Again, the detailed design for each culvert will be finalised within the detailed design stage which will be subject to BOPRC review/approval.

12.5 Stream/Surface Water Diversions

Construction Effects

12.5.1 As described for the culvert installations, the proposed stream diversion activities create the potential for adverse effects over the construction period including erosion and sedimentation effects as well as direct impacts upon stream ecology.

12.5.2 Again, the SMP attached as **Appendix G** outlines specific methodologies which can be implemented at each site to ensure that these potential effects are avoided including:

- A preference for undertaking any stream diversion construction works off-line separate to stream flows with flows only diverted into the new channel length once full stabilisation is achieved;
- Where this is not possible, implementing an appropriate dam and divert methodology to isolate the stream diversion works from stream flows;
- A requirement for any stranded fish within the redundant channel sections to be located, captured and transferred prior to backfilling.

12.5.3 Based upon implementation of the above methods it is considered that the potential construction effects associated with the stream diversion activities can be managed to ensure that they are less than minor. It is envisaged that a finalised SMP will be developed by the successful construction team prior to commencement of works as part of the overall CEMP to finalise how these methodologies will be employed at each of the stream diversion installation sites.

Aquatic Habitat Effects

12.5.4 The diversion of existing stream channel reaches will result in the direct loss of any existing aquatic values associated with the reaches to be diverted and replacement with a new constructed channel section to convey stream flows to the design alignment. Based upon the Specimen Design the **Assessment of Ecological Effects** (**Appendix I**) has identified the proposed stream diversion activities within the site as resulting in the realignment of approximately 1,287m of existing permanently flowing streams and approximately 641m of existing ephemeral watercourses and farm drains.

12.5.5 While immediate loss of existing aquatic habitat values will occur, these stream sections will typically be replaced with new stream reaches on a new alignment with the new channel sections configured as a minimum to replicate the aquatic habitat values of the existing, affected reach through:

- Constructing new stream channel sections with the same channel profile as upstream and downstream sections;
- Where possible meandering the stream alignment to maximise stream channel sinuosity and flow variability;
- Maintaining natural stream bed substrates through use of biodegradable geotextiles for channel stabilisation as opposed to quarried aggregates;
- Where hard bed substrates/rocks exist within the natural channel, relocating these substrates into the new channel section to recreate habitat values;
- Riparian planting with native species along the diverted stream channel section where contiguous to existing areas of native vegetation.

12.5.6 An example of these proposed measures implemented on a previous Transport Agency Expressway project is outlined within the SMP included within **Appendix G.**

12.5.7 The existing stream channel habitats where the proposed diversion works will occur have typically been identified as comprising heavily modified channels with limited current habitat values, although a variety of native fish species have been found to be present. Nonetheless, it is considered that based upon the proposed efforts to re-establish these new channel sections with enhanced habitat values as outlined above, aquatic habitats will re-establish relatively quickly within the new diversion alignments and once established will provide for enhanced habitat values from their current condition.

12.5.8 For the perennial stream channel diversion reaches there will be some delay before the constructed channel achieves a natural equilibrium with some areas of natural channel erosion anticipated prior to establishment of vegetation and a natural flow regime through the diversion.

12.5.9 As these effects associated with the diversion activities are unavoidable as part of the TNL construction works, the proposed management approach is to mitigate these effects through implementation of the proposed Ecological Mitigation Plan. For the purposes of this report, these effects are identified and assessed in further detail within the ecological effects assessment included within Section 12.12 below.

Flood Water Displacement/Diversion Effects

12.5.10 As described, the proposed TNL works will result in the diversion of surface water in situations where construction of the Expressway displaces existing flood storage or creates an impediment to flood flows through infilling of floodplain surfaces. Key areas where these effects will occur include the large scale TNL embankment crossing of the Wairoa River floodplain and at Takitimu Drive where the proposed widening of the existing road embankment will encroach further into the Kopurererua Stream flood storage zone. These activities can result in adverse effects on existing drainage/flood regimes including through increases in the extent of the level of flooding on other parties' land outside of the TNL designation and potential increases in flood flow velocities which could contribute to adverse erosion/ scour effects. These potential effects are assessed for each of these locations as follows:

- *Wairoa River Effects*

12.5.11 The 1% AEP flood event at the proposed Wairoa River crossing site has been shown to extend across the entire width of the low gradient, pastoral floodplain between the slopes of the Wairoa Road and Cambridge Road escarpments comprising a width of around 1,300m. Hence, the designs of the floodplain road embankment and associated bridge crossing structure have been subject to a detailed design process including development of a 1d/2d hydraulic model to ensure that the design is suitable to pass the 1% AEP flood flow without resulting in any adverse upstream/ downstream flooding or velocity impacts.

12.5.12 The model has identified the maximum flood flows through this area as occurring across the true left/western floodplain margins of the river and hence the crossing has been designed with a total 385m bridge span with approximately 235m of this span extending across this western floodplain area to achieve unimpeded flood passage during these extreme events. The remaining approximate 600m lengths of the floodplain crossing will comprise the road fill embankment extending across the eastern and western floodplain margins which have been assessed as resulting in the loss of approximately 327,000m^3 during the 1% AEP flood event. Modelling of this design has confirmed that based upon these proposed bridge/embankment specifications and the minor extent of floodplain loss associated with these activities in relation to the broader floodplain area, the crossing is able to

convey the Wairoa River 1% AEP flood flow without resulting in any increase in upstream or downstream flood levels beyond the designation boundary.

12.5.13 In addition, the assessment has identified that the activities will not result in any adverse flood flow velocity increases which could result in any adverse erosion or scouring effects beyond the site. The model does indicate that marginally higher velocities may be encountered as flood flows pass around the toe of road embankments and bridge piers which could result in localised erosion or scour effects. However, these potential effects will be addressed as part of the detailed embankment/bridge pier design through incorporation of appropriate armouring or erosion protection measures to ensure that these effects are appropriately mitigated.

12.5.14 The **Specimen Wairoa River Bridge Hydraulics Design Report** attached as **Appendix N** addresses the outcomes of this model. In addition, the design/assessment has been subject to peer review by Professor Bruce Melville of Auckland University and Graham Macky, in association with Auckland University as part of the design process to ensure an independent and robust review/assessment of the design methods utilised and these potential effects.

- *Kopurererua Stream Effects*

12.5.15 The 1% AEP floodplain of the Kopurererua Stream at the proposed site has also been shown to extend across the entire valley floor area including across the existing Takitimu Drive carriageway within the vicinity of the site. In this respect, the proposed works which include the widening of the existing Takitimu Drive formation over a significant length through placement of imported fill material, will result in the loss of existing flood storage capacity through this area with an estimated volume of floodplain infilling below the 1% AEP flood level in the vicinity of around 30,000m^3. These activities create the potential for increased flood levels on properties outside of the designation with existing flooding effects known to already be an issue within the lower Kopurererua Stream catchment area.

12.5.16 The Transport Agency acknowledges the need to ensure that the finalised design incorporates appropriate measures to offset this loss of flood storage capacity and is currently in the process of investigating options for achieving the required flood storage mitigation measures. The current, preferred option comprises utilisation of the existing TCC landfill tertiary treatment wetland adjacent to the site as a flood attenuation device during any extreme storm events. This existing low lying constructed wetland area has been identified as being subject to inundation from the Kopurererua Stream during the 1% AEP flood event. Hence, the intention is that following flood inundation, outflows from the wetland as the flood recedes can be attenuated through installation of specifically designed flood gates and outlet controls to essentially hold approximately 30,000m^3 of the hydrograph peak and release it slowly, effectively reducing the peak flow in the constricted channel through Judea. Other additional approaches applied for managing these potential flood level impacts include the installation of flood attenuation systems within the Smiths Farm tributary to control peak flood flow discharges thus again offsetting potential impacts of the Takitimu Drive widening works.

12.5.17 The Transport Agency will continue to investigate the options for addressing these potential effects and for the purpose of these applications confirms their commitment to developing a finalised flood mitigation method which will be confirmed as part of the TNL detailed design process and can be subject to review/approval by BOPRC prior to implementation on site.

12.6 Wairoa River and Hakao Stream Bridges

12.6.1 Adverse environmental effects potentially associated with the construction of bridges proposed for the TNL over the Hakao Stream (*ch.1050-1400*) and Wairoa River (*ch.3900-4100*) include 'River/

Streambank Effects', 'Effects on Natural River/ Stream flows and Flooding', 'Earthworks/ Construction Effects' and 'Navigational Safety and Public Access Effects'. Ecological effects are addressed separately within Section 12.12 of this report. Those environmental effects further include effects arising from the construction of temporary bridges for access to the alignment at either end of the TNL. These effects are variously addressed under the relevant sub-headings below.

River/ Streambank Effects

12.6.2 While each of the proposed bridges (including the temporary access bridges) will present varying degrees of effects within the localised environment, each of the bridges will inevitably result in works to the river and streambanks to necessitate construction. Those works arise from requirements to establish tracking and site access within each location, to undertake ground improvement works, to drill land for piers and to erect piers and abutments, and the need to construct temporary works platforms above the waterways themselves. Informed design and placement for these works will be required to ensure effects which may arise following construction of each bridge are minimised, associated with both river/ streambank and river/ streambed disturbance.

12.6.3 Initial disturbance of the river/streambanks will be evident in the form of vegetation clearance to facilitate site access and to establish land-based crane platforms. While individual access arrangements are to vary within the site (albeit all internal access will be restricted to the Designated Corridor), both sites require the necessity for crane platforms to be constructed either side of the waterways given the scale of bridging works in either location.

12.6.4 The construction of the land-based crane platforms is necessary to enable the placement of beams across the bridge mainframe without the need to access private property. Although the loss of vegetation is necessary to create those platforms, the **Assessment of Ecological Effects** attached within **Appendix I** notes that the riparian vegetation along this area of the Wairoa River is not significant habitat. These works will also not require the removal of any areas of significant indigenous habitat, and upon completion of the works, the Transport Agency will remediate the loss of any indigenous cover removed where ground disturbance has occurred.

12.6.5 Vegetation removal and land disturbance activities are also necessary for the sinking of land-based piles and the construction of the abutments and bridge piers. Preliminary geotechnical analysis in relation to stability of the river/streambanks has identified that ground improvements are necessary to ensure the stability of the banks and abutment areas.

12.6.6 Impacts on the river/streambanks during the bridge construction phases will be mitigated through the adoption of best practice erosion and sediment controls. Implementation of those measures is necessary to prevent the scour of those river/streambanks from stormwater and surface runoff and to avoid the deposition of silt materials within the waterways. Implementation of these controls will be in general accordance with BOPRC's Guideline "*Erosion and Sediment Control Guidelines for Land Disturbing Activities" (TR: 2010/01)*.

12.6.7 The installation of temporary piers within the Wairoa River will be necessary in order to construct temporary access platforms. The temporary access platform is necessary to provide crane access to the central sections of the bridge and to enable the lifting of bridge components over each location. The platform will further enable heavy vehicles to move throughout the site without reliance on the local roading network. The Hakao Stream can be crossed without placement of structural components in the streambed.

12.6.8 The construction of the temporary Wairoa River access platform will cause temporary, localised disruptions to the riverbed until such time as the temporary piers are able to be removed. Upon completion of the bridge spans, the access platform and temporary piers will be removed and the natural waterflows reinstated. Holes created by the temporary piers are expected to infill naturally with riverbed silts.

12.6.9 The finalised bridge designs will incorporate permanent erosion and scour protection measures to ensure the bridges long-term structural integrity.

12.6.10 Generally, therefore, it can be seen that the river/streambank disturbance will be limited to the localised construction of piers, abutments and crane platforms, most of which are located clear of waterways. A combination of site-specific design, erosion and sediment control measures and remedial planting will ensure that riverbank effects are no more than minor.

Hydraulic Effects

- *Wairoa River Bridge*

12.6.11 As previously described, the Wairoa River floodplain and river channel crossing has been subject to a detailed 1d/2d modelling assessment to inform the design of the TNL through this area. This assessment has identified a 1% AEP flood level at the bridge crossing site of RL 6.65m. Subsequently, the proposed bridge crossing has been designed based upon the New Zealand Transport Agency Bridge Manual design specifications which require a freeboard from the 1% AEP flood level to the bridge soffit of 1.2m for catchments where there is a potential for large debris flows through the watercourse. Hence, the Wairoa River bridge has been designed with a minimum soffit level set at RL 7.85m to ensure that the required clearance for flood/ debris flows is achieved. This design soffit level is noted as being approximately 6m above the existing ground level within the floodplain margins of the Wairoa River. As previously outlined, based upon this bridge design level and factoring the additional floodplain filling impacts associated with the formation of the road approach embankments throughout this area, it has been determined that the proposed crossing will not result in any adverse backwater flooding effects within the Wairoa River and its flood margins while also providing for the safe passage of vehicles along the TNL carriageway during these extreme events.

12.6.12 While the placement of the proposed bridge piers within the Wairoa River channel does present a potential for adverse scour effects around these hard structures within river flows, these potential effects will be mitigated via the location of the piers with suitable bank clearance distances and with localised scour protection treatments as required within the floodplain areas.

12.6.13 Overall, based upon these design characteristics of the Wairoa River bridge structure, it is considered that any potential hydraulic impacts of the structure upon the river channel and surrounding floodplain will be no more than minor.

- *Hakao Stream Bridge*

12.6.14 The proposed Hakao Stream bridge crossing comprises a viaduct type structure extending across the deeply incised gully stream with the bridge soffit (RL 33.27m) elevated around 24m above the existing gully floor surface (RL 9.32m). In this respect, potential for stream flows to interact with the bridge deck structure is avoided along with the potential for adverse hydraulic impacts. Furthermore, all bridge piers will be located outside of the stream channel, thus avoiding direct impediment to flows and associated hydraulic effects.

12.6.15 During extreme catchment flow events, stream levels will breach the banks and spread into the adjacent gully floor floodplain area where the bridge piers will be located. In these locations, there is a potential for adverse scour effects to occur as flood flows pass around the narrow pier structures however the intention is that the finalised bridge design will incorporate the provision of appropriate scour protection treatment to mitigate potential effects upon these structures of the surrounding floodplain landform.

12.6.16 Overall, based upon these design characteristics of the Hakao Stream bridge structure, it is considered that potential hydraulic impacts of the structure upon the stream channel and surrounding floodplain will be no more than minor.

Earthworks/ Construction Effects

12.6.17 Earthworks are required for the construction of the approach embankments to the Wairoa River bridge and excavation of the river/ streambanks to support the location of bridge abutments. Inevitably, these earthworks will give rise to environmental effects including sediment discharges and dust mobilisation resulting from earthmoving activities. These effects are temporary in nature, arising solely during the construction phases of the TNL. The construction timeframe for all works associated with the Minden Gully and Wairoa River Bridges is estimated to be provisionally between 2018 and 2021. Timeframes will be confirmed when Contractors are appointed and detailed design of the bridges are finalised.

12.6.18 The **Erosion and Sediment Control Plan** (**Appendix C**) outlines construction methodologies and protocols for the management of potential earthworks effects during the construction phases. The draft ESCP includes plans and methodologies for erosion and sediment control and for site rehabilitation. As previously noted within this report, erosion and sediment control measures will be implemented at each stage of the construction phases in accordance with BOPRC's "Erosion and Sediment Control Guidelines for Land Disturbing Activities" (TR: 2010/01). Control measures outlined within the ESCP will include (but are not restricted to) a combination of devices such as silt fences, decanting earth bunds and sediment retention ponds, installed under those guidelines to ensure best practice for effective treatment of all site runoff.

12.6.19 While the proposed control measures will ensure the majority of sediment particles mobilised under stormwater discharges and site runoff is contained, it is inevitable that some fine particulates and suspended colloidal solids will enter the receiving environment during storm events. Within the receiving environment, these discharges have the potential to result in adverse effects in water quality and aquatic ecology, including the abrasive and smothering effects of fine sediments on aquatic organisms and habitats and the discolouration of water affecting visual feeder species; as well as effects on the aesthetic and recreational values.

12.6.20 The receiving environment at each of the bridge sites is noted as comprising streams within which existing water quality and habitat values have been historically impacted by agricultural land use and development activities within their catchments. In this respect, resident aquatic organisms are likely to comprise species which would be tolerant to intermittent influxes of sediment over the construction period and are thus unlikely to be adversely affected by the temporary sediment discharges associated with the proposed activities. Hence, any sediment discharges that do occur within these areas are unlikely to impact stream amenity or aesthetics.

12.6.21 Based upon the implementation of the proposed erosion and sediment control measures, developed in accordance with best practice guidelines and the existing characteristics of the areas of disturbance

within those receiving environments, it is determined the potential earthworks effects of the bridge construction activities will be no more than minor.

12.6.22 Accidental spillage from the refueling of machinery is another potential threat to water quality. It is proposed to eliminate this risk by ensuring that refueling takes place within designated locations no less than 100m from any waterway where spills are restricted from entering the Hakao Stream or the Wairoa River. This practice is proposed to be adopted over the length of the alignment. It is expected that the Contractor will thus provide suitable hazardous substance storage facilities to meet this requirement. Such precautions are common practice for works of this nature.

12.6.23 Bridge construction activities will also require the pouring of concrete directly adjacent to and over both the Hakao Stream and the Wairoa River. Prior to the pour, temporary and permanent formworks will be installed for both structural formation and to seal any potential leakages from the pour. Formwork will typically comprise plywood sheeting or timber boards clamped in place to prevent movement during the concrete pour. As a contingency, it is intended that a sheet of geotextile, polythene or other suitable material will be suspended directly below any cladding and directly over the active flow channel during the duration of the concrete pour and curing period to ensure that any potential spillages or leakage of concrete is captured and prevented from entering those active flows.

12.6.24 Adoption of the above listed measures will ensure that impacts on water quality from hydrocarbons and concrete discharges will be no more than minor.

12.6.25 Lastly, the exposure of soil surfaces during approach earthworks creates the potential for the mobilisation of fine sediments/dust into the air, in particular during dry, windy conditions and potential nuisance effects on surrounding properties utilised for residential, rural residential and horticultural activities. However, given the isolated location of both proposed bridge sites at the Wairoa River and Hakao Stream, the potential for nuisance dust effects to arise during construction of the approach embankments and temporary staging platforms is considered to be less than minor. Nonetheless, should dust effects be identified as a risk they shall be managed in accordance with best practice dust management methodologies (e.g. minimise areas of disturbance, rapid stabilisation, water carts etc.) specified within the Dust Management Plan to ensure these adverse effects are no more than minor.

Navigational Safety/ Public Access Effects

12.6.26 It is unavoidable that as part of the TNL public access from esplanade reserves either side of the Wairoa River banks, and use of the Wairoa River itself, will be restricted during the course of the works.

12.6.27 Recreational, active and cultural use of the Wairoa River within the vicinity of the project area includes fishing (in particular for whitebait), powered boat use, both active and recreational rowing (Bay of Plenty Coast Rowing Club) and kayaking. Effects on those users of the river will be managed during construction, although temporary restrictions will be required to maintain the safety of those users by limiting their proximity to the works at certain stages of construction. Controls will include installation of temporary signage upstream and downstream of the site to warn river users of construction activities and to advise users of any specific navigational safety restrictions (bridge piles, anchored barges, temporary bridge height restrictions etc.) and the installation of temporary lighting for night-time navigation through the works site.

12.6.28 Further mitigation of effects on recreational users of the river will be through avoidance, remediation and mitigation of exposed earthworks surfaces to avoid sedimentation and contamination of the Wairoa River. Those measure are outlined through this application, including provisions to avoid the

spillage of concrete and chemicals/ fluids during the bridge construction and the implementation of erosion and sediment controls to avoid sediment laden stormwater entering the river.

12.6.29 The Wairoa River Valley Strategy (2013) identifies the site as comprised within Local Management Area 4: Bethlehem with the potential for an esplanade walkway by 2055. However, there is no existing walkway. As such, it is considered to be highly unlikely for pedestrian traffic to require access through the works site. Temporary diversion will be implemented where necessary to be confirmed by the Contractor.

12.6.30 Upon implementation of the above matters and recognising the temporary nature of the access restrictions, it is considered any potential adverse navigational safety or public access effects arising from bridge construction over the Wairoa River will be no more than minor.

12.6.31 Following construction of the bridge there will be no ongoing navigation or public access effects from the placement of piers within the waterway.

12.7 Drilling Below the Water Table

12.7.1 Drilling below the water table will occur as localised operations associated with the piling works at the proposed local road overbridge sites and the Wairoa River bridge site with a total of 96 pile installations proposed based on preliminary bridge design plans. Additionally, drilling below the water table may also be required in association with ground improvement works such as the installation of stone columns for soil strengthening purposes. Potential effects associated with these activities include potential groundwater/surface water contamination effects as well as potential aquifer effects.

Contamination Effects

12.7.2 Potential contamination effects associated with the drilling operations may occur through potential spillages or discharges of drilling fluids or other construction liquids (hydrocarbons, concrete, sediment etc.) where they may enter surface water or groundwater.

12.7.3 Each of the proposed bridge construction/drilling sites will be located within the overall site perimeter controls and thus will be bunded/contained from any natural surface water bodies. Furthermore, based upon the nature of site soils and previous piling experience, driven piles are likely to be the preferred piling method thus avoiding the need for use of any drill fluids.

12.7.4 Nonetheless, should bored piles be utilised, drill fluids are expected to be limited to bentonite or polymer which will be carefully managed to ensure that any discharges are contained within the site and do not result in any direct discharge to any watercourse. It is particularly noted that these drill fluids are typically recycled by the drilling contractor between piling jobs and thus careful management and containment of these materials is a key aspect of the piling operations.

12.7.5 All other construction materials/liquids associated with the piling operations which pose a risk of contamination (hydrocarbons/concrete) will be managed in accordance with best practice protocols including appropriate storage, containment and spill management which will be in accordance with the details outlined within the finalised CEMP documents prepared by the construction team.

12.7.6 Similarly, any temporary groundwater de-watering required as part of the drilling piling operation can be directed to site sediment control devices for treatment prior to discharge to avoid any potential sediment contamination effects.

Aquifer Effects

12.7.7 Potential aquifer effects associated with the drilling/piling operations include potential mixing of previously isolated aquifers creating a potential for aquifer contamination and potential effects on aquifer pressure/levels which may affect any nearby existing bore water supplies utilising the same aquifer.

12.7.8 As described, based upon previous experience the piling operations are expected to comprise driven piles with the potential for mixing between aquifers thus minimised by the immediate sealing effect of the steel pile tubes within the pile excavation. Nonetheless, should a bored pile method be implemented or leakage occur between aquifers during a driven pile operation, the potential for any adverse effects is considered to be less than minor on the basis that no contaminated aquifers are known to exist within the TNL alignment which could give rise to inter-aquifer contamination effects.

12.7.9 Furthermore, following pile driving/boring the excavations will be rapidly backfilled with concrete and reinforcing steel to form the permanent pile and thus any pressure effects that do occur will be of a temporary nature only and are not expected to present a risk for adverse effects upon any water supply bores within the vicinity of the site.

12.8 Groundwater Diversion and Take Effects

12.8.1 Construction of the TNL will require numerous large scale cuttings, some of which are expected to extend into the groundwater table resulting in localised reductions (drawdown) in groundwater levels as water seeps out of the cut face. Drawdown of the groundwater table in these locations creates a potential for a number of potential adverse effects upon adjacent properties including:

- Potential groundwater drawdown effects with any nearby water supply bores which may result in reduced water levels and water availability within the existing bore supply;
- Potential settlement effects due to dewatering/ drying/ consolidation of existing soils which may result in potential impacts upon any adjacent structures (dwellings/ buildings etc.) located at the top of the cut batters;
- Potential groundwater interception/ diversion effects through the cut faces into the road drainage system resulting in the diversion of groundwater which would previously have percolated through site soils to enter the upper catchment first order tributary streams within this vicinity; and
- Potential effects on adjacent streams/ wetlands and rivers.

12.8.2 Section 6.4.9 and the design sketch at the end of the 'Drawings' appendix of the **Geotechnical Interpretative Report** attached as **Appendix B** includes a Groundwater Effects Assessment for the TNL which assesses the effects of the proposed earthworks cuts on groundwater levels with specific consideration to any adjacent bore water supplies, watercourses and structures.

12.8.3 This report confirms that groundwater levels in investigation boreholes in the Wairoa Road and Cambridge Road terraces are elevated above the level of the adjacent valleys, and above the finished level of TNL. Groundwater seepages will therefore occur in the Wairoa Road and Cambridge Road cuttings and the adjacent groundwater level will be drawn down. Borehole investigations suggest that ground saturation is widespread beneath the surface however in earthworks projects in the area it is a common observation that groundwater within the Matua Subgroup materials is often perched within defined aquifers and can be of limited volume. The actual volume of flow from the aquifers will not be known prior to construction. Nonetheless, for assessment purposes, the Geotechnical Interpretative Report has assessed the impact of the cuttings based upon full saturation of the soil profile below the observed water table hence representing a worst-case scenario.

12.8.4 The worst-case combination of groundwater level and cut depth is through the Wairoa Road terrace. At that location, a total road cut depth of 15m is proposed, which extends 10m below the observed groundwater table. The groundwater has been modelled as being permanently lowered below the finished road level by 1m, or to 11m below the existing groundwater table. The ground conditions between the existing and lowered groundwater table comprise predominantly clayey and sandy silts of the Matua Subgroup Tephra (MST) unit of relatively low permeability silts. Although again, the assessment has also incorporated higher permeability rates to factor a further level of conservatism.

12.8.5 Groundwater drawdown effects have been assessed based upon these parameters from the base of the cut in accordance with best practice methods. Based upon the typical range of soil permeability's expected within these areas the drawdown zone of influence has been estimated as extending a distance of around 70m from the toe of the cutting. Factoring the significant lengths of the cut batters through these areas (50-60m based upon the Specimen Design 3:1 batter gradients), this extent of drawdown is thus only expected to extend 10-20m past the top of the batters, beyond which groundwater levels are expected to return to current levels. Factoring the conservative upper bound soil permeability case, which is considered to be reflective of a sand than the MST silts actually present, the zone of drawdown has been estimated to extend a further distance of 156m from the toe of the cut, comprising a distance of around 100m beyond the top of the cuttings.

12.8.6 Considering the estimated extent/levels of drawdown against the identified potential environmental effects of these activities, the assessment draws the following conclusions:

- The zone of potential drawdown effects is not considered to extend a significant distance beyond the top of the proposed cut batters (10-20m based upon anticipated soil permeabilities) and will be limited to shallow depth drawdown only outside the designation. On review of BOPRC's bore mapping software, no consented or existing permitted bore watertakes are known to exist within this narrow strip of land beyond the major cuttings within the site which could be adversely affected by these activities.
- The nearest buildings to these cuttings have been measured as being at a distance of approximately 60m from base of the cuttings. Based upon the estimated drawdowns within the range of soil permeabilities expected, the assessment has estimated potential settlement effects at this distance to be less than 10mm. This level of settlement is expected to have negligible effects on existing building structures. Factoring the conservative upper bound soil permeability case, which is again considered to more reflect a sand than the MST silts actually present, settlements of 25mm to 30mm are estimated. That magnitude of settlement may be noticeable to older building structures located within this zone of influence.
- There are no significant first order tributary streams within the vicinity of the cuts that are likely to be adversely affected by the groundwater diversion/interception effects. Furthermore, soil profiles in these areas are typically layered and groundwater flows are more horizontal than vertical and hence are likely to be towards the terrace escarpments where they discharge as springs/seepages to the gully slopes and then into the network of drains across the adjacent valley floors. Any seepage flows intercepted within the cuttings will be conveyed via the TNL drainage system to return to the adjacent drainage systems not far downstream.

12.8.7 Based upon these considerations, the potential groundwater diversion/drawdown effects of the proposed TNL earthworks activities are expected to be constrained to only a localised margin beyond the designation, and within these areas are expected to be no more than minor. Nonetheless, the assessment contained within the **Geotechnical Interpretative Report** identifies the potential for variability in soil profiles and permeabilities from those identified and factored within the assessment which could give rise to increases in effects beyond those anticipated. In this respect, a recommendation is made outlining a requirement for preparation of a Groundwater Drawdown

Monitoring Plan, particularly in regard to locations where cuttings and associated drawdown impacts may occur in proximity to adjacent dwellings. This plan should be based upon the finalised earthworks design and should incorporate the following items:

- The locations of the main cuts which present a risk for groundwater drawdown effects;
- Identification of all dwellings/structures located within 100m of the designation boundary which could be susceptible to potential drawdown/settlement effects;
- Establishment of groundwater monitoring bores in these locations for assessment of any drawdown effects over the duration of the works;
- A detailed monitoring regime for monitoring of drawdown effects within the bores including establishment of baseline levels;
- Identification of drawdown triggers at which there is considered to be a potential for adverse effects upon adjacent properties along with contingency measures to manage any potential effects.

12.8.8 Again, while the anticipated effects of these activities are expected to be no more than minor, development and implementation of this plan will ensure that appropriate procedures are in place to detect any potential adverse drawdown effects which may arise over the duration of the works along with contingency methods to ensure that these effects do not result in any adverse impacts upon properties outside of the designation.

12.9 Surface Water Take

12.9.1 The application proposes the extraction of 800m^3/day of surface water from the Wairoa River for the purposes of dust suppression, earthworks construction, pavement construction, concrete batching and the irrigation of re-vegetation and landscape planting during the construction phase of the TNL Expressway. Potential environmental effects associated with this large volume take includes potential sustainability/water allocation effects and the direct effects at the intake site.

Sustainability/Allocation Effects

12.9.2 In assessing the sustainability/water allocation effects of the proposed water takes it is a key point that the proposed Wairoa River take is located within the very lower reaches of the catchment, being within the tidal reaches of the river. Hence the potential for the proposed take to impact upon any downstream environmental or allocable flows is likely to very minor.

12.9.3 Available flow data for the lower Wairoa River is limited to BOPRC monitoring data sourced from their monitoring station at the Ruahihi Power Station located approximately 9km upstream of the proposed take site. Flow data has been summarised in the BOPRC River Flow Recording Station Monitoring Report for the period January 1994 to December 2005 although the report identifies that the catchment is unnatural due its dam controlled nature and with flows being recorded through the power station turbines and hence ability to record summer low flows are somewhat compromised due to turbine flows at times being entirely shut off during these periods. Nonetheless, the report outlines mean annual summer flows over this period ranging from around 1m^3/s up to over 7m^3/s with a mean summer flow over the entire monitoring period of around 3.5m^3/s (equivalent to 302,400m^3/day).

12.9.4 Considering this recorded mean summer flow at this upstream site, the proposed maximum take volume of 800m^3/day at the TNL site comprises around 0.26% of this mean flow. In addition, these recorded flows are noted as being exclusive of the additional catchment inputs from a number of additional significant tributary catchments including the Omanawa, Waireia and Ohourere Streams which contribute additional flows to the Wairoa River between the power station and the TNL site. It

is expected that this maximum daily water take will not be required to reach a maximum value every day over the 4-year estimated construction programme. As such, the volume of the water take will vary dependant on the weather conditions at the site and the subsequent Contractor's requirements dependant on the works area i.e. the extent of works and proximity to neighbour's will dictate the required daily volume of water take and application rate. Based on previous water takes for Expressway construction projects, a maximum rate of take from the Wairoa River may be operated at a maximum capacity of 90 l/s.

12.9.5 Furthermore, information provided by BOPRC has confirmed the availability of remaining water take allocation within the Wairoa River in the order of 14 l/s equating to a volume of 1,210m^3/day which is considered sufficient to accommodate the proposed take volume sought through this consent application.

12.9.6 For these reasons, it is considered that the proposed temporary construction water take can occur without resulting in any adverse sustainability or water allocations effects within the downstream reaches of the Wairoa River. The proposed take will implement typical flow monitoring, recording and reporting to ensure that the specified water take requirements are not breached throughout the duration of these activities.

Intake Effects

12.9.7 As outlined, the proposed intake structures will be floated on the river surface near the bank and will incorporate a screen not exceeding 1.5mm aperture size to avoid any potential suction effects along with potential debris blockages. Hence the proposed intake structure will be located and configured to avoid any potential effects on river users, flow regimes and aquatic ecology.

Ecological Effects

12.9.8 Section 4.2.7 of the **Assessment of Ecological Effects** report (**Appendix I**) provides a detailed assessment of the water abstraction activities on aquatic biota. That assessment identifies abstractions of water may result in adverse effects including increased temperatures and aquatic plant growth and reductions in dissolved oxygen and subsequent habitat for aquatic fauna. The severity of that effect is measured by the volume of the take and the resulting residual flow of the water body. As summarised above, the proposed volume of the take is not considered to present measurable effects on flow variability within the downstream habitats of the river and as such the potential ecological effects of the take are negligible.

12.10 Stormwater Discharge Effects

12.10.1 The application proposes the diversion and discharge of stormwater runoff from impervious surfaces associated with the Expressway pavement construction activities. Effects of stormwater runoff from these surfaces on the receiving environment must be managed in order to prevent or minimise adverse effects such as public health and safety and degradation of aquatic habitat. In this regard, there are three key areas for managing stormwater, namely:

- water quality control, (contaminants in stormwater);
- water quantity control (flooding, hydrological changes, overland flow); and
- long term operation and maintenance of the stormwater system.

12.10.2 These issues are discussed below in regard to the subject application.

Water Quality Effects

12.10.3 Stormwater runoff from roads and impervious areas is known to contain contaminants such as metals, hydrocarbons and sediment. A number of these contaminants, if allowed to enter the environment, will accumulate in the sediments of the receiving environment and may reach levels which are toxic to biota. Vehicle use of the roading surfaces can result in the deposition of heavy metals and hydrocarbons from tyre/brake wear, exhaust fumes and fuel/lubricant leaks onto road surfaces. Other development catchment contaminants can include gross pollutants (i.e. rubbish/debris), sediments and nutrients from landscaped surfaces. As contaminants often become attached to sediment particles, removal of suspended sediment provides partial treatment of stormwater.

12.10.4 All runoff from the Expressway surfaces is proposed to be routed through best practice stormwater treatment devices prior to discharge into the downstream receiving environments.

12.10.5 Based on the Specimen Design Drainage Plans the runoff from the majority of the Expressway will be treated within nine constructed wetland devices which will be designed based upon the New Zealand Transport Agency Stormwater Treatment Standard for State Highway Infrastructure (2010) (Transport Agency Stormwater Standard) which is considered to represent best practice stormwater management methods for highway runoff. These devices have been chosen based upon the configuration of the TNL carriageway drainage catchments, their high rates of contaminant removal, their multi-function characteristics (treatment/attenuation/ecological/landscape) and their off-line locations minimising traffic management requirements during maintenance (compared to long/lineal roadside swales).

12.10.6 Wetland treatment systems designed in accordance with the Transport Agency Stormwater Standard are considered to be an effective mechanism for reducing flow velocities promoting the settlement of suspended sediments and attached contaminants and providing for biofiltration of soluble contaminants by wetland vegetation uptake. Research has shown that removal of upward of 75% of suspended sediments and attached contaminants is possible in these systems. Should this treatment method be adopted by the construction team the finalised wetland design will incorporate provision of an inlet forebay to minimise discharge velocities and erosion effects, provide for initial capture of coarse sediments and other gross pollutants and provide a point for regular maintenance and removal of accumulated contaminants. Additionally, while these devices are designed primarily for stormwater management functions, planting of the wetland with native wetland species will contribute to local habitat and biodiversity values for local wildlife and also contribute to enhanced landscape/amenity outcomes for the project.

12.10.7 The **Stormwater Management Report** (**Appendix G**) includes design calculations and plans confirming that the proposed wetland devices have been sized in accordance with the best practice Transport Agency Stormwater Standard and comprise both a feasible and practical method for treatment of the TNL runoff within the designated corridor.

12.10.8 Runoff from an approximate 600m long portion of the TNL carriageway at its eastern end near Takitimu Drive has been identified as being unable to be conveyed to any of the proposed wetland treatment devices. Hence, treatment of runoff from this area is proposed via a length of treatment swale. While these devices do not provide the multi-function benefits of the wetland devices, they are still able to provide best practice stormwater treatment benefits if adequately designed. In this instance, the proposed swale length will again be designed in accordance with the Transport Agency Stormwater Standard to ensure a minimum 9-minute residence time for catchment flows through the swale to ensure best practice treatment for this minor catchment.

12.10.9 Based upon the above water quality treatment methods it is considered that best practice methods are available to ensure that all carriageway runoff is treated in accordance with these methods to avoid any potential adverse downstream water quality effects as a result of these activities.

Water Quantity Effects

12.10.10 The creation of impervious surfaces within a catchment can result in the increase in stormwater peak flows, velocities, longer duration of high rates of runoff, and more runoff from smaller storms than would have occurred prior to land development. This can result in an increase in the frequency and intensity of flood events and the associated adverse effects on any downstream property located in flood plain areas or in proximity to the subject watercourse. Furthermore, these changes can result in downstream channel erosion and consequent sedimentation in receiving waters, local erosion and a reduction in the efficiency of downstream drainage systems which can consequently result in degradation of these receiving environments.

12.10.11 The approach to management of potential water quantity effects outlined within the **Stormwater Management Report** is that six of the proposed wetlands will be designed to incorporate attenuation of peak catchment runoff events via attenuation of the 2, 10 and 100-year catchment flows to predevelopment levels. This level of attenuation is considered to mitigate any potential adverse increases in catchment flows from the TNL stormwater discharges which could contribute to increased downstream flooding effects and is consistent with the methods promoted through the Transport Agency Stormwater Standard.

12.10.12 Additionally, the wetlands have been designed to incorporate the extended detention of catchment flows during the smaller channel forming flow events which could contribute to potential downstream channel erosion effects. The Transport Agency's standard outlines the best practice methodology for managing these potential effects within these catchments as being through the capture and release of the water quality volume over a 24-hour period. Hence, these six wetland devices located at the bottom of these catchments will incorporate this design feature with an outlet orifice sized and set at an appropriate level to provide for the controlled release of the water quality volume over this period to prevent any adverse downstream channel erosion effects in accordance with the Transport Agency's Stormwater Standard.

12.10.13 As noted, three of the proposed wetland devices do not include the above stormwater quantity management provisions comprising Wetlands 005 and 006 which are both located within the low-lying Wairoa River floodplain and Wetland 009 at Takitimu Drive. Furthermore, discharges from these devices will occur more or less directly into the tidal reaches of this large capacity water body and hence present minimal risk for any adverse water quantity effects upon any downstream properties. In this respect, exclusion of peak flow attenuation and extended detention design provisions from these devices is justified with these wetlands being designed purely for stormwater treatment functions. Wetland 009 at Takitimu Drive is identified as being located within the floodplain of the Kopurererua Stream. Water quantity design requirements for this wetland are still subject to further discussion with BOPRC and TCC.

12.10.14 Based upon the implementation of these proposed stormwater management measures, it is considered that any potential water quality or quantity effects of the Expressway stormwater discharges can be effectively managed in accordance with best practice methods and will be less than minor.

12.10.15 Again, it is reiterated that the stormwater management measures outlined within the specimen design documents has purely been developed to confirm the ability of the TNL to achieve best

practice stormwater management objectives within the designation constraints. Hence, while the intention is that these design objectives will be maintained for the finalised design, flexibility is again being sought to allow for further innovation and design modifications within the finalised design documents. In this respect, consent conditions are anticipated requiring submittal of the finalised stormwater management design details to BOPRC to confirm that best practice stormwater quality and quantity effects will be addressed in accordance with the best practice guideline documents and objectives as outlined within this report.

12.10.16 Stormwater management methodologies resulting from the widening of the Takitimu Drive embankment and construction at Fifteenth Avenue are still subject to development of a mitigation plan with TCC and BOPRC and those effects will be mitigated through ongoing discussions.

Stormwater Operation and Maintenance

12.10.17 The long term effective function of the proposed stormwater management devices is dependent on the ongoing maintenance of these systems to ensure that they are capable of achieving the design stormwater management functions.

12.10.18 Following construction of the finalised drainage design an Operations and Maintenance Manual will be developed which outlines the specific monitoring and maintenance requirements for the completed stormwater management devices. This manual will be adopted by the Transport Agency maintenance contractor to ensure their long term effective function in managing potential water quality and quantity effects.

12.11 Discharge Structure Effects

Erosion Effects

12.11.1 Discharge of concentrated, high velocity stormwater flows via pipe outlets into the site watercourses creates the potential for adverse erosion effects. As previously described, it is likely that the majority of outlets will comprise constructed channels extending from the proposed stormwater management devices to enter the receiving watercourses as opposed to direct pipe outfalls. Nonetheless, all outlet structures will incorporate provision of appropriate erosion control structures including headwall/apron structures and rock armour to prevent any adverse erosion/scour effects at these discharge points. These design requirements will be finalised for each outlet through the detailed drainage design plans and based upon implementation of these measures it is considered that any potential erosion effects at stormwater outfall locations will be less than minor.

Habitat Effects

12.11.2 Any discharge structures which do extend directly into the bed of a watercourse will comprise localised pipe/rock installations within stream banks areas and will be designed and installed to fit in to the existing stream bank profile. Again, the specific design details of these structures will be confirmed through the detailed site drainage plans to be developed by the construction team. Any effects of these structures upon aquatic habitat values will be less than minor.

12.12 Ecological Effects

12.12.1 The previous sections of this Assessment of Environmental Effects of the TNL has included a number of areas where specific design provisions or construction methodologies are being proposed to avoid, remedy or minimise the potential effects of the proposed activities upon local ecology and habitat values. These provisions include:

- Implementation of best practice erosion and sediment control measures during construction to manage potential sediment effects upon receiving watercourses;
- Controls around the use of machinery to manage potential spills, contamination and biosecurity effects;
- Implementation of specific streamworks methodologies for culvert and stream diversion activities to minimise potential sediment effects and direct effects upon local aquatic communities during the construction phase;
- Specific consideration of fish passage within culvert design;
- Design of new stream channel sections associated with diversion activities to maintain natural stream habitat values;
- Incorporation of best practice stormwater quality and quantity management measures within the proposed drainage design to manage potential contamination and erosion effects within receiving watercourses.

12.12.2 In addition to these effects and the proposed management methods, the construction of TNL has the potential to create a variety of other ecological effects during both the construction phase and the use of the road when it is complete. The scale and extent of potential ecological effects will depend on the overall alignment route, the types of structures used (e.g. bridges versus culverts over stream gullies), construction methods, proximity of the road to sensitive ecological features, and the creation of barriers to the movement of fauna through a wider landscape.

12.12.3 In response to these ecological effects, a number of additional species specific management protocols and implementation of an overall Ecological Management Plan (EMP) are proposed for the TNL. These ecological management/mitigation measures are discussed in detail within the **Assessment of Ecological Effects** attached as **Appendix I** and are summarised within the following sections.

Ecological Management Protocols

12.12.4 The removal of areas of existing habitat for native species including areas of vegetation and aquatic habitat creates the potential for direct effects including mortality/injury of resident communities of native fauna during the clearance/excavation period. The potential effects on the various communities' present within these areas and proposed ecological management protocols are outlined as follows.

Bats

12.12.5 Long tail bats roost primarily in trees, selecting the oldest tallest trees available. Within native forests, the bats are cavity roosting, selecting knot-holes high in tall large diameter trees. Trees of this description within the TNL alignment are limited as the trees are generally too young or unsuitable to be cavity trees. As such, the impact of the proposed road construction on the habitat quality and quantity of bats is considered to be minor and the risk of affecting bat roosting is low. However, during monitoring undertaken by Kessels Ecology over 336 detector nights, there were two confirmed and seven potential long tail bat calls detected. The two confirmed bat passes were detected near Minden Road. As the alignment area does not provide a suitable roosting habitat, the **Assessment of Ecological Effects** suggests that that the area likely provides foraging and commuting habitat despite only sporadic tree and shrub species being present.

12.12.6 While the **Assessment of Ecological Effects** identifies limited bat roost habitat within the site, a precautionary approach is recommended in that care be taken when felling any exotic trees which could potentially comprise roost habitat for long tailed bats. Mortality of roosting bats during tree

felling should be avoided by adherence to tree-felling protocols which will be incorporated into a proposed Bat Management Plan.

12.12.7 Additionally, the implementation of the proposed EMP will provide mitigation of any potential adverse effects upon bat populations within the TNL alignment through proposed habitat enhancement and pest control measures.

12.12.8 Based upon the low risk of affecting bat habitat within the TNL alignment and the implementation of the measures mentioned above it is considered that any potential direct effect upon local bat populations during construction can be appropriately avoided or mitigated.

Birds

12.12.9 Three nationally 'At Risk' bird species were detected within the proposed TNL alignment, namely black shag, New Zealand dabchick, and North Island kaka. All other bird species that were encountered during the survey are common indigenous or exotic species typical for bush remnants, open country and urban areas. While the three 'At Risk' bird species are not likely to be permanently present within the proposed project alignment, the potential loss of freshwater habitat, especially areas of open water and riparian vegetation, are likely to affect the ability of black shag and New Zealand dabchick to forage at, and migrate through this locality.

12.12.10 While the proposed project alignment appears to be of low significance as a breeding habitat for threatened or at risk indigenous bird species, the mosaic of indigenous and exotic habitats provides valuable opportunities as part of an ecological corridor within the wider landscape, as well as potential foraging grounds. As such, the Ecological Assessment considers that the proposed project alignment will have a minor impact on indigenous avifauna values.

12.12.11 It is likely that during initial clearance works any birds that are present within the works area, will be able to avoid direct effects through flying away from the construction zone and re-establishing within adjacent habitat. The exception to this is during the nesting season when eggs, chicks or protective parents are unable or unwilling to vacate the construction zone.

12.12.12 Nonetheless, in response to these potential effects, the Ecological Assessment recommends the following protocols:

- Pre-construction surveys;
- Nest and roost searches; and
- Incidental kill and harm minimisation protocols.

12.12.13 The above measures, in addition to others, will be implemented through a proposed Bird Management Plan.

12.12.14 Additionally, the implementation of the proposed EMP will again provide mitigation of any potential adverse effects upon bird populations within the TNL alignment through proposed habitat enhancement and pest control measures.

12.12.15 Based upon the low risk of affecting bird habitat within the TNL alignment and the implementation of the measures mentioned above it is considered that any potential direct effect upon local bird populations can be avoided or mitigated.

Lizards

12.12.16 To date, habitat and night-time searches for lizards have only revealed the presence of exotic plague skinks within the TNL alignment. Despite limited field surveys to date yielding no indigenous lizard species, it is highly probable that indigenous lizards will be found within the alignment as most lizard species are well camouflaged and often difficult to detect until their habitat is significantly disturbed during construction. Vegetation removal and earthworks associated with the TNL are thus expected to further degrade any remaining habitat of indigenous lizard species present at the site. It is considered however, that the remaining habitat within the TNL alignment is relatively small and is scattered in linear disturbance areas.

12.12.17 In response to these potential effects, the Ecological Assessment recommends the capture and translocation of indigenous lizards residing within the road footprint. This will be implemented through a Lizard Management Plan. The Lizard Management Plan is expected to include a description of lizard habitat, lizard species present, legal requirements, personnel and disease management, timing, survey and recovery methods, reporting requirements, and mitigation.

12.12.18 Additionally, the implementation of the proposed EMP will provide suitable mitigation of any potential adverse effects upon lizard populations within the TNL alignment through proposed habitat enhancement and pest control measures.

12.12.19 Based upon the low risk of affecting lizard habitat within the TNL alignment and the implementation of the measures mentioned above, it is considered that any potential direct effect upon local lizard populations can be avoided or mitigated.

Fish

12.12.20 Many of the perennial watercourses within the site have been identified as providing habitat for a range of native fish species and thus proposed instream works including installation of culvert structures and stream diversions will directly affect resident populations within the stream channel works zone.

12.12.21 The installation of culverts can limit the migration of fish between the sea and upstream catchments. In order to avoid fish passage through the culvert construction area, a number of key design features will be incorporated into each of the culverts proposed on permanently flowing watercourses as set out in the **Culvert, Stream and Minden Gully Bridge Hydraulics Report** (**Appendix F**). This will ensure that passage for all fish species through each culvert is maintained. In regard to stream realignment and diversion, the new stream channels will be designed and constructed in a manner which provides quality habitat for aquatic biota as set out in the **Culvert, Stream and Minden Gully Bridge Hydraulics Report**.

12.12.22 In addition to the above, the **Assessment of Ecological Effects** (**Appendix I**) recommends that specific protocols are incorporated into an Indigenous Fish Management Plan to ensure that instream works activities include a hold point prior to de-watering/infilling of any channel section at which a fish trapping and transfer operation will be implemented to ensure that resident populations are relocated. This may include implementation of fyke nets, minnow traps or electric fishing for a set period prior to works to maximise capture and relocation of fish.

12.12.23 These methodologies will be finalised within the Indigenous Fish Management Plan which will be developed by the construction team and approved by BOPRC prior to commencement of works.

12.12.24 Based upon the mitigation measures proposed by the Transport Agency for culvert construction and stream realignment, it is considered that the TNL construction works will be suitably managed ensuring that any potential adverse ecological effects will be less than minor.

Vegetation

12.12.25 The Ecological Assessment identifies that the majority of the TNL alignment comprises modified land cleared of vegetation and used as pasture or intensive kiwifruit and avocado orchards. The vegetation located within the TNL alignment has been identified as being predominantly exotic with pockets of indigenous vegetation being present within steep escarpments and gullies although these areas are dominated by exotic growth. The construction of TNL will result in direct and indirect effects upon these sections of vegetation where mixes of native and exotic vegetation provide habitat for a range of native fauna. Of the identified areas of vegetation, approximately 5.17 ha of the vegetation has been identified as providing ecologically significant vegetation and habitat as defined under the criteria of the RPS. These ecologically significant vegetation areas are identified in **Table 5** below.

Table 5: Ecologically Significant Vegetation within the TNL Project Area

Vegetation type	Area within project footprint (ha)
Terrestrial vegetation	**2.64**
Type 9: Rimu, Totara, Puriri, Kauri, exotic broadleaf forest	0.28
Type 19: Kanuka, Karamu, Hangehange, Ponga, Harakeke scrub	0.56
Type 21: Willow, Privet, Mahoe, Barberry scrub	1.37
Type 32: Willow treeland	0.43
Wetland Vegetation	**2.53**
Type 11: Pond	0.08
Type 14: Wet exotic grassland	1.53
Type 34: (Rush) wet grassland	0.92
Overall Total:	**5.17**

12.12.26 For the majority of these areas, their identification as being of ecological significance is based predominantly upon their potential rather than actual ecological values and functions. Nonetheless, the proposed management approach for these habitats is to mitigate for their loss through the implementation of ecological mitigation works which are discussed within the following sections.

12.12.27 In regard to weed invasion, bare earth surfaces will temporarily be created during construction which are susceptible to weed invasion. These areas will be subject to re-vegetation in accordance with the site landscape plans which includes areas of re-grassing along with areas of native amenity plantings which will all be subject to ongoing maintenance to ensure the successful establishment of the desired plant cover without being compromised by weed proliferation.

Ecological Mitigation

12.12.28 The construction of TNL cannot occur without the direct loss of existing habitat for a number of notable or significant species including areas of significant vegetation cover associated with initial vegetation clearance and earthworks activities and stream habitat associated with culvert and diversion installation activities. Namely, the TNL alignment will result in the following ecological effects:

- A direct loss of existing areas of vegetation and potential habitat as a result of the roads construction;
- Modification of aquatic habitat by culverts and stream realignments;
- Disturbance of aquatic habitat during installation of culverts and realignment of streams including injury and mortality of fish;
- Disturbance of birds by construction and ongoing traffic following completion of the highway;
- Loss of lizard habitat and mortality of lizards during construction;
- Disruption of bat movement in the landscape;
- Possible mortality of roosting bats during tree felling;
- Sediment run-off during construction affecting the ecologically sensitive stream and river habitats;
- Stormwater runoff containing contaminants from the completed road surfaces entering existing water courses and wetland habitats; and
- Creation of open 'bare earth' areas susceptible to invasion by exotic plant species and changing hydrological regimes in permanent and ephemeral waterways, which in turn would alter existing ecological communities.

12.12.29 The proposed management approach to these unavoidable ecological effects is through the development and implementation of an EMP in addition to the species-specific management plans (as mentioned above) and construction management plans and design features proposed through this application. The finalised EMP will identify the finalised areas for ecological restoration along with fencing requirements, the number and type of plants to be used, and a five-year plan for each restored area. The recommended mitigation protocols for the various areas of impacts associated with the TNL works to be covered within the EMP are provided in the following sections.

Riparian Restoration

12.12.30 **Table 6** provides a summary of the stream habitat that will be lost as a result of the TNL alignment and the responding proposed mitigation planting.

Table 6: Length of Stream Habitat Impacts and Proposed Restoration

Location	Length of watercourse removed/ culverted (m)	Length of watercourse realignment/ restoration (m)	Planting length (m)	Area of planting (m2)	Area of planting (ha)
Permanent Streams – realignments					
Oturu/ Western sub-catchments	0	270	0	Planting not proposed	0

Wairoa River East tributary/ eastern Wairoa sub-catchments	677	675	675	13500	1.35
Kopurererua Stream tributary/ Cambridge Road and Smith Farm sub-catchments	610	556	110	2200	0.22
Te Mete Streams	119	247	247	4940	0.49
Permanent Streams – Culverts					
Oturu/ Western sub-catchments – culverts	0 (existing culvert to be replaced)	0	0	0	0
Kopurererua Stream Tributary	131	262	262	5240	0.524
Te Mete Streams	214	New stream habitat created	–	–	–
Total stream riparian planting					**2.6**
Ephemeral streams/ farm drains					
Te Mete sub-catchments	156	270	270	1080	0.11
West Wairoa sub-catchments	171	550	550	2200	0.22
East Wairoa sub-catchments	268	436	436	1744	0.17
Total ephemeral/ farm drain riparian planting					**0.50**

12.12.31 Mitigation in the form of riparian planting is recommended as part of the **Assessment of Ecological Effects** to compensate the stream habitat loss resulting from stream diversion and culvert installation. A total of 2.6ha of stream riparian planting is recommended, assuming a width of 10m on both sides of the stream. This width is recommended as it will ensure that there are tangible benefits to the planting and allow the sites to become self-sustaining.

12.12.32 Realignment of existing ephemeral watercourses and farm drains will result in the creation of new watercourse/aquatic habitat. It is recommended that these new watercourses are planted at a width of 2m on both sides with low-growing riparian vegetation, to preserve drainage capacity while reducing the capacity for weed invasion and enhancing habitat values. The total area of planting for these areas is 0.50ha.

12.12.33 Areas likely to provide inanga spawning habitat require careful restoration planning. Inanga require dense, low-growing vegetation near the stream banks to spawn, and densely planted tree species can shade out such vegetation. In likely inanga spawning areas such as the banks of the Wairoa River, Kopurererua Stream and tributary, and Wairoa East tributary, planting adjacent to the water's edge should be restricted to indigenous grasses, sedges and other low growing vegetation suitable for inanga spawning.

12.12.34 Overall, the planting of the riparian margins as recommended will reduce stream bank erosion, reduce the amount of sediment and nutrients getting into the stream, and provide valuable shading, which in turn keeps water temperatures low, reduces growth of unwanted algae, and helps to maintain dissolved oxygen levels. Subsequently, this planting will enhance the habitat of indigenous fish species and wetland birds that reside in the area.

Wetland Creation

12.12.35 The proposed TNL construction works are not considered to result in any areas of existing wetland habitat as defined in the RWLP being affected. Nonetheless, areas of exotic pasture land which are subject to saturation under winter conditions and where some common native reed species are present along with one artificial pond/dam feature are noted which would present some potential wetland habitat and functional values. These areas will be directly impacted/lost through the proposed works and a precautionary approach has been applied to saturated areas within the TNL alignment through this consent application.

12.12.36 The **Assessment of Ecological Effects** outlines that these areas are considered significant because they provide habitat that is reduced in size from its original extent, and represent high restoration potential. In response to the loss of these habitats the assessment recommends mitigation in the form of creation of new areas of planted wetland habitat of an equivalent area as outlined in **Table 7.**

Table 7: Impacted Wetland Type Vegetation and Proposed Mitigation

Vegetation type	Area within project footprint (ha)	Proposed mitigation ratio	Location of mitigation	Total mitigation required
Wetland Vegetation	**2.53**	-	-	**2.53**
Type 11: Pond*	0.08	1:1	Te Mete Road wetland near site of original pond	0.08
Type 14: Wet exotic grassland*	1.53	1:1	Wetland mitigation planting areas: Wairoa Eastern tributary, Kopurererua tributary, Te Mete Road wetland area	1.53
Type 34: (Rush) wet grassland*	0.92	1:1	Wetland mitigation planting areas: Wairoa Eastern tributary, Kopurererua tributary, Te Mete Road wetland area	0.92

12.12.37 Ecological mitigation wetlands will be separate from the stormwater treatment and attenuation systems.

12.12.38 As there are limited areas of existing wetland habitat within the designation footprint, these areas will likely need to be created through excavation or damming of water within low lying parts of the

designation to achieve saturated ground conditions suitable for wetland type vegetation. They will be situated within stream floodplains and will be designed to be periodically inundated by naturally fluctuating stream flows, as was likely the case prior to agricultural development of the area of these catchments.

Terrestrial Restoration

12.12.39 **Table 8** below provides an overview of the approximate hectares of terrestrial vegetation types and habitats that will be affected by the TNL alignment and the total mitigation restoration proposed to be carried out.

Table 8: Areas of Impacted Terrestrial Vegetation and Proposed Mitigation

Vegetation type	Area within project footprint (ha)	Proposed mitigation ratio	Location of mitigation	Total mitigation required
Ecologically significant terrestrial vegetation				
Type 9: Rimu, Totara, Puriri, Kauri, exotic broadleaf forest*	0.28	5:1	Revegetation areas along alignment	1.4
Type 19: Kanuka, Karamu, Hangehange, Ponga, Harakeke scrub*	0.56	5:1	Revegetation areas along alignment	2.8
Type 21: Willow, Privet, Mahoe, Barberry scrub*	1.37	1:1	Revegetation areas along alignment	1.37
Type 32: Willow treeland*	0.43	1;1	Revegetation areas along alignment	0.43
Total:	**2.64**	-	-	**6.0**
Ecologically valuable exotic vegetation				
Minden Road exotic vegetation: – Type 3: Eucalypt, Radiata Pine, Privet forest; – Type 31: Poplar, Eucalypt, Cedar, Sheoak treeland; and – Type 26: Barberry and gorse shrubland.	1.37	1:1	Gully slopes and floor	1.37
Amenity plantings with ecological value	1.39	1:1	Revegetation areas along alignment	1.39
Total	**2.76**	-	-	**2.76**
Ecologically significant wetland vegetation				

Type 11: Pond*	0.08	1:1	Te Mete Road wetland near site of original pond	0.08
Type 14: Wet exotic grassland*	1.53	1:1	Wetland mitigation planting areas: Wairoa eastern tributary, Kopurererua tributary, Te Mete Road wetland area	1.53
Type 34: (Rush) – wet grassland*	0.92	1:1	Wetland mitigation planting areas: Wairoa eastern tributary, Kopurarerua tributary, Te Mete Road wetland area	0.92
Total	**2.53**	-	-	**2.53**
Overall Total:	**7.93**	-	-	**11.29**

12.12.40 It is recommended that to mitigate for the loss of 5.17ha of terrestrial vegetation which has been identified as being of ecological significance under the RPS criteria (this excludes amenity plantings and Minden Road Gully exotic vegetation in the table above), a total of 6ha of terrestrial mitigation planting should be carried out as described in **Table 8**, in roadside re-vegetation areas.

12.12.41 A further 1.39ha of vegetation (Amenity plantings with ecological values) within the road footprint is dominated by exotic species. Mature vegetation that is part of existing ecological corridor provides habitat for indigenous fauna, but not at a level where it would be considered ecologically significant. Some of these areas include small numbers of mature indigenous trees. It is considered that the removal of these areas should be mitigated for by planting 1.39ha of indigenous vegetation at strategic locations to the east of Wairoa Road and adjacent to the Cambridge Rd intersection/Kopurererua Stream gully.

12.12.42 Overall, a total of 8.76ha of terrestrial restoration plantings is proposed to offset the loss of the existing areas terrestrial vegetation habitat.

Conclusion

12.12.43 Overall, development of the proposed EMP and species-specific management plans, as recommended in the Ecological Assessment, will follow a precautionary approach through mitigation of both actual and potential ecological impacts of the TNL project through both specific site management protocols during the construction works along with an extensive habitat mitigation/restoration package. The mitigation proposed through this plan is considered to be in excess of the minimum mitigation targets required for ecological habitats and biodiversity within the site and thus the implementation of this plan will result in an overall net improvement of local biodiversity values within the long term.

12.13 **Positive Effects**

12.13.1 The TNL Expressway will significantly benefit the sub-region by improving connectivity between Tauranga and the northern Bay of Plenty and beyond in conjunction with wider improvements to the SH2 Corridor. The TNL will further reduce the congestion currently experienced within those townships adjoining the existing SH2 alignment. Reduced vehicular congestion will result in less conflict between State Highway traffic and localised traffic and will have resultant improvements to road safety. The alignment of TNL away from urban centres will also have the benefit of reducing travel times for localised traffic.

12.13.2 The completed TNL Expressway will have a profound effect upon the ability of people and communities to provide for their social, economic and cultural wellbeing. Those benefits stem from a combination of factors, not least a quicker and more direct route between Te Puna and SH29 for freight. That improved connectivity will have social as well as economic benefits because goods and services will be more accessible to widespread communities. Other potential benefits associated with TNL include less vehicle emissions due to shortened travel times and less vehicular queuing.

13. STATUTORY ASSESSMENT – RESOURCE MANAGEMENT ACT 1991

13.1 **Sections 104 and 104B**

13.1.1 The resource consents that are the subject of this application require assessment as Discretionary Activities under the Bay of Plenty Regional Water & Land Plan (RWLP) and Plan Change 9 Region-wide Water Quantity of the RWLP. Sections 104 and 104B of the RMA are therefore relevant for consideration.

13.1.2 Section 104(1) sets out those matters that a consent authority must consider when assessing an application for resource consent. The matters that are relevant to the consideration of this application (subject also to Part 2, the Purpose and Principles of the RMA) are:

> *"(a) any actual and potential effects on the environment of allowing the activity; and*
> *(b) any relevant provisions of –*
> *(iii) a national policy statement;*
> *(v) a Regional Policy Statement or proposed regional policy statement:*
> *(vi) a plan or proposed plan; and*
> *(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application."*

13.1.3 Section 12 of this report addresses the actual and potential effects on the environment, and Section 5 of this report assesses the activity status of the proposed activities against the relevant provisions of the RWLP. The assessments conclude that potentially adverse effects are able to be avoided, remedied or mitigated.

13.1.4 Section 104B defines the power of a consent authority to grant resource consent for a discretionary activity. Section 104B states:

> ***"104B Determination of applications for discretionary or non-complying activities***
>
> *After considering an application for a resource consent for a discretionary activity or a non-complying activity, a consent authority –*
> *(a) May grant or refuse the application; and*
> *(b) If it grants the application, may impose conditions under section 108."*

13.1.5 To assist Bay of Plenty Regional Council in the assessment of this application, the Transport Agency has provided a set of 'draft consent conditions'. The proposed **draft conditions** are attached as **Appendix M**. It is requested that the Transport Agency be provided an opportunity to review any amended or new conditions that may be imposed as a condition of resource consent.

13.2 Part 2 of the RMA

13.2.1 Part 2 of the RMA contains the purpose and principles of the RMA. Section 5 sets out the sole purpose of the RMA, which is to promote the sustainable management of natural and physical resources.

13.2.2 Sustainable management is defined to mean managing the use, development and protection of such resources in a way, or at a rate, that enables people and communities to provide for their social, economic and cultural well-being and their health and safety, while:

- Sustaining the potential of resources to meet the reasonably foreseeable needs of the future generations; and
- Safeguarding the life-supporting capacity of air, water, soil and ecosystems; and
- Avoiding, remedying or mitigating any adverse effects on the environment of the activities.

13.2.3 The recent High Court decision on *R J Davidson Family Trust v Marlborough District Council* [2017] NZHC 52 determined that in most cases there is no need or ability to refer back to the purpose and principles in Part 2 of the RMA when determining applications for resource consents. That decision is subject to appeal. In any event, this case law has little overall impact on the application. The project aligns well with the relevant planning documents which can be viewed as giving substance to Part 2.

13.2.4 The RWLP lists the objectives, policies and rules which promote sustainable management within the wider Bay of Plenty Region. These considerations have been variously addressed within Sections 5 and 13.3 of this report. That assessment demonstrates that the proposed works and completed infrastructure will continue to protect water quality, soil and ecosystems, and if appropriately mitigated, have no more than a minor adverse effect on the environment.

13.2.5 The TNL Expressway will significantly benefit the sub-region by improving connectivity between Tauranga and the northern Bay of Plenty and beyond in conjunction with wider improvements to the SH2 Corridor. The TNL will further reduce the congestion currently experienced within those townships adjoining the existing SH2 alignment. Reduced vehicular congestion will result in less conflict between State Highway traffic and localised traffic and will have resultant improvements to road safety. The alignment of TNL away from urban centres will also have the benefit of reducing travel times for localised traffic.

13.2.6 The completed TNL Expressway will have a profound effect upon the ability of people and communities to provide for their social, economic and cultural wellbeing. Those benefits stem from a combination of factors, not least a quicker and more direct route between Te Puna and SH29 for freight. That improved connectivity will have social as well as economic benefits because goods and services will be more accessible to widespread communities. Other potential benefits associated with TNL include less vehicle emissions due to shortened travel times and less vehicular queuing. Collectively, therefore, it can be seen that the benefits associated with the Expressway are consistent with the sustainability principles of the RMA.

13.2.7 In general, where a particular class of activity is recognised as a discretionary activity (as in this case), then it is implicit that the activity is potentially an efficient use and development of resources.

13.2.8 Section 6 of the RMA contains 'matters of national importance'. The matters in Section 6 relevant for consideration with respect to this application are:

> *"6. Matters of national importance –*
>
> *In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:*
>
> *(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development:*
> *(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development;*
> *(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna;*
> *(d) The maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers:*
> *(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:*
> *(f) The protection of historic heritage from inappropriate subdivision, use and development...."*

13.2.9 These matters are recognised and provided for throughout the application. The application acknowledges that a degree of disturbance will be necessary on fringe wetland areas and in the vicinity of the Wairoa River. The Wairoa River is ecologically significant as a major migration corridor for indigenous species between the sea and inland areas. The corridor also contains areas of ecologically significant vegetation. Impacts upon significant vegetation and aquatic habitats are discussed in detail in Section 12 of this report, including mitigation as appropriate. In accordance with section 6(d) of the RMA, the proposed Wairoa River Bridge has been designed to maintain ongoing public access along the Wairoa River with only temporary effects on public access during construction. Recognition and regard has been had to Section 6 of the RMA, as appropriate.

13.2.10 Section 6(e) of the RMA requires the Transport Agency provide for the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga. Mauri is the life force of both the whenua (land) and awa (river) through which the project is to be constructed. Mitigation is proposed to protect, enhance, preserve and manage the mauri to recognise the special customary relationship of the local hapū. The location of bridge piers in the Wairoa River have a significant impact on the mauri of the river.

13.2.11 Section 7 lists other matters to which a consent authority is required to have particular regard in achieving the purpose of the RMA. The listed matters are not threshold tests or criteria but, where a proposal raises issues of the kind listed, regard must be had to them. The Section 7 matters that are relevant to this application are:

> *"7. Other Matters*
>
> *In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to –*
>
> *(a) Kaitiakitanga:*
> *(b) The efficient use and development of natural and physical resources:*

(c) The maintenance and enhancement of amenity values:
(d) Intrinsic value of ecosystems:
…
(f) Maintenance and enhancement of the quality of the environment:
(g) Any finite characteristics of natural and physical resources:
(h) The protection of the habitat of trout and salmon:"

13.2.12 Kaitiakitanga, as defined in Section 2 of the RMA, means the exercise of guardianship by the tangata whenua of an area in accordance with tikanga Māori in relation to natural and physical resources. It includes the ethic of stewardship. The application process has involved consultation with the tangata whenua of the area. Tangata whenua have therefore been given the opportunity to exercise a measure of guardianship over the natural resources of the site through the consultation process that is still ongoing. That ongoing requirement for consultation is referenced within the draft consent conditions in **Appendix M** of this reporting.

13.2.13 The Court has determined in *Boon v Marlborough DC* (1998) NZRMA 305 that the market is the appropriate mechanism to decide the best use of land. In this instance, the Transport Agency is the voice-piece for the market, insofar as it has recognised a need for roading infrastructure of this nature. The Transport Agency has designated the TNL for transportation purposes, which will result in more intensive development of the land resource, including earthworks and associated bridge infrastructure. That designation has been confirmed. Ultimately, the Expressway project will benefit the environment by reducing congestion and generally enabling people and resources to be transported on a quicker and more direct route. Accordingly, development of the Expressway corridor is an efficient use of resources.

13.2.14 This report has detailed the manner in which water quality, dust, recreational and ecological effects arising from construction works will be managed. The proposal also includes a range of mitigation measures (such as the creation of new areas of habitat) which will compensate for impacts that cannot be avoided. Impacts upon these amenity values are addressed in detail within Section 12 of this report and, on that basis, it is considered that particular regard has been had to Section 7(c).

13.2.15 Particular regard has been had to the intrinsic value of ecosystems, and to the value of wetlands in particular. This is evidenced by the **Assessment of Ecological Effects** which is attached as **Appendix I** and the proposed ecological conditions. The protection of ecosystems is also achieved by the careful management of stormwater runoff, both during the construction phase of the project and once the TNL is operational. Accordingly, particular regard has also been had to Section 7(d).

13.2.16 The maintenance of environmental quality is closely associated with the maintenance of amenity values. This is to be achieved through the mitigation measures previously detailed in this report including those relating to the management of water quality and ecological effects. Consideration has also been given to the enhancement of environmental quality through remedial planting of terrestrial, riparian and wetland environments once earthworks and construction works are completed. The adoption of best practice remediation techniques will mean that at worst, the Transport Agency will retain the status quo with respect to the environmental quality. With remedial planting and the adoption of best practice methodologies, however, it is more likely that environmental quality will be enhanced. Particular regard has therefore been had to Section 7(f).

13.2.17 Areas of ecological significance described previously in this report are a finite natural and physical resource. Left unmanaged, changes can degrade the quality of the waterways and terrestrial environments to the point where intrinsic qualities are lost for good. The TNL and its associated infrastructure have been designed with a range of mitigation measures to counter that threat, thus

recognising the finite characteristics of that resource. Therefore, particular regard has been had to Section 7(g).

13.2.18 A Fish Survey associated with the **Assessment of Ecological Effects** (**Appendix I**) confirms that, of the streams affected by this resource consent, only the Kopurereua Stream and the Wairoa River are shown to contain trout species. The methodologies described in this application include adoption of best practice erosion and sediment control methods to minimise siltation of waterways, thereby minimising impacts upon trout and other notable indigenous and introduced fish species. The application also considers construction timeframes as a means of avoiding or minimising impacts upon trout spawning. Particular regard has therefore been had to Section 7(h).

13.2.19 Section 8 of the RMA states the following:

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

13.2.20 The consultation undertaken to date has enabled tangata whenua to be actively involved in the assessment of the effects of the TNL and development of mitigation measures in the resource management process. Many of these are already reflected in the Specimen Design (**Appendix A**) and in the **Draft Conditions** proffered (**Appendix M**). Tangata whenua's active participation; including the protection of access to land and waters for cultural use and the approach to management of resources in accordance with responses provided by tangata whenua through the consultation process, is evidence that the principles of the Treaty of Waitangi have been taken into account in respect of this application.

13.3 Any Relevant Provisions

Bay of Plenty Regional Policy Statement

13.3.1 The Bay of Plenty Regional Policy Statement (RPS) sets out a framework for the sustainable management of the natural and physical resources of the region and the significant resource management issues, including issues of significance to iwi.

13.3.2 The RPS became operative on 1 October 2014 while the Geothermal provisions of the RPS became operative on 1 October 2013. Since the RPS has been declared operative, the following changes have been incorporated into the document:

- Change 1 (Coastal Policy): To give full effect to the New Zealand Coastal Policy Statement 2010 (NZCPS) – Operative 3 June 2015; and
- Change 2 (Natural Hazards): To insert provisions to guide regional, city and district plans and resource consent applications in managing land use and associated activities according to their level of natural hazard risk.

13.3.3 Proposed Change 3 (Rangitaiki River) to the RPS has been publicly notified as of 11 October 2016. The submissions period for that proposed change closed on 23 November 2016 with a further submissions period closing 15 February 2017. That change to the RPS does not directly relate to the activities subject to this resource consent application and as such has been disregarded.

13.3.4 The objectives and policies of the RPS which are relevant to an assessment of this application are listed and thereby assessed in **Tables K1-K8** within **Appendix K** of this report. Those relevant objectives and policies in regard to regional air quality are included within **Table K1**.

13.3.5 The proposal is consistent with the listed objectives and policies for Air Quality for the following reasons:

- Methodologies are proposed to minimise generation of particulates and associated dust effects during the construction period. During bulk earthworks, specific control measures will be established and maintained in accordance with BOPRC's *Erosion and Sediment Control Guidelines for Land Disturbing Activities, 2009 (TR: 2010/10)*. These measures will ensure that potential for dust generation during working of exposed earth surfaces are mitigated to protect people's health, amenity values of neighbouring areas, the horticultural capacity of adjoining rural and rural lifestyle land and the prevention of contamination within airsheds.
- Erosion and sediment controls implemented throughout the site will be in general accordance with the methods to prevent the generation of dust during construction activities as outlined within the attached **Dust Management Plan** (**Appendix D**).

13.3.6 The RPS policy framework with respect to 'Energy and Infrastructure' is summarised in **Table K2** of **Appendix K** of this report. The proposal is consistent with the listed objectives and policies for Energy and Infrastructure for the following reasons:

- TNL constitutes regionally significant infrastructure, the implementation of which is critical to resolving capacity issues on SH2 and to improving road safety.
- The completion of TNL will safeguard and improve a commercially important route between Auckland, the Upper Waikato and the Bay of Plenty, as well as safeguarding an important coastal tourist route ('Pacific Coast Highway'). TNL will also ensure continued access and efficiency for inter-regional freight to the Port of Tauranga which is in itself, regionally significant infrastructure.
- Improved connectivity between Te Puna and Tauranga will lead to improved social and economic wellbeing. Failure to implement TNL would inevitably have long-term detrimental impacts, both at a social and an economic level.
- The development philosophy for TNL includes strategies for the avoidance or mitigation of adverse environmental effects, and this is reflected in the proposed consent conditions which accompany this application.
- Movement of freight along the current SH2 alignment is becoming increasing inefficient due to capacity issues and a worsening safety record. TNL does not remove the need for reliance upon a road network, but it goes some ways to resolving competing interests (e.g. between freight and local traffic) thus improving the efficiency of the road network.

13.3.7 Effective and efficient resource management is dependent upon taking an integrated approach to identifying and resolving environmental issues. An integrated approach requires a holistic view that looks beyond organisational, spatial or administrative boundaries. The key RPS objectives and policies relating to 'integrated resource management' are those listed in **Table K3** of **Appendix K** to this report.

13.3.8 The proposal is consistent with the listed objectives and policies for Integrated Resource Management for the following reasons:

- The proposal adopts a holistic view that looks beyond organisational, spatial or administrative boundaries. This has proved necessary because of the linear nature of SH2, which affects multiple territorial authorities and multiple regions.
- TNL is a response to a safety and capacity issue on SH2. The NZ Transport Agency has gone to considerable lengths over a number of years, firstly to understand the nature and scale of the problem, and secondly to assess the feasibility and effectiveness of solutions. Community input has played a key role in that process.

- The Transport Agency has adopted a coherent and consistent approach with the multiple agencies who have involvement in the TNL, both at a regional and a district level. The collaborative approach extends to ongoing liaison between agencies, both before and after lodgement of this application.
- The TNL is an example of successful infrastructure integration because of its ability to link with and support other regionally significant infrastructure, such as the Port of Tauranga. It also successfully integrates with the neighbouring road networks, through provision of interchanges, overbridges and underbridges. The proposed new connection between 15th Avenue and Takitimu Drive also demonstrates the integrated nature of the development.
- TNL is a strategic response to a changing and increasingly congested environment and seeks to meet the long-term transportation needs of the region. The design and construction of the TNL relies upon an integrated approach to the management of natural and physical resources, including connectivity between the TNL and existing urban settlements.
- Construction of the TNL will provide for social, economic and cultural benefits not only to the Bay of Plenty region but for the Upper North Island as a whole.
- The Bay of Plenty is one of the fastest growing sub-regions within New Zealand, and this has manifested itself in increased freight movements and competing land use activities. Without effective and efficient infrastructure to match that growth, it will not be possible to sustainably manage cumulative effects. TNL is an effective means of managing traffic-related cumulative effects.

13.3.9 Section 2.6 of the RPS relates to iwi resource management. The Māori environmental resource management system is based on the traditional beliefs of Māori, commencing with the creation. The system requires the healthy existence of mauri within individual natural, physical and metaphysical resources, reflected in the objectives and policies relating to iwi resource management reproduced as **Table K4** of this report.

13.3.10 Development of the TNL has had specific regard to the listed objectives and policies within **Table K4** of **Appendix K** to this report. Namely:

- The issue of kaitiakitanga is provided for and recognised within Section 10 of this report, which considers cultural issues of relevance to iwi. The issue is further reflected in the proposed draft consent conditions which include matters of significance to iwi.
- Methodologies have been devised to minimise impacts upon riparian margins and to preserve the natural character and mauri of waterways. This includes the creation and planting of alternative wetland areas and the implementation of erosion and sediment control measures to manage the effects of stormwater runoff during construction.
- Consultation with the Hapū Advisory Group has ensured that the relationship of tangata whenua with the environment is recognised and provided for. This is also reflected in the draft consent conditions which have been offered by the Transport Agency, which includes protocols for the protection of waahi tapu and taonga in accordance with advice from iwi.
- The Hapū Advisory Group provided a forum for collaboration with tangata whenua to identify measures to avoid, remedy or mitigate adverse cultural effects, and to enable the Transport Agency to better understand issues of significance to Māori. The Hapū Advisory Group also served as a platform to explore resolution options for environmental issues.
- Regard has been had to multiple iwi environmental management plans in the preparation of this Assessment of Environmental Effects. Specifically, regard has been had to Te Awaroa: Ngāti Kahu Hapū Environmental Management Plan (2011), the Pirirakau Hapū Environmental Management Plan (2004) and Te Mana Taiao O Ngāi Tamarāwahao Hapū Management Plan (2013). All of these plans seek to protect the integrity of land and waterways and to safeguard

the mauri of water. TNL will achieve this through the appropriate implementation of erosion and sediment controls and adoption of best practice techniques for the treatment of stormwater, runoff and other discharges.

13.3.11 Matters of national importance contribute to the unique characteristics of the Bay of Plenty region and under section 6 of the RMA, all persons exercising functions under the Act are required to recognise and provide for those matters. This is reflected in the RPS policy framework listed within **Table K5** of **Appendix K**.

13.3.12 The proposal is consistent with the RPS policy framework with respect to matters of national importance. The reasons are as follows:

- TNL has been designed to preserve the natural character of wetlands, rivers and their margins, to the fullest extent practicable in the circumstances. Although there is an unavoidable need to cross waterways, best practice methodologies have been devised to minimise impacts on riparian margins, and to mitigate impacts upon wetlands. The extent of that mitigation is outlined in the **Assessment of Ecological Effects** (**Appendix I**) and consent conditions to this effect are proposed.
- Construction of TNL includes a comprehensive methodology for the management of erosion and sediment control. That, combined with best practice stormwater management for the completed highway, will ensure the avoidance of pollutant discharges into waterways and wetlands. In doing so, provision has been made for the mauri and health of the fresh water bodies, and recognition has been had to the relationship of Māori with taonga such as water.
- The proposal includes provision for the protection of known archaeological sites, as well as management protocols for the accidental discovery of unknown sites. The proposed consent conditions are based upon accepted best practice and have been developed in consultation with iwi over multiple Transport Agency projects.
- TNL will have a neutral impact on public accessibility to waterways. The proposed new Wairoa River Bridge has been designed to allow access along both margins of the waterway. The river itself will also remain navigable by leisure craft and other users.

13.3.13 The relevant objectives and policies of the RPS with respect to urban and rural growth management are listed in **Table K6** of **Appendix K** to this report.

13.3.14 The proposal is considered consistent with the listed objectives and policies of **Table K6** for the following reasons:

- TNL is designed to improve the efficiency and sustainability of SH2 and the wider Western Bay of Plenty road network.
- The land use pattern in the Western Bay of Plenty is heavily influenced by growth pressure and primary production. TNL is designed to respond to those land use patterns by easing the movement of freight to and from the Port of Tauranga and by enabling better connectivity between urban settlements.
- TNL provides for the growth and efficient operation of rural production activities in a manner that the existing SH2 alignment cannot do. The regions dependence upon primary production means the freight network is of critical importance to ensure the efficient transportation of produce.
- TNL is a means of ensuring that well-designed and strongly connected urban areas are able to effectively and efficiently accommodate growth. It enables urban and rural communities to be physically connected and developed in an integrated, planned manner.

13.3.15 Section 2.9 of the RPS outlines the issues and objectives for managing the land and fresh water resources of the region, and therefore indirectly managing the regions freshwater and coastal receiving environments. The quality of surface and groundwater results directly from the way land is used in that water's catchment. Land use can also affect the qualities of soil and needs to be managed to protect the finite characteristics of soil on which life depends. The relevant policy framework is summarised in **Table K7** of **Appendix K** to this report.

13.3.16 TNL is considered consistent with the listed objectives and policies of **Table K7** of **Appendix K** for the following reasons:

- Methodologies are proposed to minimise accelerated erosion effects during the construction period. During bulk earthworks, specific control measures will be established and maintained in accordance with BOPRC's "*Erosion and Sediment Control Guidelines for Land Disturbing Activities, 2009 (TR: 2010/10)*". These measures will ensure that potential sediment runoff and the subsequent water quality effects from accelerated erosion of exposed earthworks surfaces are minimised during construction.
- Water quality is affected by discharges of contaminants that, either directly from point source discharge or indirectly through diffuse discharge on to or into land, result in the contaminants getting into surface or ground water. TNL has been designed with swale filtration devices (or similar) to enable the removal of pollutants and hydrocarbons from stormwater runoff, prior to discharge into waterways. This methodology will contribute towards the achievement of Objective 27 and its associated policies. It will also ensure that the characteristics of the respective water bodies and their river classifications remain unchanged.
- The mauri of wetland margins will also be provided for by the inclusion of post-development remedial planting and weed management as recommended by the **Assessment of Ecological Effects** in **Appendix I**.

13.3.17 The use and development of fresh water resources plays an important role in providing for the Bay of Plenty regions wellbeing. Both surface and groundwater are highly valued in the region for a variety of reasons including but not limited to economic, environmental, social and cultural reasons. The relevant objectives and policies with respect to water quantity are listed in **Table K8** of **Appendix K**.

13.3.18 The proposal is considered to be consistent with the listed provisions of **Table K8** of **Appendix K** for the following reasons:

- Construction of the TNL will necessitate the taking of surface water for construction and dust-suppression purposes. The water take will be restricted to a pre-agreed source and to a pre-agreed volume, being approximately 800m^3 per day. The Transport Agency anticipates and is prepared to accept conditions which limit the quantity of water take, and which require monitoring of the activity itself. In doing so, Council can be assured that the water is being efficiently allocated at a sustainable rate in order to meet the reasonably foreseeable needs of future generations.
- Water is to be taken from the bottom of the Wairoa Catchment, before the river becomes tidal. It therefore avoids water take from up-stream sources where abstraction is more sensitive to other users and where river flows are typically less.
- The taking of water for construction and dust suppression purposes is commonplace for projects of this nature, and is an environmentally efficient means of meeting that resource need. Over-abstraction and inefficient use will be avoided through the careful monitoring of water take volumes, and by limiting water use to those activities which cannot be economically serviced by other means.

13.3.19 Making a broad overall judgement, there are no aspects of the proposal that are contrary to the Bay of Plenty Regional Policy Statement.

Bay of Plenty Regional Water and Land Plan – Objectives and Policies

13.3.20 Section 104(1)(b) requires that consent authorities give consideration to the relevant provisions of a plan or a proposed plan. Whereas consideration of rule compliance and activity classification has been provided in section 5 of this report, the following provides an assessment against the objectives and policies of the Bay of Plenty Regional Water and Land Plan.

The Integrated Management of Land and Water

13.3.21 Land use and management practices that are inappropriate to the specific characteristics of a site (including soil type), have the potential to cause adverse effects on the environment. Adverse effects potentially include erosion of land on the banks of rivers, streams and wetlands, reduced life-supporting capacity of the soil and increased sediment levels in streams, rivers and lakes. The adverse effects can also impact upon ecological values, cultural values, natural character and landscape. The relevant objectives and policies associated with this issue are listed in **Table K9** of **Appendix K**.

13.3.22 The construction of TNL will necessitate large scale land disturbance activities because much of the alignment involves either raising the expressway on embankments, or cutting the expressway into hillsides. The project adopts an integrated approach to land use management practices in order to minimise environmental effects and ensure consistency with the above-listed objectives and policies. By way of example:

- Significant earthworks will be necessary for construction of the TNL, involving approximately 3.1 million m^3 of cut and 2.8 million m^3 of fill. The earthworks will cover an area of approximately 90ha, inclusive of a proposed borrow site area, and therefore associated impacts (such as stormwater runoff) will need to be carefully managed in an integrated manner. Potential adverse effects associated with earthworks and overburden disposal will generally be avoided, remedied or mitigated by implementing the management/ mitigation measures described in this report and the attached **Erosion and Sediment Control Plans** within **Appendix C**. The Erosion and Sediment Control Plans adopt best practice methodologies from BOPRC's *Erosion and Sediment Control Guidelines for Land Disturbing Activities (TR:2010/10)*.
- The careful management of erosion and sediment runoff will contribute towards the maintenance of ecological values, as will the remedial planting of riparian margins upon completion of construction works. In doing so, water quality will be maintained and improved to meet BOPRC's Water Quality Classification which, in the case of the Wairoa River, is 'Aquatic Ecosystem'.
- The re-use of all excavated material onsite will maintain the long-term soil productivity of the locality, thereby minimizing adverse effects upon the life supporting capacity of that resource. This, in conjunction with the precautionary measures outlined in the ESCP, demonstrates the responsible stewardship of natural resources in the manner envisaged by Objective 10.
- Mitigation measures, such as riparian planting, will also ensure that adverse effects on natural character, landscape and ecological values are avoided, remedied or mitigated. In accordance with the Transport Agency's long-standing practice, riparian and remedial planting will use sustainable indigenous species, eco-sourced to the extent practicably possible.
- The Transport Agency anticipates and is prepared to accept consent conditions to the effect that an Ecological Rehabilitation Management Plan (ERMP) is finalised prior to construction works commencing onsite. The ERMP will include detailed design for the management of

riparian areas, including the retirement/ realignment of existing watercourses and the replanting of new riparian areas.

Discharges to Water and Land

13.3.23 Section 4 of the RWLP addresses discharges to water and land. It addresses the adverse effects of point source discharges of contaminants to water, discharges of water to water, and discharges of contaminants onto or into land where the contaminant may enter water. The relevant objectives and policies within the context of this application are those listed in **Table K10** of **Appendix K**.

13.3.24 The discharge of stormwater, including surface runoff from roads, is considered to be a discharge of contaminants and is to some extent inevitable both during and after construction of the TNL. Those discharges are commonplace with projects of this nature and, providing best practice methodologies are used to avoid, remedy or mitigate adverse downstream effects, the proposal will be aligned with the above-listed policy framework. Specifically:

- The design of the stormwater management system incorporates a range of measures to avoid the degradation of water quality, both during and after construction. Those methods are outlined within the ESCP and the Stormwater Management Plan and are discussed in detail in Section 12.10 of this report. Where adverse effects are unavoidable, mitigation measures have been proposed.
- The mitigation measures proposed will minimise sedimentation of waterways, thereby ensuring that significant adverse effects on aquatic ecosystems are avoided. Where adverse effects are unavoidable, mitigation measures have been proposed.
- The range of foreseeable uses of groundwater and surface water will be unaffected by the proposal.
- The filtering effect of roadside swales will ensure that concentrations of contaminants resulting from runoff are unlikely to reach levels that would present risk to human health or aquatic ecosystems. The swale technology is tried and tested and is known to achieve good industry outcomes.
- The proposal provides for the construction of a stormwater wetland which will be designed to treat and attenuate stormwater prior to its discharge to the natural receiving environment. Example wetland locations include the Minden Road to Wairoa Road section (Ch. 1000-3200) and the Cambridge Road to Takitimu Drive section (Ch. 5050-6550).
- Providing stormwater runoff is treated to accepted best practice standards, the discharge activity itself is considered unlikely to result in significant adverse effects on the relationship tangata whenua have with water and their identified taonga.
- For road runoff, TNL utilises a land based treatment and disposal system (swales), rather than the discharge of water to water. The land based system is consistent with policy expectations due to its environmental sustainability and is socially more acceptable than discharge to water.
- The nature of the cross culverts proposed and the general up-grading/ re-routing of farm drains will mean that existing flow regimes are generally enhanced.

Water Quantity and Allocation

13.3.25 Section 5.1 of the RWLP deals with the take and use of surface water and groundwater. The RWLP seeks to manage allocation due to over-abstraction of surface water degrading water quality and adversely affecting ecological values, landscape values, Māori cultural values and traditional instream uses; amongst others. Over-abstraction of groundwater can also degrade groundwater quality and

reduce water levels in aquifer systems and associated surface water bodies. The key objectives and policies with respect to the take and use of surface water are listed in **Table K11** of **Appendix K**.

13.3.26 Construction of TNL will necessitate elements of dewatering, undercutting, backfilling and permanent drainage installations to improve subgrade conditions for road construction, and to manage wetland/ catchment flows around/ through the new road alignment. Up to 800m^3 of surface water take will also provide the main water supply option for dust suppression, concrete batching and the irrigation of re-vegetation and landscape planting. These works are expected to align with the RWLP expectations as follows:

- The Applicant has demonstrated a need for the volume and rate of water take proposed. The inability to meet that need will result in the creation of adverse environmental effects that could otherwise have been avoided.
- The purpose of the water take is commonplace for activities of this scale and nature.
- With mitigation such as intake screening to avoid adverse effects upon fish passage, the volume and rate of water at which it is to be taken is expected to have no discernible effects on the overall flow of the Wairoa River, or on in-stream ecology.
- Limitations on surface water take will mean that surface water remains available for reasonable domestic and municipal needs, for stock drinking water requirements and for fire-fighting purposes.
- Consideration was given to the merits of obtaining water from alternative sources, such as cartage from more distant locations. These options were dismissed on the basis of impracticality and associated adverse environmental effects.
- Abstraction activities will not permanently or unsustainably lower water levels in streams or rivers where groundwater and surface water bodies are linked.
- Water is to be taken from the bottom of the Wairoa River catchment, where river flows are at their greatest and where the effects of abstraction will be less pronounced. Given the limited and temporary nature of the surface water take, the impact on catchment flow is expected to be less than minor.

Beds of Rivers, Streams, Lakes and Wetlands

13.3.27 Section 6.1 of the RWLP relates to activities on the beds of rivers, streams, lakes and wetlands. The provisions are relevant for assessment because construction for TNL includes provision for two new bridge structures in addition culverts, drilling for bridge piles, intake structures and discharge structures. Those two new bridge structures are the Minden Gully Bridge and the Wairoa River Bridge. Approximately 25 culverts are required variously throughout the alignment, with their locations described in **Table 1** of this Assessment of Environmental Effects. Various intake and discharge structures will also be placed throughout the alignment. The relevant objectives and policies in relation to the beds of rivers, streams, lakes and wetlands are listed in **Table K12** of **Appendix K**.

13.3.28 The proposal has been assessed against the relevant objectives and policies regarding activities in the beds of rivers, streams, lakes and wetlands reproduced in **Table K12** of this application. TNL is considered to be generally consistent with those objectives and policies for the following reasons:

- Culverts will be designed and installed to ensure that they do not cause or accentuate destabilisation of stream banks or drains, or adversely affect water quality and flow regimes.
- Culverts will be appropriately sized to ensure the status quo of flow regimes, and to provide tolerance for seasonal flood events.

- Culverts have been sized and designed on a case-by-case basis, relative to the receiving environment and the ecological value of the waterway, which the culvert serves. In so doing, the impacts upon fish passage or upon the natural character of waterways can be minimised.
- The modifications proposed to the drainage regime will not increase the adverse effects of flooding on neighbouring properties.
- While specific design plans for each of the culverts have not been completed, the BBO **Streamworks Management Plan** (refer **Appendix E**) includes a generic culvert design plan which will be applied to all culvert crossings. This plan confirms that the culverts will incorporate installation of appropriate design to maximise flow conveyance and minimise erosion and scour effects including provision of inlet/ outlet headwall/ wingwalls, aprons and flow dissipation/ armouring measures as appropriate. Additionally, all culverts will be embedded below upstream/ downstream stream inverts to maintain a depth of flow and to minimise scouring with specific provision for fish passage where necessary.
- The proposed Wairoa River Bridge has been designed to a commonly accepted design standard in order to ensure that it does not significantly impede water flows or the flow of flood water. The proposed bridge has been designed to avoid adverse effects on natural hydrological processes and takes into account the natural fluctuation of water levels.
- The proposed Wairoa River Bridge will maintain the passage of fish. The bridge design will have a nil impact upon the migratory pattern of fish species, including trout.
- The design of the Wairoa River Bridge allows for public access beneath the bridge deck, thereby maintaining the status quo in terms of legal access to waterways.

Wetlands

13.3.29 Section 8 of the RWLP addresses provisions relating to wetlands. The relevant policies and objectives in relation to wetlands are those listed in **Table K13** of **Appendix K**.

13.3.30 The proposal is determined to be consistent with the listed objective and policies within **Table K13** for the following reasons:

- The alignment includes notable areas of exotic grassland characterised by wet soil conditions that are often associated with seepages or riparian floodplains. Although small amounts of exotic rushes and sedges are present within these areas, the dominant species are exotic grasses and pastoral herbs. As such, this vegetation type resembles a highly modified wetland now used for stock grazing. Importantly, it does not meet the WLP definition for 'wetlands'. Regardless, the Transport Agency is committed to the development and recreation of indigenous wetland areas adjacent to the alignment for stormwater treatment and attenuation and as such has applied for consent to modify, destroy or disturb wetlands through this report.
- The loss of degraded wetland is to be mitigated by the re-creation of alternative new wetlands. These will contain indigenous species sourced from the Tauranga Ecological District and provide enhanced ecological connectivity with streams, improving biodiversity values and ecological function compared to the current situation. Key locations are the Te Mete Road area, eastern Wairoa River tributary and the Kopurererua Stream tributary.
- Ecological mitigation wetlands will be separate from stormwater treatment and attenuation wetlands and systems. The re-created wetlands will be situated at, or near, their original sites. A total of 2.5ha of wetland will be re-created in these locations, incorporating indigenous species and naturally fluctuating water levels.

Proposed Plan Change 9 Region-wide Water Quantity: Bay of Plenty Regional Water and Land Plan

13.3.31 As stated above, Section 104(1)(b) requires consent authorities to give consideration to the relevant provisions of a proposed plan. Proposed Plan Change 9 has legal effect under Section 86B(3) of the Resource Management Act 1991 and has been incorporated in response to the Regional Councils requirements to implement the National Policy Statement for Freshwater Management 2014. In this respect, consideration of objectives and policies within Proposed Plan Change 9 sought to replace those objectives and policies of Section 5 (Water Quantity and Allocation) of the RWLP must be undertaken. Those relevant objectives and policies of Proposed Plan Change 9 are listed within **Table K14** of **Appendix K** to this report.

13.3.32 While TNL construction requires elements of groundwater dewatering activities, undercutting and installation of permanent drainage installations, including modification of natural and artificial water flows and extraction of up to 800m^3 per day for water supply, those works are expected to remain consistent with the expectations of water quality and quantity maintenance and protection under Plan Change 9 as follows:

- The proposed TNL water take will not exceed the allocable surface water take available at source at 10% of the Q_5 7-day low flow for the Wairoa River and will therefore not change the status of the river under the Tauranga Harbour Water Management Area;
- Abstraction of water for TNL has considered the values held by the representative hapū within the Hapū Advisory Group and as stated within those Environmental Management Plans assessed, to which the application has been concluded as not contrary to those values;
- Water abstraction at the rate and via intake structures proposed will not adversely affect the ability of the Wairoa River to support ecological integrity within the water body;
- The activity will not result in saltwater intrusion into underground aquifers; and
- The TNL water take will not adversely affect the ability of the Wairoa River downstream of the alignment to be sustainably allocated or will have ecological or water quality impacts on the downstream reaches.

13.4 Other Matters

Heritage New Zealand Pouhere Taonga Act 2014

13.4.1 Recorded and unrecorded archaeological sites are subject to the Heritage New Zealand Pouhere Taonga Act (HNZPTA). All archaeological sites, whether recorded or not, are protected and it is illegal to destroy or modify an archaeological site without an authority under Section 44 of the HNZPTA.

13.4.2 Archaeological sites are defined in Section 6 of the HNZPTA as:

a) Any place in New Zealand, including any building or structure (or part of a building or structure), that:

i) Was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and

ii) Provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and

b) Includes a site for which a declaration is made under section 43(1).

13.4.3 The HNZPTA requires that an archaeological authority be obtained from Heritage New Zealand to damage, destroy or modify an archaeological site prior to any earthworks within the vicinity of a known archaeological site, or in an area where there is reasonable cause to suspect there may be an archaeological site. Therefore, it will be necessary for the Transport Agency to apply to Heritage New

Zealand under Section 44 of the HNZPTA for an authority to damage, modify or destroy any archaeological sites within the Designated Corridor prior to earthworks associated with construction commencing. Under Section 48 of the HNZPTA, on receipt of an application, Heritage New Zealand may grant an authority in whole or in part, subject to conditions as it sees fit, or may refuse to grant an authority.

13.4.4 The Archaeological Assessment of Effects notes the need to apply for a general archaeological authority for all earthworks associated with the construction of the TNL. That authority must further be granted before commencement of earthworks. That authority under the HNZPTA has been sought from Heritage New Zealand concurrent to this consent.

Wildlife Act 1953

13.4.5 The Wildlife Act 1953 deals with the protection and control of wild animals and birds and the management of game as administered by the Department of Conservation (DOC). The **Assessment of Ecological Effects** in **Appendix I** notes the need for a permit under the Act for all lizard handling, holding, salvage and release and for any felling of trees which are occupied by roosting long-tailed bats. Any necessary approvals under the Act will be sought from DOC subsequent to this consent.

National Policy Statements

13.4.6 When considering application for resource consent the territorial authority must, subject to Part 2 of the Act, have regard to any relevant provisions of a National Policy Statement under Section 104(1)(b)(iii) of the RMA. The following policy statement is of particular relevance to the construction and operation activities for the TNL:

- National Policy Statement for Freshwater Management (Operative 1 August 2014).

13.4.7 The NPS for Freshwater sets out the objectives and policies for freshwater management under the Resource Management Act 1991. The NPS for Freshwater came into effect 1 August 2014, with provisions retrospectively incorporated in part into the RWLP in October 2014. BOPRC is currently still in the process of implementing the required changes to the RWLP to support the NPS for Freshwater, including through the incorporation of new rules under Proposed Plan Change 9 Region-wide Water Quantity and the establishment of new Water Management Areas. The NPS for Freshwater sets the direction for Council's policy making in regard to freshwater management within the Region. The activity has been assessed in detail against the objectives and policies of both the RWLP and Proposed Plan Change 9 listed within **Appendix K** of the report and has been found to be consistent with those objectives and policies. On that basis, it is concluded consent to this application will not be contrary to the purpose of freshwater management sought by the NPS for Freshwater.

National Environmental Standards

13.4.8 Territorial authorities must take into account National Environmental Standards (NES's) under Section 17(1)(b) of the RMA. The following NES's are in particular relevance to the construction and operation of the TNL:

- Resource Management (National Environmental Standards for Air Quality) Regulations (Operative 8 October 2004); and
- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (Operative 1 January 2012).

Resource Management (National Environmental Standards for Air Quality) Regulations (2004)

13.4.9 The NES for Air Quality includes five ambient (outdoor) air quality standards, including relating to emissions from motor vehicles and dust discharges, and are therefore relevant to the TNL. Schedule 1 of the NES for Air Quality sets out ambient air quality concentration limits for carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and fine particulate matter less than 10 microns in diameter (PM_{10}).

13.4.10 The construction and operation of the TNL will result in construction vehicle emissions and discharges of fine particulate matter arising during earthworks activities to air, to be controlled through the methodologies outlined within the draft **Dust Management Plan**, attached as **Appendix D** to this report. Subject to general accordance with those methodologies under conditions of consent, and subject to final confirmation by the construction Contractor, works associated with the construction and operation of the TNL are expected to comply with the relevant ambient air quality standards in the NES for Air Quality.

Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (2011)

13.4.11 The NES Soil Contamination came into force on 1 January 2012. The regulations provide a national environmental standard for activities on pieces of land where soil may be contaminated in such a way as to pose a risk to human health. Those activities include removing or replacing a fuel storage system, sampling the soil, disturbing the soil, subdividing land and changing the use of a piece of land.

13.4.12 The NES Soil Contamination mandates the methods for setting applicable numerical standards for contaminants in soil that have the potential to impact on human health. Applicable standards for 12 contaminants (called "priority contaminants" in Regulation 7(2) of the NES Soil Contamination) were derived and must be used if the land use fits within the particular exposure scenario. All territorial authorities (district and city councils) are required to give effect to and enforce the requirements of the NES Soil Contamination. The NES does not affect existing land uses.

13.4.13 The **Preliminary Site Investigation** (PSI) prepared by Geohazard Environmental Ltd has identified 50 'pieces of land' within the Designated Corridor on which activities registered within the Ministry for the Environments Hazardous Activities and Industries List (HAIL) have historically occurred, are likely to have occurred or are occurring on those 'pieces of land'. A global resource consent under the NES Soil Contamination has been sought for the Designated Corridor through a joint consent application to TCC and WBOPDC, lodged concurrently to this resource consent application.

Wairoa River Valley Strategy (2013)

13.4.14 The Wairoa River Valley Strategy (2013) (WRVS) is an initiative between TCC and WBOPDC providing a non-statutory framework for the management of the Wairoa River Valley. The purpose of the WRVS is to provide a management framework for TCC and WBOPDC to better identify with the community, guide the issues objectives and policies of their respective resource management documents and plans and to integrate the management of the Wairoa River between both territorial authorities. In doing so, the WRVS seeks to provide a balance between protecting and recognising the environmental values of the river valleys upper reaches and the recreational values of the lower reaches.

13.4.15 Section 2 (page 8) sets out the vision of the WRVS which provides direction for the future of the Wairoa River Valley environment. The vision is as follows:

"The Wairoa River Valley forms a 'green corridor' that runs through farmland and bush, parks and reserves and the urban landscape. Within the green corridor the river and its surrounds create tranquil settings, places for relaxation, recreation, working and living. The iconic landscape that is the Wairoa River Valley can be viewed from vantage points that allow this peaceful natural and cultural landscape to be appreciated by all."

13.4.16 Although essentially a management framework for TCC and WBOPDC, the NZ Transport Agency is cognisant of the management themes outlined in WRVS and the project is considered to align with those themes to the extent practicably achievable in the circumstances. By way of example:

- Sustainable Land Use and Development: TNL represents a sustainable land use, designed to meet the needs of current and future generations for many years to come. Whilst the road will inevitably cut through the Wairoa River Valley, it will be elevated on embankments which are to be planted and vegetated and supported in its stormwater management objectives through the establishment of new indigenous wetlands. The vegetated margins of the embankment will contribute towards a 'green corridor'.
- Quality of the River Environment: The TNL application is accompanied by multiple management plans which recognise the sensitivity of the receiving environment and the need for precautionary measures regarding the management of environmental effects. Implementation of these management plans will ensure that the margins of the Wairoa River are maintained and enhanced for future generations
- Landscape: The iconic landscape that is the Wairoa River valley will still be able to be viewed from multiple vantage points along the 'green corridor', including from new vantage points created by TNL.
- Cultural values: The NZ Transport Agency is committed to genuine engagement with tangata whenua, both prior to lodgement of this application and post-lodgement. The Kaitiaki role of tangata whenua in matters relating to the use of the Wairoa River Valley is recognised in the consultation section of this application;
- Recreation and Access: Construction of TNL is aligned to the existing designation, and as such, will not decommission any additional areas which might otherwise have been available for recreational purposes. Recreational opportunities on the Wairoa River will be maintained. The river will remain navigable for leisure craft and, and access to the river margins will be unaffected by the TNL alignment.

13.4.17 Making an overall judgement, and recognising the significance of the existing designation, no aspects of the TNL construction activities are considered to be in direct conflict with the WRVS.

Te Awaroa: Ngāti Kahu Hapū Environmental Management Plan (2011)

13.4.18 The Ngāti Kahu Hapū Environmental Management Plan (NKHMP) was developed in 2011 by Te Runanga O Ngāti Kahu to provide Councils, the hapū and other Key Stakeholders with a statement of Ngāti Kahu values in regard to natural resource and environmental management within the Ngāti Kahu rohe. The overriding vision for the NKHMP is established through Section 1.2 of the Plan, to be given effect to through the underlying objectives in Parts 3 and 4.

13.4.19 The Ngāti Kahu rohe identified within the NKHMP establishes an area of interest whereby all resource management activities shall be assessed against the objectives for natural resource and environmental management held by Ngāti Kahu. That rohe includes Mauao, Tauranga Harbour, the mouth of the Wairoa River, including the eastern and western sides of the Wairoa River Valley, the Kaimai Watershed to the west of the Omanawa River to Te Hanga, and Te Irihanga extending to Weraiti. That rohe area is represented within Appendix A of the NKHMP.

13.4.20 Within Part 4 of the NKHMP, sub-sections 4.1 to 4.9[2] detail principles and policies related to the TNL, to which these are assessed below. As some sub-sections require a tabled format, those objectives and policies are included within **Appendix L** of this report.

4.1 Kaitaikitanga

c) Any desecration or manipulation of Te Taiao must involve Utu (reciprocity). This principle demands that utu exceed the desecration or manipulation (adverse effects) in order to maintain or restore the mauri of Te Taiao. Ngāti Kahu do not accept that "less than minor or minor negative effects" can be excluded from utu. Utu will focus on restoring the mauri of the taonga, whether or not the action proposed is the progenitor or not of the undermining of the mauri of the taonga. This allows for atonement of past inaction regarding utu in respect of damage to the environment.

f) Ensure that it is understood by all, especially by those who have direct jurisdiction, that Maori culture relies on the relationship it has with the natural environment, and that lack of respect, honour and protection of this natural environment compromises Maori culture, Maori well-being and Wairuatanga, and interferes with our ability to carry out Kaitiakitanga.

4.2 Ranginui (Irirangi, Climate Change, BOPRWLP)

1) Ngāti Kahu require that all peoples, including Tangata Whenua, resource consent applicants, Councils and other agencies which have jurisdiction or which may impact Ngāti Kahu environmental (social, cultural, economic and environmental well-beings) matters apply the generic principles above in all planning and management tools and resource consent application assessment of environmental effects.

13.4.21 Construction of TNL will inevitably require the manipulation of Te Taiao (the natural world) due to activities such as earthworks, vegetation removal and realignment of water channels. Utu is nonetheless provided for through a range of mitigation measures, including but not limited to, the creation of new wetland areas, the revegetation of water margins and the replanting of disturbed ground. The recommended mitigation measures are outlined in the **Assessment of Ecological Effects** which is attached as **Appendix I** of this application. The NZ Transport Agency anticipates and is prepared to accept consent conditions which requires the implementation of that mitigation. In so doing, the generic principles regarding Utu and Ranginui will be adhered to.

4.3 Papatuanuku

13.4.22 The policies within Section 4.3 are too many to replicate in this section of the report and have therefore been attached as a separate Appendix (**Appendix L**).

13.4.23 In consideration of these policies, the NZ Transport Agency has sought to ensure that Ngāti Kahu is recognised as Kaitiaki over waahi tapu, waahi hirahira, waahi tupuna and other sites of significance in their rohe. The consultation completed to date with Ngāti Kahu is affirmation of that status and the NZ Transport Agency anticipates continued input from Ngāti Kahu throughout the life of this project (see Draft Condition 11 within **Appendix M**).

13.4.24 The **Archaeological Assessment of Effects** (**Appendix J**) which accompanies this application identifies sites of significance in the vicinity of TNL. It is important to the NZ Transport Agency that Ngāti Kahu's relationship with these sites is respected. Therefore, whilst a generic authority has already been applied for to modify known archaeological sites, it is recognised that construction works could impact on additional unrecorded sites. Recognising this, the Archaeological Assessment of Effects

[2] Te Awaroa Ngati Kahu Hapu Environmental Management Plan (2011), Pages 37-65.

recommends accidental discovery protocols which provides for the involvement of kaumatua in the event of accidental site disturbance. Consent conditions to this effect are welcomed by the NZ Transport Agency, thereby ensuring the continued relationship between Ngāti Kahu and sites of significance. Those accidental discovery conditions are included for reference within this reporting.

13.4.25 As part of the Archaeological Assessment of Effects, consultation was also undertaken with the Hapū Advisory Group, which included Ngāti Kahu, amongst others. The Group advised that they had no concerns with the existing archaeological authority application, conditional upon hapū members monitoring earthworks proceedings and conducting appropriate ceremonies. Involvement of this nature is commonplace with large NZ Transport Agency projects, and conditions on the archaeological authority to this effect are expected.

4.4 Wai – Water

13.4.26 As above, the policies within Section 4.4 are too many to replicate in this section of the report and have therefore been attached as a separate Appendix (**Appendix L**).

13.4.27 Construction of TNL involves the realignment of waterways and drainage channels, including the insertion of multiple culverts. The disturbance associated with these works have the potential to impact on the mauri of water unless appropriately managed. To understand these risks, the NZ Transport Agency completed a detailed **Assessment of Ecological Effects** (**Appendix I**), which provided a baseline for the health of existing waterways. The outcomes of that assessment are discussed in detail in Section 12 of this AEE. The **Assessment of Ecological Effects** provided input to a Construction Environmental Management Plan (CEMP) which is the project's overarching environmental management tool. The CEMP and is supported by a variety of sub-plans to deal with specific environmental effects, including but not limited to, a '**Streamworks Management Plan**' (SMP) and a '**Culvert and Stream Hydraulics Report**' (CHR).

13.4.28 Collectively, the above-listed reports recognise the value of riparian margins and acknowledge the potential impacts of construction activities on the mauri of waterways. Although TNL has been designed to maintain riparian margins and buffer zones to the fullest extent practicable, a degree of disturbance is unavoidable due to stream realignment or culvert installation. The SMP outlines methodologies to minimise potential adverse environmental effects during the installation of culverts. This includes the use of an off-line installation methodology wherever possible to avoid any direct disturbance of the stream channel over the construction period. Where this is not possible, a dam and divert methodology will be implemented to create an isolated, dry works site to avoid any direct release of sediments to the downstream environment.

13.4.29 Other considerations in the CHR include the ability of fish to navigate between waterways. This will result in culverts being designed to ensure that native fish have uninhibited and environmentally appropriate passage between rivers, streams and waterways.

13.4.30 The NZ Transport Agency anticipates and is prepared to accept consent conditions relating to the protection and remediation of waterways, including the protection of waterways from construction activities.

13.4.31 A key consideration for construction and operation of TNL is the avoidance of contaminant discharges, which otherwise have the potential to impact upon aquatic ecosystems. Given the large volumes of earthworks proposed, the application includes an **Erosion and Sediment Control Plans** (**Appendix C**) as a key part of the construction methodology. The sediment control measures within the ESCP have been designed in general accordance with BOPRC's *Erosion and Sediment Control Guidelines for Land Disturbing Activities (TR: 2010/10)*. Methodologies include but are not limited

to, decanting earth bunds, silt fences, sediment ponds and cut off drains to separate clean from contaminated run off. The methods outlined in the ESCP will ensure that adverse effects associated with the discharge of sediments are avoided. Post-construction, the highway has also been designed to utilise swale filtration devices to treat pollutant run off from the carriageway, rather than discharge directly to waterways.

13.4.32 Water takes will be required for construction activities but will be limited to a maximum 800m^3 daily take. In the interests of minimising impact and downstream effects, the abstraction point will be in the lower reaches of the Wairoa River, towards the confluence with the coast. The volume of abstraction has been assessed as having negligible impact on overall flows and is for a temporary duration only.

4.5 Te Awa Wairoa – Wairoa River

13.4.33 Section 4.5 of the NKHMP is too large to replicate in this section of the assessment and has therefore been included within **Appendix L**. Commentary is provided as follows:

13.4.34 The special relationship that Ngāti Kahu has with the Wairoa River is recognised by the NZ Transport Agency, as evidenced by the consultation which is ongoing with Ngāti Kahu. As discussed in the preceding section, the TNL project includes multiple methodologies to safeguard the mauri of this important waterway. The combination of CEMP and ESCP (amongst others) are designed to separate and treat pollutant run off prior to discharge, thereby ensuring that no pollutants or harmful toxins enter the Awa.

13.4.35 Ngāti Kahu do not support the use of flocculants as a mitigation measure for water quality effects in relation to the Awa. Ngāti Kahu's opposition to flocculants is acknowledged. In this instance, however, construction of TNL is likely to require the use of flocculants because of its effectiveness at treating sedimentation effects. Flocculation is unlikely to be the primary sedimentation treatment, but is one of a number of techniques that is likely to be required at some stage. Use of flocculant will be in accordance with an approved Flocculant Management Plan, which is expected to be a condition of consent.

13.4.36 Under Policy 9 of Section 4.5, Ngāti Kahu do not support the development of any structures which impact on the mauri of the Awa including buildings, marinas and jetties and walkways. TNL will necessitate the construction of a new bridge over the Wairoa River Bridge, the design of which will result in the placement of support piers within the bed of the river channel. Whilst it is acknowledged that this is inconsistent with NKHMP policy, the NZ Transport Agency considers that the design option with piers in the river channel is an environmentally better option (and thus is more consistent with the NKHMP policy) in comparison with a pier-less full-span bridge. The environmental reasons for piers in the river channel over a single span bridge are:

- If the single span option was constructed, the proximity of the piers to the riverbanks will result in increased scour protection that will require the riverbanks to be extensively armoured. Armouring removes quality riverbank habitat.
- Larger bridge back-spans are required for a single span bridge. The back-span on the true right bank is hydraulically unnecessary as the flood flow velocity to be mitigated is on the true left-hand bank.
- Least ecological impact. The liveliness of the river bed means that ecology is concentrated on the river banks. Keeping the piers away from the river banks will reduce flow velocities and ecological impact near the river banks.

- Additional 10% imported fill required for a single span bridge to increase embankment height. Fill source undetermined. Additional trucks on roads increasing congestion and safety risk.
- A steel single span bridge is a far less aesthetically pleasing structure, being chunkier steel with variable bridge beam depths, than a uniform concrete structure.
- A single span bridge will have a greater impact on groundwater due to the fill embankments being higher.

13.4.37 In order to construct the permanent pier located within the bed of the Wairoa River, a temporary access across the river will be necessary to provide a work platform. The temporary access will be supported by steel piles, but will be removed in its entirety at the completion of the project. The permanent bridge has been designed to ensure that the river remains navigable for recreational use and to maintain public access along the river margins.

4.6 Tangaroa Raua Ko Hinemoana

2) *Ngāti Kahu require consenting bodies to demonstrate via planning documents and consent conditions that they understand the impacts on Ngāti Kahu well-beings of mismanagement of the environment such as poor urban development, land-use intensification, diversion of waterways and use of rivers and waterways to carry pollutants to the sea.*

4.7 Ngāti Kahu Community, Village and Environs

4) *Ngāti Kahu are opposed to any development in Wairoa which puts at risk the relationship of Ngāti Kahu whanau to the whenua, wai, awa, takutai and moana of Tauranga.*
5) *Ngāti Kahu require that any development in Wairoa must demonstrate the social, economic, cultural and environmental benefits to Ngāti Kahu whanau.*

4.8 Economic Well-being

2) *Ensure that the existing and new infrastructure reflects the highest environmental standards.*
3) *Require that activities related to roading, bridges, sewage facilities, buildings and other infrastructure avoid discharges of any contaminants to the waters of Wairoa and follows or leads in best management practices.*
7) *Require implementation of monitoring regimes to ensure that any adverse effects (including existing or potential loss of tuna/ eel) on the health of mahinga kai resources and/ or their habitats are identified and addressed.*
8) *Require, if deemed necessary, that companies provide opportunities for hapū representatives to participate in monitoring.*

13.4.38 Construction of TNL will require stream and surface water diversions as well as the installation of multiple culverts. These activities create the potential for adverse effects including erosion and sedimentation effects, as well as direct impacts upon stream ecology. In consideration of Section 4.6 of the NKHMP, the **Assessment of Ecological Effects** in **Appendix I** and the **Streamworks Management Plan** (SMP) in **Appendix E** both demonstrate an understanding of environmental impacts associated with these works, and both include methodologies for remedying or mitigating those risks. By way of example, the SMP seeks to avoid the risk of 'mismanagement' by undertaking stream diversion construction works off-line from existing stream flows, with diversions only taking place once the new channel sections have been fully stabilised and constructed. Where this is not possible, damming and diversion methodologies will be used to isolate the stream diversion works from existing stream flows.

13.4.39 In consideration of sections 4.7 of NKHMP, the mitigation methods described in this report demonstrate that all practical methodologies will be used to protect the relationship of Ngāti Kahu

whanau to the whenua, wai, awa, takutai and moana of Tauranga. Inevitably there are risks associated with construction activities and, if inappropriately managed, these have the potential to impact on the wider Wairoa environment. It is proposed to manage those risks by way of a Construction Environmental Management Plan (CEMP) which is the project's overarching environmental management tool. The CEMP and is supported by a variety of sub-plans to deal with specific environmental effects (e.g. **Erosion and Sediment Control Plan**, **Dust Management Plan** etc.).

13.4.40 In addition to environmental considerations, Sections 4.7 of NKHMP also gives consideration to the potential for social, economic and cultural benefits. Construction of TNL will have tangible social and economic benefits due to the improved connectivity between Te Puna and Tauranga. The improved connectivity supports economic investment (for both Ngāti Kahu whanau and the wider community) and enables people to better access community facilities and support services. The project will also have significant social benefits because of improved safety on SH2, which will lead to a reduction in deaths and serious injuries. Cultural benefits will accrue from the environmental mitigation proposed throughout all aspects of the project, which is intended to significantly outweigh the actual environmental costs.

13.4.41 Construction of TNL supports section 4.8 of NKHMP which relates to economic wellbeing. The economic benefits of TNL were addressed in detail at the designation stage of the project, and therefore the benefits of the work are already well understood within the community. Nonetheless, the preceding sections of this report demonstrate that new highway is being designed to the highest environmental standards. This includes the careful management of earthworks and stormwater runoff to avoid the discharge of contaminants into waterways. Through use of swales, best management practices will also be used for the treatment of contaminants from the completed highway, thereby avoiding direct discharge to waterways.

4.9 Relationship Building, Consultation, Principles for Engagement

13.4.42 Section 4.9 of the NKHMP is too large to replicate in this section of the report and has therefore been included within **Appendix L**.

13.4.43 The NZ Transport Agency has sought to follow the consultation protocols outlined in section 4.9 of NKHMP. To that end, the purpose of pre-lodgement consultation has been made clear from the outset and the Agency has sought to ensure that adequate information of the project has been provided to Ngāti Kahu in a timely and appropriate manner. The project has also been informed through Ngāti Kahu's input into the Hapū Advisory Group, and through inputs to specialist reports such as the Archaeological Assessment of Effects. As required by the NKHMP, the TNL application has given careful consideration of cultural and social effects, including the benefits to be gained by a safer State Highway. Where environmental effects are unavoidable, the project supports the concept of Utu, and mitigation is recommended accordingly. The project also supports the concept of monitoring in connection with accidental discovery of koiwi, and consent conditions to this effect are welcomed.

13.4.44 To summarise, the assessment against Part 4 of the NKHMP has drawn the following conclusions in response to design and management of the TNL with respect to values held by Ngāti Kahu:

- The project will ensure the adoption of best practice erosion and sediment controls during construction in order to minimise adverse water quality effects from pollutant discharges, thereby protecting the mauri of waterways;
- Post construction, the design provides for effective stormwater treatment devices in accordance with best practice guidelines, to remove contaminants within runoff from operational road surfaces without discharge into waterways;

- The proposal provides for effective stormwater attenuation devices where required, in accordance with best practice guidelines, to mitigate potential adverse downstream water quantity effects (e.g. flooding, channel erosion);
- Water abstraction will be limited to the minimum necessary for construction and dust suppression purposes, and for a temporary period only;
- In-stream structures will be designed to minimise hydraulic impacts on flows, to avoid exacerbating erosion effects and to maintain public access along the river margin;
- Utu is provided for in the creation of new wetlands and ecological habitats, as appropriate; and
- Monitoring provision is made for the protection of culturally sensitive sites (archaeology) through inclusion of accidental discovery protocols.

Te Mana Taiao O Ngāi Tamarāwaho Hapū Management Plan (2013)

13.4.45 The Ngāi Tamarāwaho Hapū Management Plan (NTHMP) was released as an operative document in December 2013. The purpose of the NTHMP is to establish how Ngāi Tamarāwaho will deal with environmental and resource management issues within the hapū rohe or where input into regional and/ or national environmental issues is appropriate. The NTHMP also provides cultural perspectives on the management of environmental resources through the obligations of the hapū as kaitiaki for land and waters within its rohe. The NTHMP is classified as an Iwi Management Plan under s35A of the RMA.

13.4.46 The NTHMP is split up into five identifiable sections[3]. Section 'A' (Pages 1-6) is the introduction to the Management Plan and establishes the overarching purpose of the document, including a description of the hapū and hapū rohe. Section 'B' (Pages 7-13) outlines the cultural and environmental values promoted by the hapū. Section 'C' (Pages 13-16) outlines the principles and protocols regarding the Treaty of Waitangi, relationship principles with other parties and protocols for hapū representation. Section 'D' (Pages 16-18) establishes the goals of the hapū for infrastructure, growth and social and economic aspirations. Lastly, Section 'E' (Pages 18-20) provides an action plan for hapū development and short and long-term development proposals for future engagement.

13.4.47 The Ngāi Tamarāwaho rohe is described within the NTHMP as follows:

> *"The hapū rohe within which Ngāi Tamarāwaho holds mana whenua begins from the Te Okohanga valley, moving outward along Kaitere, Westridge, connecting along Moffat Road, in a continuous line through to Tauriko; on the east, beginning at Ōtamataha (linking with Ngāti Tapu) on a continuous line through to Sulphur Point, inwards to encompass downtown Tauranga, onwards including the Te Papa peninsula through to Gate Pā and on to Te Ranga and Taumata up to and including Pūwhenua maunga. The boundary adjoining Ruahine or Waimapu is this (western) side of the Waiorahi River. (See map attached as Appendix 1)."*[4]

13.4.48 The TNL application has been assessed against the cultural and environmental values of the NTHMP. It is considered to be in general accordance with those values for the following reasons:

- The **Archaeological Assessment of Effects** (**Appendix J**) which accompanies this application demonstrates an understanding of cultural values, including recognition of places of significance to Ngāi Tamarāwahao. The Assessment of Environmental Effects includes recommended consent conditions with respect to the accidental discovery of culturally

[3] The NTHMP has been split for ease of reference and is not sectioned within the overall document.
[4] Te Mana Taiao O Ngāi Tamarāwaho – Hapū Management Plan, Page 5.

significant sites identified within that archaeological assessment, including unrecorded burial grounds. The conditions are based on tikanga protocols which have been developed in consultation with the Hapū Advisory Group. The conditions demonstrate respect for Māori heritage and cultural values;

- The NTHMP's environmental values relate to 'air', 'land' and 'water'. This Assessment of Environmental Effects acknowledges the potential for adverse environmental effects if construction activities such as earthworks are not appropriately managed. The NTHMP expectation is that air should be kept clean and free from harmful pollutants. The TNL application includes provision for a **Dust Management Plan** (**Appendix D**) which outlines the procedures and control measures needed to avoid air pollution. This includes but is not limited to: the staging of earthworks to minimise exposure of disturbed surfaces, controlling the route and speed of earthmoving machinery, stabilisation of haul routes, the monitoring of environmental conditions and the use of water carts for dust suppression purposes. With these measures in place, construction activity is not expected to result in the generation or discharge of harmful pollutants to air;
- Ngāi Tamarāwahao expects to be consulted and be an active participant where a proposal or development involves earthworks, discharges to land, or affects land that holds a special cultural significance for its people. The NZ Transport Agency has actively consulted with Ngāi Tamarāwahao in order to understand environmental concerns and to ensure that environmental risks are appropriately avoided, remedied or mitigated. Construction activities include discharges to land and methodologies for management of that issue have been addressed in this assessment and discussed through the Hapū Advisory Group;
- Ngāi Tamarāwahao have a kaitiaki obligation to ensure the quality of waterways and to protect and preserve the life that is within those waters. Recognising that obligation, the TNL project includes multiple methodologies to safeguard the mauri of waterways. The combination of the CEMP and ESCP (amongst others) are designed to separate and treat pollutant run off prior to discharge, thereby ensuring that no pollutants or harmful toxins enter the Awa. Sediment controls are a fundamental component of the construction methodology, and these will be implemented in accordance with Regional Council best practice guidelines; consent conditions to this effect are expected.

Nga Taonga Tuku Iho: Pirirakau Hapū Environmental Management Plan (2004)

13.4.49 The Pirirakau Hapū Environmental Management Plan (PRMP) became operative on 15 October 2004. The purpose of the PRMP is to provide both for a more meaningful and effective participatory role in the management of natural and cultural taonga, and to give effect to the responsibilities and obligations of the hapū to protect, preserve, nurture and manage those taonga for the benefit of present and future generations. The Pirirakau rohe extends from the Wairoa River to the Waipapa River, reaching into the upper Kaimai Ranges. Pirirakau further claim resource use rights extending from the Wairoa River to the Aongatete River and continued to the top of the Te Hunga range.

13.4.50 The PRMP is divided into nine distinguishable sections, the first three (Te Ahua, Nga Korero Whanui and Nga Take Me Nga Moemoea) addressing structural and purpose matters, Sections Four to Seven providing a statement of environmental values held by Pirirakau and addressing cultural, environmental and built environment issues; while Sections Eight and Nine detail review and monitoring processes for the Plan.

13.4.51 Section 4 of the PRMP details the environmental values of Pirirakau. Key objectives as outlined within that section include the development of protocols for the blessing or archaeological sites, land and buildings (4.2.3c), protection and maintenance of all taonga identified as significant to Pirirakau

(4.3.1a), maintenance of history, traditions and relationships with taonga (4.6.1a), and maintenance of the management and conservation of taonga significant to Pirirakau.

13.4.52 Section 5 of the PRMP details cultural issues of importance to Pirirakau and identifies objectives, actions and roles for statutory authorities and other key stakeholders to manage cultural taonga within the Pirirakau rohe. Key objectives include the recognition and protection of spiritual and customary waahi tapu (5.2.1a), preservation of access to sites of cultural significance (5.4.1a), and the protection of cultural integrity within unidentified sites of significance (5.3.1a). The TNL application is considered to support these cultural objectives in the following ways:

- The application is accompanied by an **Archaeological Assessment of Effects** (**Appendix J**) which identifies sites of significance to Pirirakau, and to tangata whenua in general. As noted previously, the Assessment of Environmental Effects within Section 12 of this report includes recommended consent conditions with respect to the accidental discovery of culturally significant sites identified within the archaeological assessment, including unrecorded burial grounds. The conditions are based on tikanga protocols which have been developed in consultation with the Hapū Advisory Group. Adherence to those conditions will protect the cultural integrity of unidentified sites in the manner envisaged by the PRMP;
- In consultation with the Hapū Advisory Group, the NZ Transport Agency has applied for an archaeological authority from Heritage New Zealand to modify archaeological sites. The authority will include conditions to ensure that protocols are in accordance with relevant tikanga. Aside from the modification of those sites, there are no other aspects of the TNL project which affect access to sites of cultural significance.

13.4.53 Section 6 of the PRMP deals with the environmental issues of water, land, flora and fauna. Relevant water objectives include 'maintaining the life supporting capacity of water systems' (6.1.1b), 'ensuring that the adverse effects from land use activities on water are avoided' (6.1.1d) and 'ensuring that land use activities maintain both water quality and quantity within catchments' (6.1.1e). The TNL project is considered to support these objectives in the following ways:

- The TNL project includes multiple methodologies to safeguard the mauri of waterways and to maintain the life supporting capacity of water systems. Management Plans such as the CEMP and ESCP include provisions for the treatment of pollutant runoff to ensure that harmful toxins do not enter the Awa. As previously noted, sediment controls are a fundamental component of the construction methodology and will be implemented in accordance with BOPRC's best practice guidelines. Consent conditions to this effect are expected;
- In addition to pollutant safeguards during the construction phase, the design of TNL also provides for the treatment of pollutant runoff from the completed carriageway. A combination of swale drains and new wetland treatment areas are strategically located throughout the TNL alignment, and will manage pollutant discharges which might otherwise have affected the life-supporting capacity of waterways.

13.4.54 The relevant objective relating to 'land' is Objective 6.2.1a which seeks to 'protect and enhance the natural features and landscapes within the Pirirakau rohe that are of value to Pirirakau'. The intent is that land use activity avoids or mitigates negative effects on natural landscapes of value and significance to Pirirakau. Although the PRMP does not identify specific landscapes or features which are of significance to Pirirakau, it recognises that the objective will be achieved through inputs to District and Regional Plans. It is acknowledged that construction of TNL will change the localised landscape along the route. However, the landscape is not identified as outstanding or of special significance in either the District or Regional plans. Land change is somewhat unavoidable for a

project of this nature, and this has generally been an accepted outcome by the Hapū Advisory Group from the earliest stages of the project.

13.4.55 Objective 6.4.1a relates to the protection of flora and fauna. It seeks the 'protection and enhancement of the life supporting capacity and the ecological intrinsic conservation and cultural values of the rohe's natural taonga'. The PRMP anticipates District and Regional Plans as playing a key role in identifying and safeguarding flora and fauna of significance. Whilst the TNL project has had regard to District and Regional Plan status, it has also been guided by the **Assessment of Ecological Effects** contained within **Appendix I** of this report. The **Assessment of Ecological Effects** recognises the need for an Ecological Management Plan (EMP) to ensure that appropriate avoidance, remediation and mitigation measures are implemented. It is envisaged that the EMP will incorporate species specific management requirements for indigenous birds, lizards, bats and fish as well as riparian margin enhancement measures, including indigenous plantings and stream realignment provisions. In so doing, it will assist in giving effect to Objective 6.4.1a of the PRMP, irrespective of whether that localised flora and fauna is specifically recognised in District or Regional Plans.

13.4.56 Section 7 of the PRMP details objectives for the built development and encompasses 'roads', 'stormwater' and 'water supply'. Of specific relevance is Objective 7.7.1a which seeks to 'ensure that roading infrastructure is developed in a way that does not compromise Pirirakau values associated with land, marine environment and water'. The TNL project is considered to support this objective for the reasons already listed in Sections 12.10 and 13.3 of this report above. In short, the project incorporates multiple methodologies to safeguard the mauri of waterway, to maintain the life supporting capacity of water systems and to avoid or remediate impacts upon natural flora and fauna. These measures are variously detailed in the CEMP, SMP, CHR and EMP, as previously discussed with the management plans expected to be a condition of consent. Importantly, although the PRMP seeks to ensure that roading is not at the expense of environmental, cultural and spiritual values, it recognises the economic and social benefits that stem from the construction of roads.

13.4.57 Pirirakau objectives in relation to stormwater include 'avoiding adverse environmental effects' (7.2.1a), 'avoiding, remedying or mitigating the contamination of waterways' (7.2.1b), 'ensuring stormwater infrastructure is developed in a way that does not compromise Pirirakau values associated with the land, marine environment and waterways' (7.2.1c), and 'ensuring the discharge of stormwater does not compromise the mauri of water sources' (7.2.1d). The TNL project is considered to support these objectives for the reasons already discussed in Sections 12.10 and 13.3 (above) and variously throughout Section 12 of this assessment. As already stated, management plans play a critical role in the containment and treatment of stormwater, with multiple methodologies used to prevent pollutant discharge to waterways. The finalised SMP will incorporate best practiced methodologies, as agreed with BOPRC. As a result, the mauri of waterways will be protected, as will the cultural and ecological values associated with that resource.

13.4.58 Section 7.4 of PRMP relates to water supply. The relevant objectives are 'ensuring water supply infrastructure does not compromise Pirirakau values associated with land, marine and waterways' (7.4.1a) and 'ensuring that the taking of water does not compromise the mauri of the water resource' (7.4.1c).

13.4.59 As noted in the preceding sections, water take will be required for construction activities as it is proposed to source this from the Wairoa River. The water take will be limited to approximately 800m^3 per day, as required, which equates to approximately 0.26% of mean summer flow. The recorded flows are noted as being exclusive of the additional catchment inputs from a number of additional significant tributary catchments including the Omanawa, Waireia and Ohourere Streams which contribute additional flows to the Wairoa River between the Rukuhia Power Station and the TNL site.

For that reason, the volume of abstraction has been assessed as having negligible impact on overall river flows and in the circumstances, the small scale and temporary nature of the water take is expected to maintain the mauri of the waterway.

13.4.60 Additionally, in the interests of minimising impact and downstream effects, the abstraction point will be from the lower reaches of the Wairoa River, towards the confluence with the coast. In accordance with best practice, precautions (such as mesh screen filters) will be taken to avoid adverse impacts on in-stream biota.

14. CONCLUSION

14.1 The Tauranga Northern Link is a high-order priority activity within the Bay of Plenty Regional Land Transport Plan (2015-2045) delivering a primary economic performance objective, intended to enhance connectivity for through traffic from the SH2 Omokoroa to Te Puna Corridor to Takitimu Drive and the Wider Bay of Plenty Region. The Transport Agency is seeking the following resource consents to enable the construction of the 6.8km long extension of SH2, being the Tauranga Northern Link:

- To undertake earthworks, vegetation clearance, overburden disposal and disturbance of contaminated land;
- To install culverts within the road and within the beds of watercourses;
- To erect structures over the bed of a watercourse (Wairoa River & Minden Gully Bridges);
- To divert surface water;
- To take and use surface water;
- To undertake drilling within the bed of a watercourse;
- To undertake drilling below the water table;
- To divert groundwater;
- To take and use groundwater;
- To divert and discharge sediment-contaminated stormwater and surface runoff to land and water;
- To install discharge structures;
- To discharge proprietary products for sediment and dust control to land;
- To install intake structures; and
- To modify, destroy or disturb wetlands.

14.2 The resource consent applications are consistent with the sustainability principles of the Resource Management Act 1991. That is to say, the TNL will meet the reasonably foreseeable needs of future generations, and will do so in a manner that safeguards the life supporting capacity of air, water, soil and ecosystems.

14.3 Potential adverse environmental effects are able to be avoided, remedied or mitigated by the implementation of the key expressway design and construction parameters and the measures and methods outlined in this report.

14.4 The proposal has been assessed against and is found to be generally consistent with, the relevant objectives and policies of the Operative Bay of Plenty Regional Policy Statement and the Bay of Plenty Regional Water and Land Plan. The proposal is also not in conflict with those relevant National Policy Statements, National Environmental Standards, the Wairoa River Valley Strategy; or the Ngāti Kahu, Ngāi Tamarāwaho or Pirirakau Hapū Environmental Management Plans.

14.5 The Tauranga Northern Link is an integral and necessary part of the wider SH2 strategic corridor and the purpose of the Resource Management Act 1991 would be served by the granting of consents for the above listed works.

APPENDIX A:
SPECIMEN DESIGN DRAWINGS

[APPENDIX A IS BOUND SEPARATELY]

APPENDIX B:
GEOTECHNICAL INTERPRETIVE REPORT

APPENDIX C:
EROSION AND SEDIMENT CONTROL PLAN

APPENDIX D:
PRELIMINARY DUST MANAGEMENT PLAN

APPENDIX E:
STREAMWORKS MANAGEMENT PLAN

APPENDIX F:
CULVERT, STREAM AND MINDEN GULLY BRIDGE HYDRAULICS REPORT

APPENDIX G:
STORMWATER MANAGEMENT REPORT

APPENDIX H:
PRELIMINARY SOIL CONTAMINATION INVESTIGATION

APPENDIX I:
ASSESSMENT OF ECOLOGICAL EFFECTS

APPENDIX J:
ARCHAEOLOGICAL ASSESSMENT OF EFFECTS

APPENDIX K:
RELEVANT OBJECTIVES AND POLICIES OF THE BAY OF PLENTY RPS AND RWLP

APPENDIX L:
RELEVANT OBJECTIVES AND POLICIES OF TE AWAROA: NGĀTI KAHU ENVIRONMENTAL MANAGEMENT PLAN

APPENDIX M:
DRAFT CONDITIONS

APPENDIX N:
SPECIMEN WAIROA RIVER BRIDGE HYDRAULICS DESIGN REPORT