WAKA KOTAHI
NZ TRANSPORT AGENCY

PROUDLY DELIVERING
New Zealand Upgrade Programme

ŌTAKI TO NORTH OF LEVIN HIGHWAY PROJECT

Volume II - Notices of Requirement for a Designation and Application for Resource Consents: Supporting Information and Assessment of Effects on the Environment

1 NOVEMBER 2022

Te Kāwanatanga o Aotearoa
New Zealand Government

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Abbreviations and acronyms

The following table sets out technical terms and abbreviations used in this document.

Term	Definition
AADT	Average Annual Daily Traffic
ABM	Automatic bat monitoring device
ACO	Artificial Cover Object
ADP	Archaeological Discovery Protocol
AEP	Annual Exceedance Probability
ARI	Annual Recurrence Interval
ASD	Approach Sight Distance
BCR	Benefit to Cost Ratio
BOAM	Biodiversity Offset Accounting Model
BOD	Biological Oxygen Demand
BPO	Best Practicable Option
CCFC	Closed Cell Foam Cover
CEDF	Cultural and Environmental Design Framework
CEMP	Construction Environment Management Plan
CH	Chainage
CIA	Cultural Impact Assessment
CLM	Contaminant Load Model
dB	Decibel
DBC	Detailed Business Case
DCR	Design and Construction Report
DEB	Decanting Earth Bund

Term	Definition
DOC	Department of Conservation
DSI	Deaths and Serious Injuries
EcIAG	Ecological Impact Assessment Guidelines
ECR	Environmental Compensation Ratios
EIANZ	Environment Institute of Australia and New Zealand
ESC	Erosion and Sediment Control
ESCMP	Erosion and Sediment Control Monitoring Plan
ESCP	Erosion and Sediment Control Plan
F&B	Royal Forest and Bird Society of New Zealand
F&G	Fish and Game New Zealand
FENZ	Fire and Emergency New Zealand
FFDB	Freshwater Fish Database
FIDOL	Frequency, Intensity, Duration, Offensiveness and Location
GD05	Auckland Council Guideline Document 2016/005 "*Erosion and Sediment Control Guideline for Land Disturbing Activities in the Auckland Region*"
GDP	Gross Domestic Product
GPS	Government Policy Statement on Land Transport: 2021/22–2030/31
GWRC	Greater Wellington Regional Council
ha	Hectares
HAIL	Hazardous Activities and Industries List
HCV	Heavy Commercial Vehicles
HDC	Horowhenua District Council
HDP	Horowhenua District Plan
HIG	Hapū Integration Group

Term	Definition
HIRDS	High Intensity Rainfall Design System
HITS	Horowhenua Integrated Transport Study
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
Horizons	Manawatū-Whanganui Regional Council
IAP2	International Association for Public Participation
IBC	Indicative Business Case
ICOMOS	International Council on Monuments and Sites
IBI	Index of Biotic Integrity
KCDC	Kāpiti Coast District Council
KCDP	Kāpiti Coast District Plan
km	Kilometre(s)
km/h	Kilometres per hour
$L_{Aeq(24h)}$	Average sound levels over a 24-hour period
LINZ	Land Information New Zealand
L_{AFmax}	Maximum sound level
LOS	Level of Service
LTMA	Land Transport Management Act 2003
LUC	Land Use Capability
m	Metre(s)
MCA	Multi-Criteria Analysis
MCI	Macroinvertebrate Community Index
MfE	Ministry for the Environment

Term	Definition
MGSD	Minimum Gap Sight Distance
NES-AQ	Resource Management (National Environmental Standards for Air Quality) Regulations 2004
NES-CS	Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
NES-F	Resource Management (National Environmental Standard for Freshwater) Regulations 2020
NIMT	North Island Main Trunk (railway line)
NLTP	National Land Transport Programme 2018 – 2021
NoR	Notice of Requirement for a Designation of Land
NPS-FM	National Policy Statement for Freshwater Management 2020
NPS-HPL	National Policy Statement for Highly Productive Land 2022
NPS-UD	National Policy Statement for Urban Development 2020
NZAA	New Zealand Archaeological Association
NZUP	New Zealand Upgrade Programme
One Plan	Horizons Regional Council One Plan
PM_{10}	Particulate Matter (10 micrometres or smaller)
PNAP	Protected Natural Areas Programme
PNRP	Proposed Natural Resources Plan for the Wellington Region (Appeals Version (all consent orders included))
PP2Ō	Peka Peka to Ōtaki Expressway
PPV	Peak Particle Velocity (vibration)
PWA	Public Works Act 1981
Requiring Authority	Has the same meaning as section 166 of the RMA and, in the case of the NoRs, is Waka Kotahi New Zealand Transport Agency

Term	Definition
RLTP	Horizons Regional Land Transport Plan 2021-2031 (note WRLTP defines the Wellington Regional Land Transport Plan)
RMA	Resource Management Act 1991
RPS	Regional Policy Statement (note: reference to the Horizons or Greater Wellington RPS is contextually defined)
SAL	Special Amenity Landscape
SEV	Stream Ecological Valuation
SH1	State Highway 1
SH57	State Highway 57
SIP	Speed and Infrastructure Programme
SISD	Safe Intersection Sight Distance
SNA	Significant Natural Area
SRP	Sediment Retention Pond
SSD	Safe Sight Distance
SUP	Shared Use Path
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
USLE	Universal Soil Loss Equation
VPD	Vehicles per day
VPH	Vehicles per hour
Waka Kotahi	Waka Kotahi New Zealand Transport Agency
WHO	World Health Organisation
WRGF	Wellington Regional Growth Framework 2021

PART A: INTRODUCTION AND BACKGROUND TO THE PROJECT

He mea whakawhanake te Ō2NL Project e Waka Kotahi, Muaūpoko Tribal Authority me ngā hapū o Ngāti Raukawa ki te Tonga: Ngā Hapū o Ōtaki (ki te taha ki a Ngāti Kapumanawawhiti), rātou ko Ngāti Hikitanga, ko Ngāti Huia ki Poroutawhao, ko Ngāti Huia ki Mātau, ko Ngāti Kikopiri, ko Ngāti Ngarongo, ko Ngāti Pareraukawa, ko Ngāti Takihiku, ko Ngāti Tukorehe, ko Ngāti Wehiwehi.

Ko te kaupapa o Ō2NL he hanganga o tētahi huarahi matua haumaru hōu, nā konei ka whakautu, ā, ka tūhono anō ki ngā pānga o rāwhiti me te uru i te taiao.

Mā te whakamahi i ngā mātāpono, te whakamauru, te mahikē me ngā ine kapeneihana o *ki uta, ki tai* (Ngā maunga ki te moana) i whakatautika ai, ā, i whakatakoto ai kia tuia anō te taiao puta noa i te huarahi matua hōu, kia tūhonoa te whenua me te awa, kia whakaūtia, ā, kia whakawhanaketia ngā nekehanga tīaro, ā, kia hoata tāpaetanga pai ki te ahurea me te hapori o te taiao. Ko te awhe o ngā ine e tūtohua ana, ko te whakatupu me te kāhaki o ngā rawa i ngā kōawa me ngā awa, ko te whakawhanaketanga me te hanganga o ngā ngahere (ngahere taketake) me ngā rohe kōreporepo, ā, ko te whakawhanaketanga o ngā wāhi e nōhia nei e ngā mokomoko taketake me ngā momo ngata onge (tae ki ngā ratonga patu kīrearea), ka mutu, ko te hanganga o ngā ara hīkoi me ngā ara pahikara ki ngā hapori me ngā āheinga kia hanga ara hōu ki ngā awa hirahira (ngā wai).

The Ō2NL Project is being developed by Waka Kotahi NZ Transport Agency (Waka Kotahi), Muaūpoko Tribal Authority and the following hapū of Ngāti Raukawa ki te Tonga: Ngā Hapū o Ōtaki (on behalf of Ngāti Kapumanawawhiti), Ngāti Hikitanga, Ngāti Huia ki Poroutawhao, Ngāti Huia ki Mātau, Ngāti Kikopiri, Ngāti Ngarongo, Ngāti Pareraukawa, Ngāti Takihiku, Ngāti Tukorehe and Ngāti Wehiwehi.

The Ō2NL Project is the formation of a new safe and modern state highway in a manner that responds to and reconnects the physical east west connections in the landscape.

Using *ki uta ki tai* (mountains to the sea) principles, mitigation, offsetting and compensation measures (needed to appropriately respond to effects) have been aligned and configured to restitch the landscape together across the new highway, to reconnect the whenua and awa, to maintain and enhance existing movement and to provide a positive contribution to the cultural and community landscape. The range of measures proposed include the planting up and removal of stock from streams and rivers, the enhancement and creation of ngāhere (native forest) and wetlands, the enhancement of spaces where native lizard and rare snail species live (including through pest control), the creation of walking and cycling access to and between local communities and opportunities to form new accesses to significant awa (water bodies).

1 Overview

Waka Kotahi is giving notices of requirement (NoRs) for designations of land to the Horowhenua District Council (HDC) and the Kāpiti Coast District Council (KCDC) and is applying for the necessary resource consents from Manawatū-Whanganui Regional Council (Horizons) and Greater Wellington Regional Council (GWRC) for the Ōtaki to north of Levin Project (Ō2NL Project or Project). The Ō2NL Project comprises the construction, operation, use, maintenance and improvement of approximately 24 kilometres of new four-lane median divided state highway (two lanes in each direction) and a shared use path (SUP) between Taylors Road, and the Peka Peka to Ōtaki expressway (PP2Ō), (to the north of Ōtaki) and State Highway 1 (SH1) north of Levin. Figure 1-1 below shows the Ō2NL Project location and extent.

Figure 1-1 Location and extent of the Ō2NL project

1.1 Project approach

The Ō2NL Project is being developed through a Project Partnership of Waka Kotahi, Muaūpoko Tribal Authority and the following hapū of Ngāti Raukawa ki te Tonga: Ngā Hapū o Ōtaki (on behalf of Ngāti Kapumanawawhiti), Ngāti Hikitanga, Ngāti Huia ki Poroutawhao, Ngāti Huia ki Mātau, Ngāti Kikopiri, Ngāti Ngarongo, Ngāti Pareraukawa, Ngāti Takihiku, Ngāti Tukorehe and Ngāti Wehiwehi (Ngāti Raukawa ki te Tonga).

A central component of the Ō2NL Project is that iwi and hapū have an inalienable connection with the waterways, whenua and each other, and a responsibility for the health and wellbeing of the environment. Accordingly, the Project Partners are committed to ensuring that the Project outcomes seek to improve the health and wellbeing of te taiao. Moreover, the partnership aims to bring benefits to te taiao and te tangata to improve the overall wellbeing for whānau, hapū, iwi and the wider community. Hapū and marae are integral to the success of the relationship and the Ō2NL Project, working together in a collaborative manner.

Many of these outcomes extend beyond Resource Management Act processes and this application and will be designed and delivered through the ensuing Ō2NL Project development phases.

Waka Kotahi, Muaūpoko Tribal Authority and Ngāti Raukawa ki te Tonga have worked together to develop a concept design, along with the range of management responses to actual and potential adverse effects on the environment, as described in this document and in the Cultural and Environmental Development Framework (provided in draft as Appendix Three to this Volume). The next phases of the Project's development (once RMA approvals have been obtained) is to develop the design of the Project through the CEDF and in accordance with it's kaupapa tumu / core principles:

- Tread Lightly, with the Whenua*
  - Me tangata te whenua (treat the land as a person)
  - Kia māori te whenua (let it be its natural self)
- Create an Enduring Legacy
  - Kia māori te whakaaro (normalise māori values)
  - Me noho tangata whenua ngā mātāpono (embed the principles in all things)
  - Tū ai te tangata, Tū ai te whenua, Tū ai te Wai (elevate the status of the people, land and water

** tread lightly, with the whenua aligns with 'first do no harm'. It does not imply 'do minimum.*

Other principles that are aligned, and should be considered along with the core principles are:

- Rongomau - 'to make peace' also referencing healing - rongoā
- Haumanutanga - referencing safety, recovery, restoration; the process to ensure these things.
- Wairuatanga - relating to the need to consider the mauri of the whenua and the wai; the process to ensure this and bring this together in an holistic way.

These principles have informed option design, assessment and selection, as well as the ongoing design development of the recommended option, including construction methods and management. The partnership has informed the development of mitigation responses to effects and has provided a particular emphasis on designing the Project to enable the delivery of a positive and enduring legacy, notably through the design of an integrated approach to planting, knitting together ecological mitigation, offsetting and compensation, with landscape rehabilitation and natural character planting using *ki uta ki tai* principles.

1.2 Iwi partners

In undertaking the Ō2NL Project, Waka Kotahi is committed to a partnership-based approach with tangata whenua that reflects the principles of Te Tiriti o Waitangi.

The following values underpin the partnership:

- Te Tiriti (spirit of partnership)
- Rangātiratanga (leadership – professionalism – excellence)
- Ūkaipotanga (care – constructive behaviour towards each other)
- Pukengatanga (mutual respect)
- Manaakitanga (generosity – acknowledgement – hospitality)
- Kaitiakitanga (environmental stewardship)
- Whanaungatanga (belonging- teamwork)
- Whakapapa (connections)

Following the partnership between Waka Kotahi and mana whenua since 2020, the Iwi Project Partners form part of the Ō2NL Project. It is noted that throughout this chapter, references to engagement (pre-2020) and collaboration (post-2020) with Iwi Project Partners have been made to highlight the involvement of Iwi and how certain areas of concern have been addressed throughout the various phases of the Project.

Iwi, Hapū and Marae will develop the Ō2NL Project's understanding of the Rangatiratanga o te Taiao and the application of a hapū led framework towards the health and wellbeing of our community.

The partnership approach is maintained through regular and on-going engagement at governance, management and operational levels, including formal and informal hui, site visits, participation in fieldwork, site walkovers and co-creation of key project documentation (and is described in more detail in Part F of this Volume). Regular workshops, focusing on particular aspects of the Ō2NL Project's design, have assisted to integrate cultural and spiritual values into the Ō2NL Project as it has developed.

Waka Kotahi appreciates and respects that issues such as 'areas of interest' and mana whenua are for Māori to determine in accordance with tikanga. Waka Kotahi seeks to operate in a manner that is respectful of tikanga. Consequently, an open and inclusive approach is adopted. Waka Kotahi acknowledges that there will be different layers and strengths of history, association and interests.

Ongoing and active engagement provides an iterative process to inform, understand and respond to areas of interest and cultural values, including potential impacts on those interests and values.

Muaūpoko and the various hapū of Ngāti Raukawa representatives have key governance roles on the Ō2NL Project, including positions on the Project Steering Committee (PSC), which is responsible for steering investigations and improvements to the Ō2NL Project to ensure that it is delivered, integrated with and cognisant of the wider programme of works.

The PSC provides regular updates to the NZUP Governance Group as part of the overall programme, including cost summaries, risks and issues. Iwi Project Partner representatives engage directly with iwi, hapū and whanau at hui-a-iwi and hui across the Ō2NL Project Area, working alongside shared reports and expertise through the development of expert assessments, this AEE and the proposed conditions (attached as Appendix Five to Volume II).

This approach permeates all levels of the Ō2NL Project and will be reflected as appropriate in all key Ō2NL Project artefacts as the charter, strategies/plans and documents are developed. It is intended to be maintained throughout the next phases of design and construction of the Ō2NL Project. Iwi management plans and the approach to management of effects respond to iwi values and are set out in the proposed designation and resource consent conditions. Refer to Part G of this report for further details regarding the management of cultural effects.

1.3 Waka Kotahi

Waka Kotahi is a Crown entity with its functions, powers and responsibilities set out in the Crown Entities Act 2004, Land Transport Management Act 2003 (LTMA), the Land Transport Act 1998, and the Government Roading Powers Act 1989 (GRPA). The overarching objective of Waka Kotahi, as set out in section 94 of the LTMA is to "*undertake its functions in a way that contributes to an effective, efficient, and safe land transport system in the public interest*".

Waka Kotahi is also a network utility operator approved as a requiring authority under Section 167 of the RMA. The legal name for Waka Kotahi is the New Zealand Transport Agency.

1.4 The Ō2NL Project

The Ō2NL Project comprises the following key features:

- a grade separated diamond interchange at Tararua Road, providing access into Levin;
- two dual lane roundabouts located where Ō2NL crosses the existing Arapaepae Road/State Highway 57 (SH57) and where it connects with the current SH1 at Heatherlea East Road, north of Levin;
- four lane bridges over the Waiauti, Waikawa and Kuku Streams, the Ohau River and the North Island Main Trunk (NIMT) rail line north of Levin;
- a half interchange with southbound ramps near Taylors Road and the new PP2Ō expressway to provide access from the current SH1 for traffic heading south from Manakau or heading north from Wellington, as well as providing an alternate access to Ōtaki;
- local road underpasses at South Manakau Road and Sorensons Road to retain local connections;
- local road overpasses to provide continued local road connectivity at Manakau Heights Drive, North Manakau Road, Kuku East Road, Muhunoa East Road, Tararua Road (as part of the interchange), and Queen Street East;
- new local roads at Kuku East Road and Manakau Heights Road to provide access to properties located to the east of the Ō2NL Project.
- local road reconnections connecting:
    - McLeavey Road to Arapaepae South Road on the west side of the Ō2NL Project;
    - Arapaepae South Road, Kimberley Road and Tararua Road on the east side of the Ō2NL Project;
    - Waihou Road to McDonald Road to Arapaepae Road/SH57;
    - Koputaroa Road to Heatherlea East Road and providing access to the new northern roundabout;
- the relocation, and improvement, of the Tararua Road and current SH1 intersection, including the introduction of traffic signals and a crossing of the NIMT;
- road lighting at intersections on the new state highway, that is, where traffic can enter or exit the highway;
- signs, including gantries, as required;
- median and edge barriers that are typically wire rope safety barriers with alternative barrier types used in some locations, such as bridges;
- stormwater treatment wetlands and ponds, stormwater swales, drains and sediment traps;

- culverts to reconnect streams crossed by the Ō2NL Project and stream diversions to recreate and reconnect streams;
- a separated (typically) three-metre-wide SUP, for walking and cycling along the entire length of the new highway that will link into shared path facilities that are part of the PP2Ō expressway;
- spoil sites at various locations along the length of the Project; and
- five sites for the supply of bulk fill/earth material located near Waikawa Stream, the Ohau River and south of Heatherlea East Road.

A description of the Ō2NL Project, including a description of the anticipated physical works, is included in Part C and supported by the plans and drawings included in Volume III.

The avoidance of adverse effects where practicable has been a key driver for the identification of a preferred corridor for the Ō2NL Project, and the subsequent shaping and refinement of the corridor (to ultimately determine the location and extent of the proposed designation). The adverse effects that are avoided or minimised through project shaping have included the avoidance of native woodland areas; the avoidance of listed heritage items and the selection of an eastern route to avoid culturally significant areas, native bush, lakes and wetlands to the west of existing SH1.

The Ō2NL Project also comprises a range of measures to remedy, mitigate, offset and compensate for actual and potential adverse effects that the Project may have on the environment. The measures are described in Part G and Part H and include, among other measures:

- open graded porous asphalt ("OGPA") road surfacing for the length of the new highway to reduce road traffic noise;
- noise barriers and increased depth OGPA in some locations to further reduce road traffic noise;
- 146ha of stormwater, screen / rehabilitative and restorative landscape planting;
- the retirement from farming and subsequent planting of riparian (stream) margins over a length of approximately 11 kilometres (entailing approximately 50 hectares of riparian planting) and up to 43 ha of natural character planting;
- the creation, restoration and enhancement of approximately 10 hectares of wetlands and creation of at least 1 ha of new open water;
- approximately 12.5 hectares of terrestrial ecological offset and buffer planting; and
- pest plant and animal pest management.

2 Strategic context

The Ō2NL Project has been developed in accordance with relevant legislation and transport policy. The Ō2NL Project is delivered through NZUP. Projects delivered through Crown appropriations contribute to transport and wider outcomes. An integrated approach to transport planning, funding and delivery is taken by Waka Kotahi. This includes investment in public transport, walking and cycling, local roads and the construction and operation of state highways. In meeting its objective and carrying out its functions, Waka Kotahi is required by the LTMA to exhibit a sense of social and environmental responsibility.

2.1 The New Zealand Upgrade Programme

The Government has committed $6.8 billion in capital investment from the Crown to progress new infrastructure projects (NZUP). This supports specific projects for the future transport system of New Zealand.

NZUP reflects the Government's balanced transport policy with $6.8 billion being invested across road, rail, public transport and walking and cycling infrastructure across New Zealand.

In addition, Waka Kotahi's social and environmental responsibility and value for money imperatives in the LTMA have been key considerations in planning for the Ō2NL Project through the process of identifying a preferred corridor.

Waka Kotahi national resilience assessments have identified flooding as the primary hazard for the Ōtaki to north of Levin area, with the risk of extreme consequences projected to increase from 'likely' to 'very likely' as a result of climate change.

2.2 Regional Land Transport Plan

The Horizons Regional Land Transport Plan 2021 - 2031 ("Horizons RLTP") sets the strategic direction for land transport in the Manawatū-Whanganui Region and describes the 'Transport Investment Priorities' for the Region.

The Ō2NL Project is identified as a priority investment area in the Horizons RLTP, which notes that funding is allocated through to construction completion. The Horizons RLTP explains that linkages "*to the Wellington Region via a new highway and rail corridor are vital to the Manawatū-Whanganui Region and wider central North Island to enable the efficient, effective and safe movement of people and freight through the region. It is therefore essential that a safe, efficient and reliable link is provided through implementation of the Wellington Northern Corridor project, specifically the section from Ōtaki to north of Levin…".*

The Ō2NL Project is also identified in the Horizons RLTP as one of the 'Significant Inter-Regional Activities Between the Manawatū-Whanganui Region and Greater Wellington Region'.

The Horizons RLTP also identifies the improvement of high-risk intersections, with a focus on Palmerston North, Whanganui and Levin urban areas and the state highways that link them, as a priority investment area as part of Transport Investment Priority 2: Safety. Further, local road upgrades relating to, and enabling, the Ō2NL Project is also ranked Priority 2 for the Manawatū-Whanganui Region for funding purposes.

In advance of the construction and opening of the Ō2NL Project, a programme of safety improvements to the state highway network (SH1 and SH57) from north of Ōtaki and through the Horowhenua District is being implemented (as detailed in the Horizons RLTP). These improvements, facilitated through the NLTF, provide short-term and medium-term safety improvements and include a review of speed limits on SH1 from Ōtaki to Levin and on SH57 from SH1 to Shannon. Improvements to SH1 to the north of Levin are being implemented as part of the national Safer Network Programme and will provide longer term solutions, consistent with the design of the Ō2NL Project.

The policy context included in the RMA plans is assessed in Part D and Part I of this document.

3 Project background and need

3.1 The existing transport network and rationale for the Ō2NL Project

The Wellington Northern Corridor is a critical part of the state highway network that is characterised by its function in connecting Wellington to the central and upper North Island. It also provides an essential

economic connection to Palmerston North, the largest freight node in central New Zealand. The route is essential because no other resilient route exists on the western side of the Tararua Ranges.

The Ō2NL Project is the northern most section of the Wellington Northern Corridor, connecting to PP2Ō, which is due to be completed in late 2022. Once PP2Ō is complete, a minimum 4-lane expressway from central Wellington CBD to north of Ōtaki (Taylors Road) will be provided, as the Mackays to Peka Peka expressway opened in February 2017 and Transmission Gully/Te Aranui o Te Rangihaeata also recently opened.

3.1.1 Existing SH1 no longer fit-for-purpose

SH1 through the Ō2NL Project Area is not fit-for-purpose as a modern state highway. Issues with the form and functioning of the existing section of SH1 between Ōtaki and north Levin have been identified and well documented over a number of years. These issues impact on the safety and resilience of the route, the economy of the lower North Island and the liveability of the district.

In the five years to 2021 there were 14 fatal crashes and 39 serious injury crashes on SH1 and SH57 network between Ōtaki and north of Levin (that the Ō2NL Project proposes to improve). These crashes resulted in 72 deaths and serious injuries, being an average of 1.2 deaths or serious injuries a month. Additionally, there were 107 minor injury crashes, and 303 non-injury crashes, an average of just under two crashes a week. The statistics for the preceding 10 years are similar.

Reasons for the safety of the route being compromised include:

- poor road geometry and alignment;
- narrow shoulders;
- roadside hazards; and
- a very high number of intersections and accessways.

The deficiencies listed above, and the safety impacts of them, will be compounded by the forecast growth in travel demands. At Ohau, the existing network carries approximately 18,250 vehicles per day, including over 1,800 heavy vehicles. This is estimated to increase to 27,600 vehicles by 2039 using the 75%ile growth forecast by HDC.

In terms of resilience, SH1 is critical to the accessibility of the lower North Island because the only other route is State Highway 2 (“SH2”), including the Remutaka Hill (itself at high risk of closure in a significant event). When an event occurs between Manakau and Ohau that closes the highway, the trip from Wellington to Levin increases by at least 2 hours outside of peak hours.

The Ōtaki to north of Levin section of SH1 is at high risk of closure[1] particularly from:

- **earthquakes** – five bridges have a high or significant earthquake disruption risk, four of which are located on SH1 between Manakau and Ohau and have no viable alternate route;
- **flooding** – the existing highway passes through a floodplain and is also subject to surface flooding (two recent large-scale events closed the highway – one for 90 minutes and the other for over 24 hours);
- **crashes** – high severity crashes often occur between Manakau and Ohau resulting in highway closures for several hours.

[1] Between 2017/18 and 2021/2022 there were at least 28 unplanned closures, primarily relating to crashes. There were also 135 natural events that caused at least cautions, including fires, surface water, flooding, fallen trees, rockfalls, ice, and drop out.

An indicative economic assessment of the impact in a scenario where SH1 was closed and where there was no viable alternative (except SH2) puts the total cost per day to road users at approximately $2.5 million.[2]

3.1.2 Growth and development

Growth in Horowhenua is occurring at the fastest rate in a generation. The Horowhenua Socio-Economic Projections Update Report[3] predicts that this growth will continue, especially considering the investment in the transport corridor between Wellington and Ōtaki and the rising cost of living in the main urban centres. HDC projections to 2040 equate to an additional 16,000 people living in the district as compared to 2019.[4] To provide for this demand, HDC has identified growth areas, including at Ohau, Manakau and Levin East. Growth, including at these growth areas, places additional demands on the local roads and state highway network, which exacerbates issues including congestion, the ability to gain access to goods and services and the ability to safely use the roading network.

The existing SH1 runs through the middle of Levin. The conflict between the use of SH1 Oxford Street as both a main freight route and a town centre results in the town centre attractiveness being much lower than it otherwise could be. This is due to a range of factors such as:

- noise;
- vehicle emissions;
- road safety;
- odour; and
- severance.

HDC's 'Transforming Levin Town Centre Strategy'[5] includes the following objectives (amongst others):

- consolidate its form and concentrate development and investment to the west of Oxford Street;
- become a 'destination' that does not rely on state highway through-traffic for economic success;
- offer a high-quality public realm that conveys an intrinsic sense of place that is timeless; and
- provide transport options that optimally serve the community and all of its constituents.

Having SH1 (Oxford Street) running through the centre of Levin compromises the ability for HDC to meet these objectives.

If growth occurs as forecast, the number of vehicles passing through Levin is projected to increase from 14,100 vehicles per day with 1,100 heavy vehicles (2019) to 20,000 vehicles per day by 2039, including a near doubling of the number of heavy vehicles to over 2,000 per day.

In addition to the completion of the other elements of the Wellington Northern Corridor, a number of safety improvements have been implemented over recent years, most notably in Ohau and Manakau. To the north of Levin, the replacement of the Whirokino Trestle and Manawatū River Bridge has recently been completed, opening up the existing SH1 through the Ō2NL Project Area to High Productivity Motor Vehicles ("HPMVs") that previously were restricted from crossing the trestle bridge.

[2] 'Ōtaki to North of Levin Indicative Business Case' December 2018, Page 24.
[3] https://www.horowhenua.govt.nz/files/assets/public/growth/sense-partners-update-report-horowhenua-socio-economic-projections-may-2020.pdf
[4] 75th percentile.
[5] https://www.horowhenua.govt.nz/files/assets/public/council-documents/strategies/transforming-taitoko-strategy.pdf

3.2 The Ō2NL Project route

Since the late 1980s there have been numerous investigations into an improved SH1 corridor in the Horowhenua District, including to bypass Levin.[6] These studies have considered the issues relating to the existing state highway including in respect of resilience, geometric design, safety record and increasing congestion.

These earlier investigations informed an Indicative Business Case ("IBC") that was developed in 2018.[7] The IBC investigation commenced by considering traffic management options (including public transport and speed reductions), and also considered options to improve the existing state highway. These were discounted as they could not solve the problems on this part of the network. The IBC investigations then developed a long list of options for an offline highway taking into consideration historic studies, previous investigation stages of Ōtaki to north of Levin and input from Muaūpoko Tribal Authority, Ngāti Raukawa ki te Tonga, the community and stakeholders (including HDC).

The IBC long list of options was reduced to thirteen different options through a four-stage community workshop based multi-criteria analysis ("MCA"), with these options being further refined to a short list of three northern options and three southern options due to impacts on cultural values, traffic modelling predictions and constructability considerations. Further consultation and analysis undertaken in 2018 was also factored into the identification of the preferred corridor.

The IBC recommended an eastern corridor option comprising southern option S6 and northern option N4. This option is located to the east of SH1 and bypassed Levin to the east of SH57. This option also runs through the western side of land zoned for peri-urban development (an area called 'Gladstone Green') that is now known as the Tara-Ika Growth Area and is zoned for urban development. At this time, it was recognised that the development of the Ō2NL Project at this location would intersect with a potential future urban development location so careful planning would be needed to ensure they "*are appropriately integrated without significant impact on one another*." The Tara-Ika Growth Area was the subject of a recent change to the Horowhenua District Plan ("HDP") (Proposed Plan Change 4 ("Proposed PC4")) that was approved in June 2022 and is now subject to an appeal to the Environment Court[8].

The IBC concluded that the Ō2NL Project be taken forward to the next stage of investigations as part of a programme of work. The programme comprised three separate strands of investigation comprising:

[6] Since the mid-1980s this has included:

- Levin Bypass Scoping Report, 1989, Works Consultancy Services;
- Levin Bypass Project Investigation, 1990, Works Consultancy Services;
- Levin Transportation Study, 1995, Traffic Design Group;
- SH1 Horowhenua District Strategy Study, 1996, Works Consultancy Services;
- Himatangi to Waikanae - Review and Development Study, 2000, Worley;
- Himatangi to Waikanae - Strategy, 2000, Worley;
- SH1 Levin to Ōtaki Expressway – Proposed Designation Methodology, 2000, Meritec;
- Roads of National Significance (RoNS) Wellington Airport to North of Levin Scoping – Taylors Road Ōtaki) to North of Levin, 2010, New Zealand Transport Agency; and
- Taylors Road to Pukehou Rail Overbridge – RoNS Corridor Study, 2010, Opus.

[7] The IBC was subject to a re-evaluation process in 2018 to ensure that it aligned with the new priorities and strategic direction set out in the 2018-28 Government Policy Statement on Land Transport.
[8] Separate appeals against the plan change have been lodged by Waka Kotahi as well as two landowners traversed by the Ō2NL Project.

- Ō2NL Project investigations to investigate and develop a concept design within the proposed S6 / N4 option (corridor) and would also consider staging options;
- a programme of safety improvements to undertaken to the current state highway network to provide immediate safety relief; and
- investigate public transport improvements.

The programme is shown in Figure 3-1 below:

Figure 3-1 Ō2NL project and the overall programme

In January 2020, the Government announced funding for Ō2NL Project as part of NZUP. Since then, further work has been done on refining the Project, including its integration with Tara-Ika Growth Area. Alignment options within the preferred corridor, including potential interchange locations, have been developed and subject to MCA processes, consultation and stakeholder engagement. These route refinement investigations are reported in a Detailed Business Case Report ("DBC"). It is this refined route that is accommodated by the proposed designations and is the subject of the NoRs and applications for resource consents.

Part E of this document summarises the alternative options.

3.3 Related RMA approvals

3.3.1 KiwiRail Holdings Limited

The Ō2NL Project proposes work across and within the NIMT rail corridor in two locations. The detailed design of these proposed works will be developed in collaboration and agreed with Kiwi Rail Holdings Limited (KiwiRail), as follows:

- **SH1 / Tararua Road intersection and crossing the NIMT** - the proposed works entails development of a crossing of the NIMT and new intersection with SH1, the exact form of which is yet to be agreed. This entails crossing an existing designation for the NIMT (designation reference D1 in the Horowhenua District Plan, KiwiRail is the Requiring Authority). Waka Kotahi has been engaging with KiwiRail over a number of months regarding this matter. Waka Kotahi will require written consent (under s176(1)(b) of the RMA) from KiwiRail to undertake the work and this will be sought during the Project's detailed design stage. These may be requested in a phased manner in response to particular construction requirements. There are also a number of other non RMA approvals that Waka Kotahi will be required to apply for prior to the commencement of works. An application request for a new level crossing has been put to KiwiRail, and Stage 1 approval has been provided in principle. Stage 2 and 3 approvals are required before any new level crossing can be put in place and these approvals are being worked though.
- **Proposed overbridge crossing of NIMT (near Sorensons Road)** – a concept design for this work is shown on Drawing 310203848-01-405-C1000 and C1100 (Volume III). The proposed works entail development of a new overbridge crossing NIMT which as described above is designated (reference D1) in the Horowhenua District Plan. The Ō2NL Project designation proposes to cross this existing designation and, therefore, Waka Kotahi will require written consent (under s1776(1)(a) of the RMA) from KiwiRail to undertake this work. This consent will be sought during the detailed design stage of the Project and may be requested in a phased manner in response to particular construction requirements. There are also a number of other non RMA approvals that Waka Kotahi will be required to apply for prior to the commencement of works.

3.3.2 Waka Kotahi notice of requirement for a designation between Queen Street East and Tararua Road

In February 2022, Waka Kotahi gave notice for a NoR to designate land for the Ō2NL Project over the area subject to Proposed PC4 in advance of notices of requirement being given, and resource consents being sought, for the Ō2NL Project in its entirety.

The purpose of that NoR is to protect the land necessary for the Ō2NL Project and enable HDC, landowners and Waka Kotahi to appropriately and efficiently integrate the planning, consenting, design, construction and maintenance of Ō2NL Project and the Tara-Ika Growth Area.

Advancing the proposed designation over the Tara-Ika Growth Area has enabled:

- the design and development of the two projects to be better integrated;

- protection of the Ō2NL route; and
- certainty for landowners, stakeholders and the community (including in respect of planning for the Levin town centre).

The current NoRs and applications for resource consents are for the entire Ō2NL Project (including the area of land and proposed works subject to the February 2022 NoR).

3.3.3 Tara-Ika: Proposed East West Arterial

The Tara-Ika Structure Plan shows an east/west arterial road (referred to as East West Arterial) crossing over Ō2NL and connecting the Tara-Ika Growth Area with Arapaepae Road. The East West Arterial provides access to the proposed commercial centre of Tara-Ika and provides additional capacity in the transport network. As the East West Arterial will cross over O2NL it will required bridging, which will require RMA approvals. It is expected that the RMA approvals will be sought in the near future.

3.3.4 Waka Kotahi SH57 Tararua Road roundabout

For completeness, it is noted that Waka Kotahi is separately (outside of these NoRs and applications for resource consents) seeking planning approvals for the construction, operation, maintenance and improvement of a roundabout at the intersection of Arapaepae Road/SH57 and Tararua Road. The purpose of the roundabout is to safely accommodate projected traffic growth associated with residential development within the Tara-Ika Growth Area. This work is being undertaken in collaboration with HDC. The current programme is for this improvement to be constructed in the next 3 years.

3.4 The existing state highways

The Ō2NL Project will become the new SH1 and will replace the existing SH1 and that part of the existing SH57 along Arapaepae Road. Once the Ō2NL Project has been constructed and opened, it is likely these existing sections of state highways (then bypassed by the Project) will function as local roads providing access for communities to various local amenities and uses in the district, including as access to the new highway. These existing sections will also provide an alternative strategic route for resilience.

The process associated with changing the form and function of the existing state highway is subject to separate procedures and discussions with stakeholders. This revocation process will be carried out in accordance with the relevant provisions of the LTMA and/or the Public Works Act 1981 (“PWA”) and GRPA.

3.5 Waka Kotahi and climate change

The Ō2NL Project takes two approaches to climate change, as follows:

- reducing greenhouse gas emissions – with consideration given to embodied/construction, operational and enabled emissions; and
- adapting and improving the resilience of the Ō2NL Project to the actual and expected effects of climate change.

3.5.1 Greenhouse gas emissions

The three key sources of greenhouse gas emissions from the Ō2NL Project are:

- embodied/embedded and construction emissions that arise as a result of the production of materials for use in construction. These also include emissions that arise from the construction methodology such use of machinery and equipment on site, and transport of material and people to/from the site
- operational emissions that arise through regular operation and maintenance of the infrastructure
- enabled emissions that arise from motor vehicles using the infrastructure once it has been completed.

3.5.1.1 Embodied/embedded and construction emissions

As part of the NZUP programme, the Ō2NL Project is required to achieve a minimum of a 10% reduction and target a 20% reduction in embodied and construction emissions. Investigation and incorporation of a number of the identified opportunities has already occurred as part of the Ō2NL Project investigations. This work has also identified that the pathway to reduction will include:

- wider industry engagement on desired approaches and outcomes;
- construction supply chain engagement to ensure manufacturing capability, application of technology and supply of materials and methods;
- challenging the construction supply chain to use the waste reduction hierarchy to avoid, reduce, reuse, recycle and recover as much waste as practicable; and
- consideration of how Waka Kotahi technical standards and specifications need to be changed to enable low greenhouse gas options to be considered.

Delivering such outcomes is driven through processes outside of the RMA. The work required to understand the options and opportunities, considering full life cycle greenhouse gas assessment and cost will continue through the development of the procurement and detailed design stages of the Ō2NL Project. Collaboration with the industry will be key, as well as setting up expectations and a road map for outcomes (for example, a sector programme setting out when construction petrol/diesel vehicles would be phased out).

3.5.1.2 Operational emissions

The work to reduce embodied and construction emissions from the Ō2NL Project will consider whole of life cycle, including considering what materials used in construction can be recycled and reused either within the new state highway or elsewhere. Project focused work will be integrated with wider work across Waka Kotahi to improve sustainability across all operations as set out in Toitū Te Taiao – the Waka Kotahi Sustainability Plan.[9]

3.5.1.3 Enabled emissions

The Toitū Te Taiao 'Avoid-Shift-Improve' framework to achieve 'sustainable urban access' has been applied to consider the potential opportunities to reduce the enabled emissions resulting from use of the new state highway, acknowledging that while the proposed SUP provides mode choice, the greatest potential for reduction is through integration of land use and transport planning and providing connections to existing cycling and walking paths. The 'Avoid-Shift-Improve' framework assessment is set out in the Table below. More broadly, a sector programme setting out when petrol/diesel vehicles would be phased out will be worked through across Government and with industry over time.

While much of the integrated planning work to achieve this integration is outside of the scope of the Project, the infrastructure built or processes resulting from the Ō2NL Project provide building blocks for this integration to occur.

Waka Kotahi will continue both through statutory planning processes but also through future integrated master planning processes and the improvement programme to work with stakeholders to achieve the sustainable urban access critical to reducing enabled emissions.

Table 3-1 'Avoid-shift-Improve' framework assessment

Approach	Assessment
Avoid/reduce the need to travel, or the time or	Integrated land use was considered as a strategic alternative, but it was determined that it would not resolve the issues the Ō2NL Project addresses. The Project can

[9] https://www.nzta.govt.nz/assets/resources/toitu-te-taiao-our-sustainability-action-plan/sustainability-action-plan-april-2020.pdf

Approach	Assessment
distance travelled by car while improving accessibility, for example, through integrated land use and transport planning for urban form that supports well connected multi-modal access to local services and employment	help support better and higher density land use near existing urban areas through removal of traffic from the existing highway and reduction in safety and efficiency constraints to development, a key example being that the Ō2NL Project will result in decreased traffic on the main street of Levin, improving the safety and amenity of the town centre. The removal of state highway traffic from the main street of /Levin improves the safety and amenity of the town centre and is considered a cornerstone to HDC being able to achieve the outcomes of 'Transforming Taitoko' – the Levin Town Centre Strategy. While not within scope of the Ō2NL Project itself, through other processes Waka Kotahi will be working with project partners including HDC, KiwiRail and Horizons to develop master plans for the town centres, to enable the integrated land use and transport planning required to reduce the need for travel and promote multi-modal travel. Waka Kotahi has also agreed a programme of activities with these partners to deliver walking and cycling improvements, road safety/monitoring improvements and master planning through the Levin Town Centre, Ohau and Manakau.
Shift/maintain focuses on shifting people to more energy efficient modes such as public or active transport, for example, through better provision of low carbon travel options and incentives to choose them.	The function of SH1 is primarily to provide for trips between regional destinations and urban areas and therefore it will be difficult for residents/businesses to achieve a significant mode shift for these movements. However, the Ō2NL Project can enable shorter local trips to be made by alternate modes to some degree through enabling changes to the existing highway. This will be achieved working with Councils both in statutory and master planning processes. The reassignment of traffic away from the existing state highways will also help to increase appeal for walking and cycling on parts of those corridors, including between marae and their communities. Some shift is expected through the SUP, which will become an active transport spine for all of the communities along the route and contributing to the provision for cycling in the region. The SUP is anticipated to attract 150 – 200 new trips per day and is expected to be a catalyst to future spur lines as the HDC network is developed. Further, during the detailed design stage of the Project, the potential for special vehicle lanes will be investigated on the new state highway to prioritise freight, public transport and electric or multiple occupancy vehicles.
Improve focuses on improving the energy efficiency of motorised vehicles, and optimisation of transport infrastructure and operations for more efficient vehicle movement	Although beyond the scope of the Project, other initiatives such as the Clean Car Standard are being led by Waka Kotahi to encourage the uptake of lower emission vehicles. Waka Kotahi will also explore where to place charging points for electric vehicles along this section of the state highway.

3.5.2 Climate change resilience

The lack of resilience in the existing transport system within the Ō2NL Project area means that journeys, particularly inter-regional, are regularly disrupted – most often by crashes. As noted above, there is no alternate route to SH1 between Manakau and Ohau – this section also has ageing structures and is at high risk of closure due to regular flooding. This section of state highway has a 5L (extreme consequence,

likely) resilience risk hazard. This rating is forecast to deteriorate to the highest level of risk possible of 5VL (extreme consequence, very likely) by 2050 due to climate change impacts.

Climate change will result in increased frequency and severity of flooding and other natural hazard events. The social and economic impacts of any closure, currently estimated at over $2.5M per day[10], will rise as demand for regional travel increases. This route is a key economic and social lifeline and closures add over 2 hours to any journey via SH2, which itself includes the high-risk Remutaka Hill.

Improving the Project's resilience to climate change is being achieved through both the alignment location and the design standards used. Resilience benefits as part of the Ō2NL Project relate to a combination of reduced hazard exposure (volume reduction due to the new highway and its location) coupled with a 90% reduction in detour length if an event were to occur on the current section of SH1 between Manakau and Ohau with the new highway in place. During the alternatives assessment process, the assessment of the highway alignment alternatives considered the location of flood zones, and the associated increased complexity of construction in those locations as part of the option selection process, which minimised the potential for alignment interaction with flood hazard areas.

Culverts, bridges, and stormwater management systems have been designed to accommodate the forecast climate changes over the next 100 years to 2130. This includes making provision for increased rainfall, more major storm events and the risk of reduced bridge performance as trees, rocks or gravel that may pass downstream during major flood events or after earthquakes or landslips.

4 Notices of requirement and applications for resource consents

4.1 Requiring authority status

An NoR for a designation may only be given by a requiring authority. Section 166 of the RMA defines a requiring authority as:

> *"(a) a Minister of the Crown; or*
>
> *(b) a local authority; or*
>
> *(c) a network utility operator approved as a requiring authority under section 167."*

Waka Kotahi is a network utility operator approved as a requiring authority under section 167(3) of the RMA for:

- The construction and operation (including the maintenance, enhancement, expansion, realignment and alteration) of any state highway network or motorway;[11] and
- The construction or operation and maintenance of cycleways and shared paths.[12]

Waka Kotahi is the requiring authority for the proposed designations.

4.2 The proposed designations

Section 168(2) of the RMA provides:

> *"(2) A requiring authority for the purposes approved under section 167 may at any time give notice in the prescribed form to a territorial authority of its requirement for a designation—*
>
> *(a) for a project or work; or*

[10] 'Ōtaki to North of Levin Detailed Business Case' 2022, Page 24.
[11] Resource Management (Approval of Transit New Zealand as a Requiring Authority) Notice 1994.
[12] Resource Management (Approval of NZ Transport Agency as a Requiring Authority) Notice 2015.

(b) in respect of any land, water, subsoil, or airspace where a restriction is reasonably necessary for the safe or efficient functioning or operation of such a project or work."

Waka Kotahi is proposing to designate land for the construction, operation, use, maintenance and improvement of a new state highway and SUP between Taylors Road (the northern extent of the PP2Ō expressway) and Koputaroa Road, SH1 north of Levin. The extent of the proposed designations is shown on the plans and drawings in Volume III. The directly affected properties (including the areas affected) are listed on the NoRs in Volume I and set out in a schedule in Volume III.

4.3 Resource consent requirements

Waka Kotahi is seeking the regional resource consents required for the construction and operation of the Ō2NL Project pursuant to the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES-F), the Horizons Regional Council One Plan (One Plan) and the Proposed Greater Wellington Natural Resources Plan for the Wellington Region (Appeals Version (all consent orders included)) (PNRP). These are summarised in Part D and a detailed rule assessment is contained in Appendix One.

Given the extent to which the activities for which resource consents are required are interrelated and overlapping, they cannot realistically be considered separately. Therefore, it is appropriate for the resource consent applications to be 'bundled' together and considered jointly. As the most restrictive consent sought in both the Wellington and Manawatū-Whanganui Regions is for a non-complying activity, the overall activity status for the applications is non-complying (for activities including earthworks, vegetation clearance, activities in the bed of any lake or river, taking and diversion of water, discharges of sediment during construction and discharges of stormwater, within or to an identified rare or threatened habitat pursuant to the One Plan and works within a significant wetland including reclamation and land disturbance, and drainage and diversion of surface water pursuant to the PNRP for the Wellington Region[13]).

4.4 Public notification and direct referral

Pursuant to section 87D and 198B of the RMA, Waka Kotahi requests that Horizons, GWRC, HDC and KCDC approve the notices of requirement and applications for resource consents being determined directly by the Environment Court. This request to the local authorities is made formally in Volume I.

Waka Kotahi also requests that the NoRs and applications for resource consents be publicly notified under sections 95A, 169(1) and 149ZCB(2) of the RMA.

4.5 Aspects and approvals not covered

There are future consents, authorisations and approvals that are not sought at this time and are therefore not addressed in this documentation. These include:

- a resource consent Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS);
- the alteration or removal of the existing SH1 and SH57 designations (as appropriate noting the revocation processes described above);
- potential transfer of water permits rights under s.136 of the RMA in relation to existing water bores on property acquired for purposes of construction;
- the submission of outline plans under section 176A of the RMA (Waka Kotahi is not seeking to waive the requirement to submit outline plans, expect for establishment works where a waiver is sought);

[13] Final Appeals Version 2022

- requiring authority consent under section 176 and 177 of the RMA for works that may prevent or hinder an existing designated project or public work from KiwiRail (for crossing the existing rail corridor designation);
- an archaeological authority (or authorities) that may be required by the Heritage New Zealand Pouhere Taonga Act 2014;
- permits from Ministry of Primary Industries under section 97 of the Fisheries Act 1996 in relation to fish; and
- an authorisation given by the Director-General of the Department of Conservation under section 53 of the Wildlife Act 1953 in relation to any protected wildlife.

4.6 Project objectives

The objectives of Waka Kotahi for the Ō2NL Project for the purposes of section 171(1) of the RMA are:

- to enhance safety of travel on the state highway network;
- to enhance the resilience of the state highway network;
- to provide appropriate connections that integrate the state highway and local road network to serve urban areas;
- to enable mode choice for journeys between local communities by providing a north-south cycling and walking facility; and
- to support inter-regional and intra-regional growth and productivity through improved movement of people and freight on the state highway network.

5 Purpose and scope of documentation

This documentation has been prepared in accordance with sections 88, 168 and Schedule 4 of the RMA to support the NoRs and applications for resource consents necessary to authorise the construction, operation, use, maintenance, and improvement of the Ō2NL Project. The documentation includes the information necessary to enable a robust understanding of the Ō2NL Project and the actual or potential effects the Project will have on the environment.

The documentation is contained in five volumes as set out in Table 5-1 below:

Table 5-1 – Documentation volumes

Volume	Contents
Volume I	Notices of requirement for designation, applications for resource consents; and request for determination by the Environment Court
Volume II	Supporting documentation and assessment of effects on the environment
Volume III	Drawings and plans
Volume IV	Technical assessments

Volume	Contents
Volume V	Cultural impact assessments

5.1 Content of Volume II

The structure and content of Volume II (supporting documentation and assessment of effects on the environment) is set out in Table 5-2 .

Table 5-2 – Structure of Volume II

Part	Name	Contents
A	Introduction and background to the project	The background to the Project, the requiring authority and the Project objectives.
B	Description of the environment	A description of the environment in which the Project is located and against which actual and potential effects of the Project are assessed.
C	Description of the project	A description of both the operation and construction of the Project.
D	Statutory context	An outline of the statutory matters that are relevant to the Project.
E	Consideration of alternatives	A summary of the process undertaken to consider alternatives.
F	Consultation and engagement	A description of the consultation and engagement undertaken, to assist in the identification of persons affected by the Project.
G	Assessment of effects on the environment	An assessment of any actual or potential effects on the environment that may result from the construction, operation, and maintenance of the Project.
H	Management of effects on the environment	Proposed measures to avoid, remedy or mitigate the identified adverse effects on the environment, including proposed conditions to be imposed on the designations.
I	Statutory assessment	A consideration of the NoRs and applications for resource consents against all relevant statutory considerations.
-	Appendices	**Appendix one** Rule assessment **Appendix two** Relevant statutory/planning provisions **Appendix three** Cultural and environmental design framework **Appendix four**

Part	Name	Contents
		Design and Construction Report **Appendix five** Proposed conditions

5.2 Content of Volume IV

The following Table 5-3 lists the technical assessments that are included in Volume 3:

Table 5-3 – Technical assessments

Technical assessment	
A	Transport
B	Noise and vibration
C	Air quality
D	Landscape, visual and natural character
E	Social impacts
F	Hydrology and flooding
G	Hydrogeology and groundwater
H	Surface water quality
I	Contaminated land
J	Terrestrial ecology
K	Freshwater ecology
L	Archaeology
M	Built heritage
N	Productive land
O	Economics and town centre impacts

PART B: DESCRIPTION OF THE ENVIRONMENT

6 Overview

This part provides a description of the human, natural and physical aspects of the existing environment within which the Ō2NL Project will be constructed and operated. This description of the existing environment draws on information from a number of sources including the technical assessments contained in Volume IV. The potential effects of the Ō2NL Project on this environment, and measures to mitigate or otherwise manage these effects, are set out in Part G.

7 Regional context and economy

The Ō2NL Project is generally located at Taylors Road, PP2Ō (to the north of Ōtaki) and State Highway 1 (SH1) north of Levin.

The Ō2NL Project is located within the Manawatū-Whanganui and Wellington Regions and the Kāpiti Coast and Horowhenua Districts. The Ō2NL Project Area is illustrated in Figure 7-1.

SH1 provides the main north to south roading connection through the Wellington and Manawatū-Whanganui Regions. The route currently passes through a number of urban areas[1], including Levin along the western coast, connects communities and economies and enables the movement of people and goods. SH57 provides a direct route to Palmerston North and access to Hawke's Bay.

The Wellington Regional Growth Framework[2] includes Levin as a high growth area. The Framework identifies proposed improvements to the state highway network including the Ō2NL Project, and the opportunities that this creates to 're-imagine' Levin town centre.

Levin is the largest commercial centre in Horowhenua and also the largest commercial centre between Paraparaumu and Palmerston North, being located a similar distance from both locations (approximately 45km). The town centre accommodates nearly 400 businesses. Outside of Levin the area is predominantly agriculture or horticulture farmland (including market gardens) with the exception of smaller settlements of Ohau and Manakau (acknowledging that there are also distinct rural communities including at Kuku). Levin functions as the business, administration, retail, civic, cultural, social and recreational hub for the surrounding area.

Levin has a population of 19,000 people, with approximately 6,600 people employed in the town. The region has been experiencing population growth, with projections of an additional 16,000 people living in the Horowhenua District by 2040, with more than 760,000 people living within an hour's drive of the Horowhenua District[3].

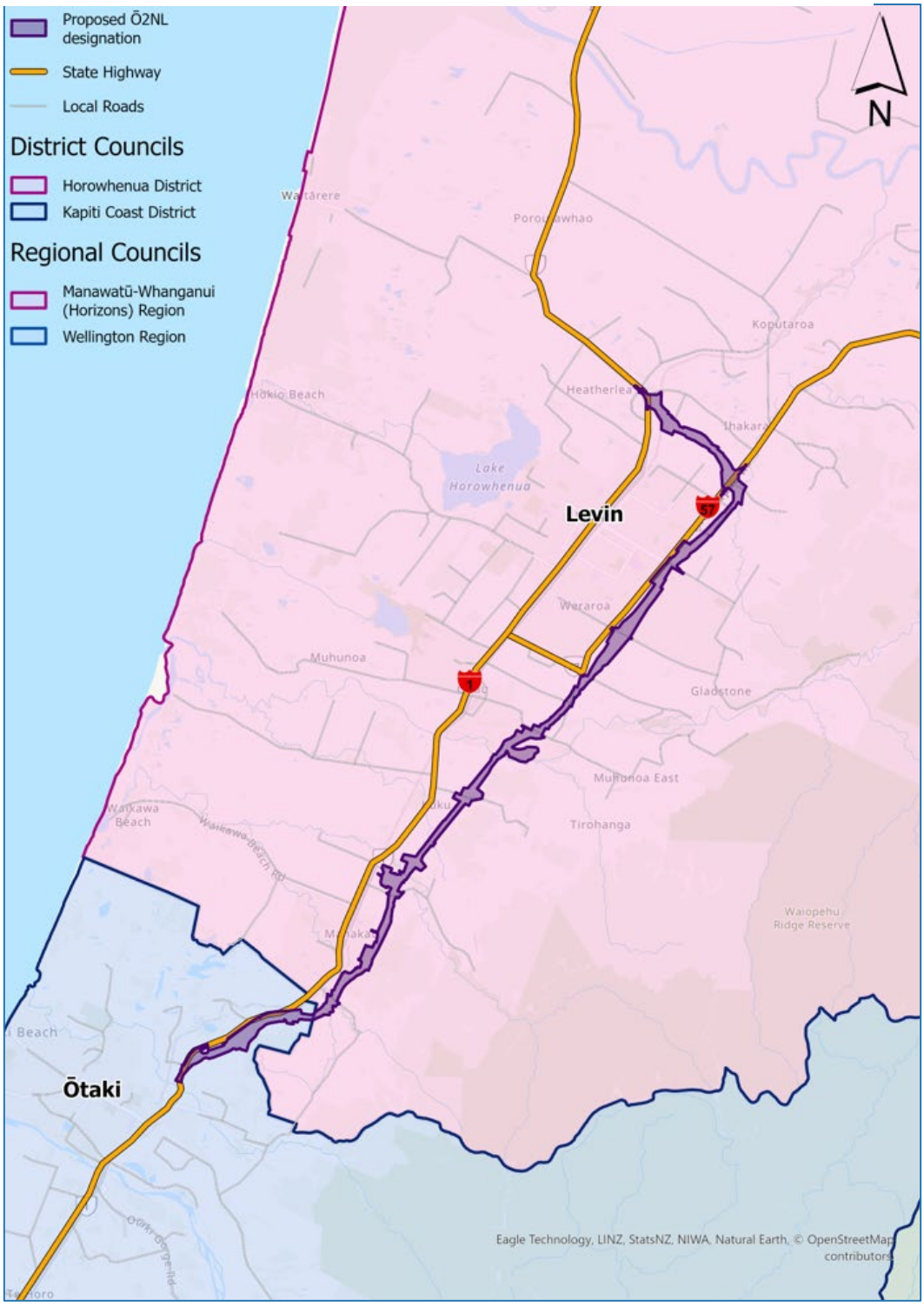
To accommodate this projected growth, HDC has identified growth areas, including at Ohau, Manakau and east of Levin (at the planned Tara-Ika growth area). Growth, including at these growth areas, places

[1] Following completion and opening of the Peka Peka to Ōtaki Project, Manakau, Ohau and Levin will be the first settlements passed through after leaving Wellington.
[2] https://wrgf.co.nz/wp-content/uploads/2021/08/1320-Wellington-Regional-Growth-Framework-Report-JULY-2021-FINAL-LR.pdf
[3] sense-partners-update-report-horowhenua-socio-economic-projections-may-2020.pdf

additional demand on the local roads and the state highway network, that causes congestion and the overall safety of the roading network.

The Ō2NL Project provides capacity on the state highway and local road network and improved intra and inter regional connections and thus supports projected growth in Horowhenua.

Figure 7-1 Regional and district context



8 Natural and physical environment

8.1 Topography and landscape

The Ō2NL Project is set within the Horowhenua plains. It is backdropped by the Tararua Range and foothills to the east and bordered by the Tasman Sea sand dunes country to the west. The Project extends from the Koputaroa Stream (a tributary of the Manawatū River) in the north to the Waitohu Stream in the south.

The Horowhenua plains are a combination of outwash terraces from the Tararua Range and former seabed raised by tectonic activity. A number of watercourses flow across the plains towards the coast. The most notable are the Ohau River, and the Koputaroa, Kuku, Waikawa, Manakau, Waiauti, and Waitohu Streams. Other smaller tributaries and ephemeral watercourses rise within the plains or on the foothills. The Koputaroa Stream follows a different pattern to the rest of the streams. It rises on the Arapaepae Range east of Levin and flows northwards along the toe of the hills to the Manawatū River. The Koputaroa Stream has extensive wetlands in its lower course.

The plains originally supported lowland rainforest dominated by species such as tōtara, rimu and tawa and are now a productive (or 'working') landscape interspersed with pockets of lifestyle or rural residential development. Occasional small or remnant stands of tall indigenous forest remain.

Aesthetically, the dominant feature is the Tararua Ranges and foothills backdrop. Pukehou is a prominent landmark at the southern end of the Ō2NL Project Area. It is a steep faced, symmetrical hill that stands proud of the rest of the foothills. Other foothills are also distinctive landmarks. These include the Arapaepae Ridge east of Levin, Ōtarere (a prominent sentinel overlooking the Ohau River), Poroporo (a range of hills with a small peak behind Kuku) and the Hanawera Ridge to the east of Manakau. The aesthetic qualities of the locality also include the proximity of the Tararua Ranges to the coast across sharply defined outwash plain and sand dune barrier.

There are no outstanding natural features or landscapes identified in the One Plan, the PNRP, the Kāpiti Coast District Plan (KCDP) or the HDP.

The following photographs generally depict the Horowhenua plains context relative to the Ō2NL Project.

Figure 8-1 – Heatherlea East Road looking south

Figure 8-2 – View from Arapaepae Road/SH57 south of Queen Street east looking north-east

Figure 8-3 – Muhunoa East Road west of the intersection with Arapaepae Road looking north-east

Figure 8-4 – Kuku East Road looking south-west

Figure 8-5 – Waikawa Stream (true left bank) looking north-east

Figure 8-6 – Taylors Road, State Highway 1 looking north-east towards Pukehou

8.2 Landforms and geology

The Ō2NL Project traverses a series of coalescing alluvial fans, formed by highly mobile rivers and streams of various sizes, that form a piedmont plain between the Tararua Range and the coast. The alluvium deposited by these rivers and streams ranges from coarse gravels to clay; depending on the size of the stream and the relative position of the thalweg (the deepest and fastest channel) when the sediment was deposited. The interaction between the mobile nature of the rivers and streams, potential truncation of stream channels by strike-slip motion on faults, sea level fluctuations and changes in sediment supply from the headwaters gives rise to an extremely complex three-dimensional mosaic of coarse to fine sediment, of either alluvial or marine origin.

Table 8-1 Geological units in the vicinity of the Ō2NL project

Unit	Formation Name	Description
Q1a	Holocene river deposits	Alluvial gravel, sand, silt, mud and clay with local peat (includes modern riverbeds).
Q2a	Late Pleistocene river deposits	Poorly to moderately sorted gravel with minor sand or silt underlying terraces (includes minor fan gravel).
Q3a	Late Pleistocene river deposits	Weathered, poorly sorted to moderately sorted gravel underlying loess-covered, commonly eroded, aggregational surfaces.
Q5b	Late Pleistocene shoreline deposits	Beach deposits consisting of marine gravel with sand; commonly underlying loess and fan deposits.
Q6a	Pleistocene Alluvium	Weathered, poorly sorted to moderately sorted gravel underlying loess-covered, commonly eroded, aggregational surfaces.
Tt	Basement (Wellington Greywacke)	Alternating sandstone, mudstone, poorly bedded. Conglomerate, basalt, chert.

A plan showing the geology of the area is included on page 27 of the CEDF (provided as Appendix Three to Volume II). Drawings showing the geological model in the proposed designation are provided in Appendix 4.1.1 (Geotechnical Consenting Design Report provided as Appendix 4.1 to Volume II).

The geomorphology of the area is revealed in its name – Horowhenua, which means “the great landslide”. This name could be a reference to the last significant earthquake event. This earthquake occurred on the Northern Ohariu Fault (refer to Figure 4.1.3 in Appendix 4.1 (Geotechnical Consenting Design Report), provided in Volume II) between several hundred and one thousand years ago and caused ground surface displacement of 3 to 4 metres.

The active Northern Ohariu Fault is visible in the landscape at the edge of the Tararua foothills in the Arapaepae area. The fault remains capable of generating large damaging earthquakes, and, as a consequence, landslides on the western flanks of the Tararua Ranges from Ōtaki to Palmerston North. In addition, such an event could give rise to liquefaction in low-lying parts of Horowhenua, where the young sand country, river terraces and flood plains are known to be susceptible to ground failure.

8.3 Water catchments and surface water quality

The Ō2NL Project traverses five main surface water catchments. These are (from north to south):

- Koputaroa Stream (a tributary to the Manawatū River);
- Kuku Stream;
- Ohau River (including the Kuku and Waikokopu streams);
- Waikawa Stream (including the Manakau Stream and Waiauti Stream); and
- Waitohu Stream.

- The Waitohu Stream catchment is located in the Wellington region, while all other catchments are within the Manawatū-Whanganui region.

A drawing showing the location of these catchments is included in Volume III.

The existing surface water quality in the Project Area has been established using a combination of data from regular monitoring undertaken Councils and supplemented by additional monitoring.

Table 8-2 provides a summary description of the five catchments. There is no existing surface water connection between the Ō2NL Project area and the Punahau/Lake Horowhenua/Hokio Stream catchment, with all flows being groundwater. For completeness, this catchment is also described below.

Table 8-2 – Description of catchments

Catchment	Description of catchment
Koputaroa Stream	The Koputaroa Stream is a lowland tributary of the Manawatū River with a mean flow where it crosses SH57 of 0.327m^3/s. The catchment has alluvial/soft sedimentary geology and has a predominantly pastural landcover. There is important wetland habitat in the northeast of the catchment (outside of the Ō2NL Project footprint). The Koputaroa Stream has a soft sediment substrate and poor water quality characterised by low water clarity, high concentrations of phosphorus, particularly high concentrations of nitrogen and E. coli bacteria. The Ō2NL Project crosses two headwater tributaries of the Koputaroa Stream.
Punahau/lake Horowhenua/Hokio stream catchment	The catchment is lowland and dominated by pasture, market gardens and urban land use. The mean flow leaving Punahau/Lake Horowhenua is 0.97m^3/s and measured median flow is 0.907m^3/s. Punahau/Lake Horowhenua currently has very poor water quality characterised by low water clarity with very high total organic nitrogen concentrations and low MCI scores at all monitoring sites.
Kuku Stream	The Kuku Stream is a small lowland tributary to the Ōhau River with a mean flow at SH1 of 0.142m^3/s. It has hard sedimentary geology, and the landcover in the catchment is predominantly pasture with scrub and wetland on riparian margins. Some indigenous tree cover (titoki and manatu and black beach) is present on the stream alluvium terraces. The stream has a gravel bed and the macroinvertebrate community indicates “good” water and habitat quality with possibly mild pollution. Monitoring indicates elevated nutrient levels in the downstream catchment.
Ohau River	The Ohau River has an estimated mean flow of 5.6m^3/s and a median flow at SH1 of 4.12m^3/s. The catchment land use is predominantly pasture at SH1 but there is extensive indigenous forest cover in the upper catchment. The river terraces have patches of indigenous treeland (titoki, manatu, te kouka, and pukatea), and there are some lowland river terraces with swamp forest (maire, tawake, pukatea). There is a considerable decline in water quality in the Ohau River between Gladstone Reserve and SH1, however, the Ōhau River at SH1 has good water quality, with water clarity of 2.8 and low concentrations of E.coli bacteria. Downstream of SH1 nitrogen concentrations increase.
Waikawa Stream (including the Manakau Stream and Waiauti Stream)	The Waikawa Stream is a small hill-country stream with a mean flow of 1.36m^3/s and a median flow of 0.905m^3/s. The Waikawa Stream has its headwaters in the foothills of the Tararua Ranges and drains an area of 29.4km^2 upstream of the Ō2NL Project area. The catchment geology is hard sedimentary rock. The land cover is predominantly pasture catchment at SH1 but indigenous forest is dominant upstream of North Manakau Road.

Catchment	Description of catchment
	Riparian margins are well vegetated. Upstream monitoring show had a high MCI score and %EPT ((Ephemeroptera, Plecoptera and Trichoptera) abundance of 'cleanwater' taxa invertebrates[4]) values, high water clarity, and low E. coli and nutrient concentrations, indicating high water quality and good instream habitat conditions. Habitat conditions generally degrade in a downstream direction. The Manakau, Mangahuia and Waiauti Streams are all tributaries to the Waikawa Stream. Water quality in these streams is poor related to the main stem of the Waikawa Stream.
Waitohu Stream	The Waitohu stream has its headwaters in the foothills of the Tararua ranges. The Ō2NL Project crosses several small tributaries of the Waitohu stream, each with a mean flow of approximately 0.034m^3/s. These are small, soft-bottomed lowland streams running through soft sedimentary geology. The substrate of the Waitohu and its tributaries is predominantly silt/sand. The catchment landcover is predominantly pasture. These tributaries drain to the Forest Lakes and wetland system before entering the main stem of the Waitohu stream. The main stem of the Waitohu stream at Norfolk Cres has low water clarity (0.93m), very high E.coli, and moderately high nitrogen and phosphorus concentrations. NH4-N is slightly elevated which may reflect the wet pastural landscape.

In terms of flood risk, high rainfall in the steep Tararua Range can result in rapidly responding rivers, streams and overland flow paths that drain predominantly westwards toward the sea. This rapid catchment response to rainfall events peaks are approximately 3-4 hours after the peak rainfall intensity for larger streams. In the smaller catchments that drain towards the Ō2NL Project (in the area south of the Ohau River) the time to peak is closer to 1 hour.

On the larger streams, and particularly during larger events, existing SH1 has been subject to historic flooding and erosion. Parts of Levin and Manakau are also susceptible to localised flooding.

The soils in the vicinity of the Ō2NL Project are predominately medium to well drained. This means that frequent rainfall events do not produce significant sheet flow. In larger events, such as those greater than the 1:10 AEP event, the potential for sheet flow increases, particularly in topographic depressions and on floodplains and poorly drained areas.

8.4 Groundwater

The Ō2NL Project traverses three groundwater management zones. Figure 8-7[5] shows the location of these zones and they are further described in Table 8-3 below.

[4] See paragraph 53(b) of Technical Assessment K in Volume IV
[5] One Plan: Schedule D – Groundwater Quantity

Figure 8-7 – Location of groundwater management zones

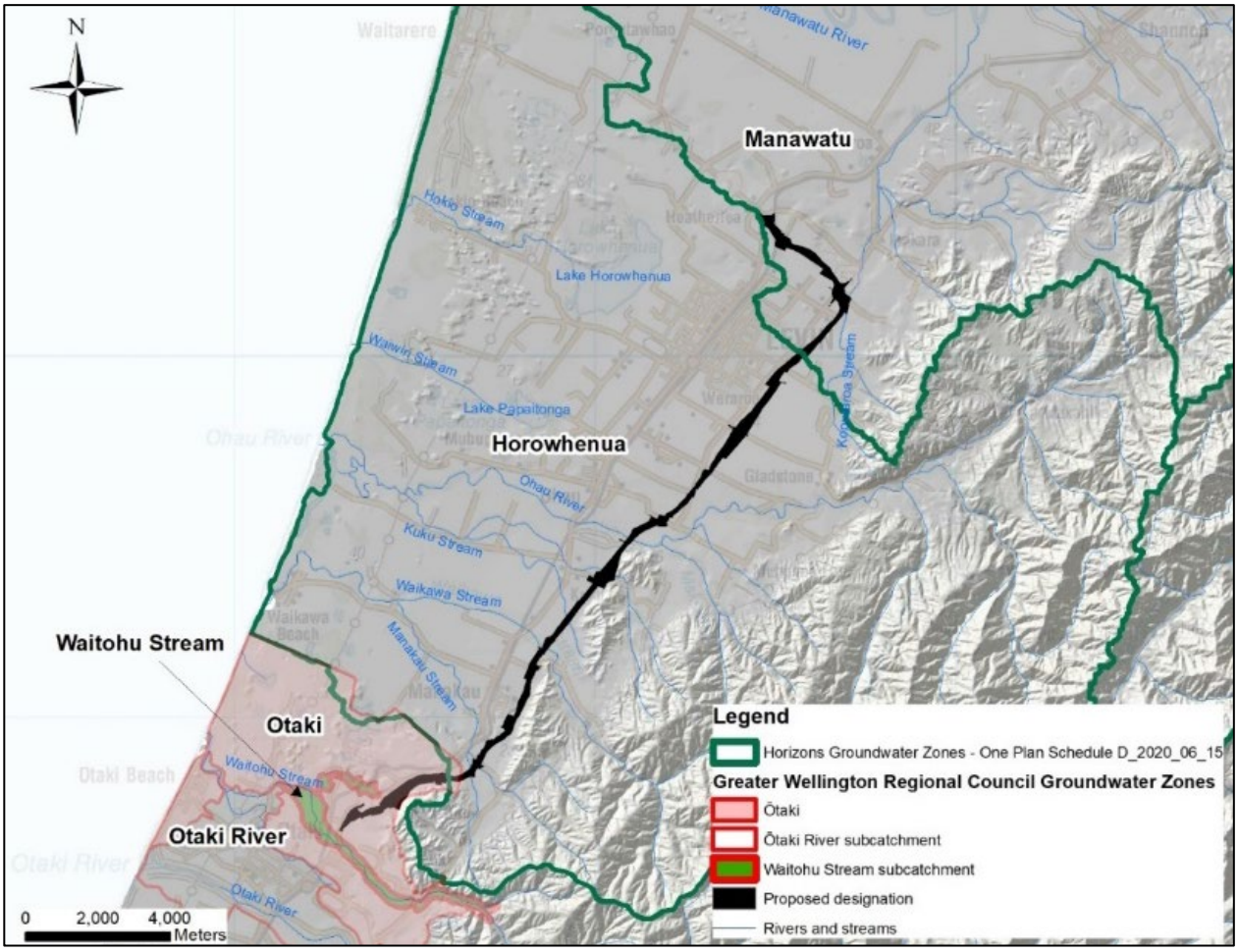


Table 8-3 – Groundwater management zones

Groundwater management zone	Description
Horowhenua groundwater management zone (HGMZ)	70% of the Ō2NL Project is within the HGMZ, which covers 388 km^2 and extends from the foothills of the Tararua Range to the coast. Groundwater occurs within a multi-layered, unconfined and semi-confined (leaky) aquifer system. Unconfined aquifers are present across the entire HGMZ and range in thickness from 5m to 40m with the water table ranging from ground level to approximately 30m depth. The aquifer system (unconfined and semi-confined) extends from 15m to greater than 300m below ground level and is underlain by low permeability Tararua Range greywacke basement. Groundwater levels show a typical seasonal pattern of the highest groundwater levels in later winter spring, and lowest water levels in late summer. Groundwater flows in a general east-west direction from the Tararua Ranges to the coast before discharging into the Tasman Sea and through hydraulically connected

Groundwater management zone	Description
	surface water bodies such as Punahau/Lake Horowhenua and various spring fed streams. The two principal inflows to the aquifer system are rainfall infiltration, and leakage into the aquifer through the bed of the Ohau River and other smaller drainage systems sourced in the Tararua Ranges. The principal outflows are groundwater outflow to the sea and leakage into rivers, lakes and streams, along with abstractions from bores. The main surface water bodies are the Ohau River, Punahau/Lake Horowhenua and Lake Papaitonga. Smaller streams and lakes include Waikawa, Kuku and Koputaroa Stream. Groundwater is highly connected to these surface water bodies with Punahau/Lake Horowhenua being the major groundwater discharge point. There are numerous springs formed by groundwater discharging to the ground surface within this Zone, but most of these springs are located a significant distance from the Ō2NL Project. The groundwater is generally high in nutrients, and shallow groundwater in unconfined aquifers is prone to microbiological contamination from intensive land uses; particularly those involving animal husbandry. The HGMZ is administered by Horizons.
Manawatū groundwater management zone (MGMZ)	The MGMZ hosts the largest proportion of the Region's bores and is extensively used for municipal, industrial, agricultural and domestic water supply. It extends from the central ranges through the Oroua and Pohangina Valley's and across the Manawatū plains to the Manawatū Estuary at Foxton Beach. Groundwater flows through a sequence of Quaternary sediments towards the coast, with vertical movement limited by interbedded silts and clays. Preferential flow occurs through moderate-high yielding gravel and sand lenses. Of particular note, the MGMZ in the vicinity of the Ō2NL Project is characterised by shallow groundwater, springs and groundwater fed wetlands. The MGMZ is administered by Horizons.
Ōtaki groundwater management zone (ŌGMZ)	The ŌGMZ has three main aquifers. These include an unconfined aquifer to 10m depth, and two semi-confined aquifers, one from 10m to 20m depth, and the other greater than 20m depth. The unconfined aquifer consists of river gravels, sand and silt overlain by up to four metres of sand, silt and clay deposited during floods in the Ōtaki River. Adjacent to the Ōtaki River, constant reworking of alluvial sediments has resulted in an unconfined, high-yielding riparian aquifer that flows northwest towards the coast. The primary surface water features in the ŌGMZ are the Ōtaki River and Waitohu Stream, which exhibit significant interaction with the unconfined aquifer, losing water downstream of its emergence from the Tararua foothills and gaining appreciable base flow in its lower reaches near the coast. The ŌGMZ is administered by GWRC.

There are numerous registered bores within the three groundwater management zones. Approximately 34 bores are located within the proposed designation and a further 104 bores within 250m (known/with an existing water permit). Only one bore within the designation has an existing water permit. A number of unregistered bores may also exist.

8.4.1 Groundwater monitoring

Groundwater monitoring data has been collected through Ō2NL Project investigations and has provided the following more specific information[6]:

- the highest groundwater level recorded by a Ō2NL Project bore was 0.3m below the ground surface adjacent to Manakau Stream and, in general, the highest groundwater levels ranged from 0.5m to 2m below the ground surface in areas near Queen Street East (east of Levin), east of Manakau, and adjacent to Manakau Stream;
- there was no flowing artesian groundwater in any of the Ō2NL Project monitoring bores, test pits, or cone penetration test holes;
- the lowest groundwater levels and the greatest groundwater level variation were observed east of Levin, from south of Queen Street East to McLeavy Road;
- larger groundwater water level variations were observed in bores screened at depths greater than 10m-15m;
- the groundwater levels in Ō2NL Project bores adjacent to the Ohau River respond directly to changes in Ohau River flow;
- flows in Kuku, Waikawa and Manakau Streams may affect, or be affected by, the adjacent groundwater depending on the reach and the hydraulic gradient between the river and the groundwater; and
- there is a lag in the response of groundwater levels to rainfall recharge that ranges from hours up to ten days in some deeper Ō2NL Project bores with deep and shallow bores follow a very similar trend - indicating that at least most of groundwater beneath the piedmont plain is acting as a single interconnected and interacting system.

8.5 Freshwater ecology

The Ō2NL Project traverses the five catchments described above. Within these catchments, there are forty-eight waterbodies that intersect with the Ō2NL Project including four ponds, 24 permanently flowing streams/rivers and 19 ephemeral watercourses/overland flow paths. No intermittent streams have been identified.

Ecological surveys of the watercourses indicate that the majority of streams/rivers were degraded by agricultural and/or horticultural land use.

A core assemblage of commonly found, widespread fish species are found in all five of the catchments, including shortfin tuna/eel (*Anguilla australis)*, longfin tuna/eel (*Anguilla dieffenbachii*), upland bully (*Gobiomorphus breviceps*), common bully (*Gobiomorphus cotidianus*), inanga (*Galaxias maculatus*), and banded kōkopu (*Galaxias fasciatus*).

Seven fish species known from at least one of the catchments traversed by the proposed designation are considered to be at a national level 'At Risk – Declining' (longfin tuna/eel, bluegill bully (*Gobiomorphus hubbsi*), inanga, giant kōkopu (*Galaxias argenteus*), kōaro (*Galaxias brevipinnis*), brown mudfish (*Neochanna apoda*)) and torrentfish (*Cheimarrichthys fosteri*)), while two are considered 'Threatened – Nationally Vulnerable' (shortjaw kōkopu (*Galaxias postvectis*), and pirahau/lamprey (*Geotria australis*). [7]

Four fish species known from at least one of the catchments traversed by the proposed designation are considered to be "regionally rare" (redfin bully, bluegill bully, banded kōkopu, kōaro) and four are

[6] Refer Technical Assessment G (Hydrogeology and Groundwater)
[7] Dunn, N.R., Allibone, R.M., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M. Jack, D.C., Ling, N., Waters, J.M. & Rolfe, J.R. 2018. Conservation status of New Zealand freshwater fishes, 2017. *New Zealand Threat Classification Series 24*. Department of Conservation, Wellington. 11 p.

considered to be “regionally threatened” (giant kōkopu, shortjaw kōkopu, brown mudfish and pirahau/ lamprey).[8]

Brown trout (*Salmo trutta*) are the only exotic fish known from the Waikawa catchment, while brown and rainbow trout (*Oncorhynchus mykiss*) are present in the Waitohu and Ōhau catchments. Koi carp (*Cyprinus carpio*) and perch (*Perca fluviatilis*) have been found within Punahau/Lake Horowhenua, while goldfish (*Carassius auratus*) are known to be present in four of the five catchments. The invasive mosquitofish (*Gambusia affinis*) has recently been detected in the lower Koputaroa catchment.

Brown mudfish are known from wetlands in the Koputaroa, Punahau/Lake Horowhenua/Hokio, and Waitohu catchments.

Based on flow permanence, SEV scores, habitat characteristics, macroinvertebrate community assemblages, and fish species present, the overall ecological values were:

- “high” – two sites (Ohau River and Waikawa River);
- “moderate” – ten sites (Kuku Stream, Manakau Stream, Waiauti Stream and seven unnamed streams);
- “low” – all other permanently flowing streams;
- “negligible” – overland flow paths.

8.6 Terrestrial ecology

The Ō2NL Project is located primarily in the Manawatū Plains Ecological District, in the Manawatū Ecological Region. A small section of the Project, near Manakau, is in the Tararua Ecological District. The Manawatū Plains Ecological District is almost entirely used for agricultural or horticultural purposes with approximately 98% of original vegetation cover being lost, and only isolated areas of indigenous wetland and forest remaining.

These remaining areas include locally characteristic tōtara forest, some black beech forest and mixed podocarp-broadleaved forest, and in the south, forest remnants dominated by kohekohe and/or tawa. Most of the remaining areas of indigenous vegetation are very small, being less than a few hectares in extent, and generally having regenerated following earlier vegetation clearance. The portion of the Tararua Ecological District that intersects with the Ō2NL Project is lowland terraces and foothills and is similar to the Manawatū Plains Ecological District in character.

8.6.1 Indigenous vegetation and habitats

There are no protected natural areas within the proposed Ō2NL Project designations.

All wetlands and indigenous vegetation within the wider Ō2NL Project area lie within an area classified as Acutely Threatened (<10% indigenous cover remaining) by the Manaaki Whenua Landcare Research Threatened Environment Classification.

The Ō2NL Project footprint (being the construction area plus a construction buffer) include 86% (312.8 hectares) pasture and cropping land, with a further 5.5% (19.8 hectares) occupied by houses and associated gardens and road and rail occupying 2% (7.5 hectares). Terrestrial vegetation dominated by indigenous species, including forest, treeland, scrub, and fernland covers 3.25 hectares (0.9%), with an additional 0.8 hectares (0.2%) of forest and scrub comprising a mix of indigenous and exotic plant species in the canopy. Terrestrial vegetation dominated by exotic species comprise 6.6 hectares (1.8%).

Wetland habitats (including open water) within the Ō2NL Project footprint cover 3.84 hectares (1%), comprising 0.61 (0.1%) hectares of indigenous wetland vegetation, 0.8 hectares (0.2%) of mixed indigenous-exotic wetland vegetation, 2.06 (0.4%) hectares of exotic wetland vegetation, and 0.34

[8] McArthur, K., Clark, M., & McGehan, J. 2007. Sites of significance for aquatic biodiversity in the Manawatu-Wanganui Region: Technical report to support policy development. Report No. 2007/EXT/794. Horizons Regional Council. 96 pp.

hectares (0.1 %) of open water habitat. The wetland habitats within the Ō2NL Project footprint are primarily swamps on valley floors, but there are also smaller areas of oxbow wetlands associated with meandering streams, and hillslope seepage wetlands. Most of the wetlands are grazed, exotic-dominated wetlands of relatively low ecological value.

Table 8-4 includes a summary description of habitats and key ecological features. The Ecology Plans included in Volume III (Drawings) shown in the location and description of ecology systems within, and adjacent to, the proposed designations.

Table 8-4 – Overview of habitats and key ecological features (north to south)

Chainage	Habitats and key ecological features
CH9800 - CH11300	Pasture and cropping land, with numerous dwellings and associated gardens, stands of trees, ponds, and wetlands also present. The notable ecological features include an area of open water habitats and marginal wetlands at CH10500 - CH10700, and a valley floor wetland with raupō reedland at CH11050. The area south of CH10500 is in the headwaters of the Koputaroa catchment.
CH11300 - CH13600	Pasture and cropping land, with scattered, grazed valley floor wetlands dominated by exotic plant species.
CH13600 - CH20500	Pasture and cropping land with numerous houses and associated gardens. There are no ecological features of note within the footprint of this section. The Project passes between two forest areas, one on either side of the proposed designation, including Arapaepae Bush.
CH20500 - CH22600	Pasture and cropping land, with associated houses and gardens. The Project traverses the upper arm of a valley floor wetland at CH20550, and scrub with emergent indigenous trees on a scarp at CH22200 - CH22350.
CH22600 - CH22700	The Project crosses the Ohau River and the associated forest, scrub, and vineland on its riparian margins.
CH22700 - CH26400	Pasture with small areas of wetland and scrub habitats in close proximity to the Kuku Stream (CH23500 - CH23900) and Waikokopu Stream (CH25500).
CH26400 - CH26550	The Project crosses the Waikawa Stream and associated forest, scrub, rank grassland, and gravel deposits on its riparian margins.
CH26550 - CH31100	Pasture with small, grazed, valley floor wetlands, areas of indigenous treeland (CH29800 - CH2900), and some localised residential areas with houses and gardens. Some areas of wetland habitat, on valley floors and in one stream oxbow, occur close to the Waiauti Stream at CH30300 - CH30500.
CH31100 - CH31950	Pasture with four forest remnants in close proximity (two to the north and two to the south). These are the highest value forest habitats immediately adjacent to the proposed designation. An area of planted indigenous forest at CH31550 is within the Project footprint.
CH32000 - CH34100	The Project crosses several low ridges and valley floor habitats in the upper catchment of the Paruauku Swamp (itself located outside of the proposed designations). Primarily pasture, as the valley floors have been extensively drained, but there are small valley floor

Chainage	Habitats and key ecological features
	wetlands within the footprint (CH31500), and one hillslope seepage wetland directly adjacent to the designation (CH31650). Between CH33660 and CH33950, the proposed designation includes the valley floor wetland. This is the largest area of wetland habitat within the Ō2NL Project footprint, and it lies approximately 500 metres to the southwest of more extensive, high value wetland habitats in the Paruauku Swamp - also known as O te Pua (Pukehou Swamp).
CH34100 - CH34400	Pasture with no ecological features.

The indigenous terrestrial and wetland vegetation in the vicinity of the Ō2NL Project have been assessed as 'Negligible' to 'Very High' ecological value. Given the high level of historical loss of habitats in the Horowhenua lowlands, the provision of habitat for common indigenous flora and fauna species, and the presence of 'Threatened', 'At Risk', and locally uncommon species is important.

8.6.2 Flora

Surveys have confirmed the presence of two indigenous species that were not planted and are listed as 'Threatened' in the vicinity of the Project as follows:

- several kānuka trees (*Kunzea robusta*; 'Threatened - Nationally Vulnerable'); and
- aka (*Metrosideros perforata*; 'Threatened - Nationally Vulnerable').

These two species are still common and widespread, both in the region and nationally, and have been elevated from 'Not Threatened' to 'Threatened-Nationally Vulnerable' due to the risk posed by myrtle rust (*Austropuccinia psidii*).

8.6.3 Indigenous fauna

8.6.3.1 Bats

The Ō2NL Project traverses moderate-quality potential foraging habitat for long-tailed bats (*Chalinolobus tuberculatus* - classified as 'Threatened – Nationally Critical'), and some potential roosting habitat in mature indigenous and exotic trees. However, based on the information held in the Department of Conservation (DOC) Bat Distribution Database and automatic bat monitoring undertaken that has not detected the presence of bats, it is considered highly unlikely that long-tailed bats are present. Appendix J.4 (Bat Surveys) to Technical Assessment J (Terrestrial Ecology) provides further details of the data collected to determine if bats are present within the vicinity of the proposed Ō2NL Project designations.

8.6.3.2 Birds

Potential avifauna habitats have been surveyed with a total of 28 indigenous birds have been recorded in the vicinity of the Ō2NL Project. Species that were recorded include:

- Koekoeā/long-tailed cuckoo ('Threatened - Nationally Vulnerable');
- Karakahia/grey duck ('Threatened - Nationally Vulnerable');
- Pihoihoi/New Zealand pipit ('At Risk – Declining');
- Pūweto/spotless crake ('At Risk – Declining');
- Koitareke/marsh crake ('At Risk – Declining');
- Kawau/black shag ('At Risk – Relict');

- Tūturiwhatu/black-fronted dotterel ('At Risk - Naturally Uncommon'); and
- Weweia/New Zealand dabchick ('At Risk – Recovering').

In addition, a single kākāriki/yellow-crowned parakeet ('Not Threatened') was notable as an uncommon species flying over an open area.

While not recorded, it is noted that a further seven notable bird species may be present based on other records from the local area. These species include matuku/Australasian bittern, tūturiwhatu/banded dotterel, karearea/bush falcon, pōpokatea/whitehead, and torea/South Island pied oystercatcher.

8.6.3.3 Lizards

While the area subject to the proposed designations is generally characterised by low diversity and abundance of lizards due to the highly degraded environment that likely contains high numbers of predatory mammals and birds, two lizard species (the ornate skink (*Oligosoma ornatum*, 'At Risk – Declining') and the Northern grass skink (*Oligosoma polychroma*, 'Not Threatened')) have been detected by surveys in the vicinity of the Ō2NL Project. Appendix J.6 (Lizards) to Technical Assessment J (Terrestrial Ecology) provides further details of the surveys undertaken to determine the presence of lizards within the vicinity of the Project.

It is anticipated that further ornate skink populations, copper skink (*Oligosoma aeneum*; At Risk – Declining) and glossy brown skink (*Oligosoma zelandicum*, At Risk – Declining) may also be present. These lizards are likely to be concentrated around rank exotic grasslands and in gardens. Lizard populations may also be present along wide rough grass margins along farm tracks and road and rail verges, hedges, forest edges, and around farm buildings.

It is unlikely that arboreal geckos are present because it is difficult for arboreal lizards to colonise isolated habitat patches where there is a hard edge between habitats.

8.6.3.4 Terrestrial invertebrates

No terrestrial invertebrates classified as 'At Risk' or 'Threatened' have been recorded as part of surveys undertaken within the wider Ō2NL Project footprint, however two notable, but non-threatened species (peripatus (*Peripatoides novaezeelandiae*) and the giant land snail (*Wainuia urnula*)) were recorded in locations of woody vegetation with abundant cover in the ground tier, and an absence of livestock.

Notable species that may be present but have not been recorded include:

- Powelliphanta spp. (Powelliphanta traversi florida, Powelliphanta traversi otakia, and Powelliphanta traversi traversi);
- The spiny longhorn beetle (*Blosyropus spinosus*); and
- New Zealand mantis (Orthodera novaezealandiae).

9 Human environment

9.1 Cultural

Iwi partners Muaūpoko and hapū of Ngāti Raukawa ki te Tonga are the keepers of their own cultural history and the holders of their own whakapapa, values and relationships with one another and their cultural landscape. The following is a summary narrative shared by iwi partners with the Project and is not intended to be comprehensive or exhaustive.

9.1.1 Muaūpoko

We trace our whakapapa back to our atua, however we also recognise our eponymous ancestors who reached Aotearoa during the waka migration from our ancestral homelands in Hawaiki. They

are Kupe (an early adventurer), Toi-te-huatahi (Toi the explorer, the grandfather of Whātonga), and Whātonga (a captain of the Kurahaupō waka) as our eponymous ancestors. Our story of Kupe is considered an account of our origins in Aotearoa, in which Kupe, a chief from Hawaiki, argued with Muturangi whose pet octopus had stolen bait from his fishing lines. Kupe boarded the waka Matahourua with his companion Ngake (or Ngahue) aboard Tawirirangi (or Tawhirirangi). The pair set sail in pursuit of the octopus to Aotearoa where it was finally killed at place known as Arapaoa after the final blow that ended the life of the octopus. Kupe travelled on, naming places in Aotearoa along the way. The two islands in Te Whanganui-a-Tara were named for his daughters (or nieces), Matiu and Mākaro, he discovered greenstone in the South Island, later returning to Hawaiki from Hokianga. Upon his return, Kupe informed his (our) people of the new land he had discovered, one of whom was his nephew Turi, who captained the Aotea waka to these shores.

Meanwhile, the Kurahaupō waka, including Whātonga, arrived on the west coast at Tongapōrutu. Whātonga found his grandfather Toi-te-huatahi at Whakatāne, then ventured onwards to Heretaunga where he settled and sent his sons Tara-Ika and Tautoki to Te Ūpoko o te Ika (the head the fish of Maui/southern North Island) to explore and live. A son of Whātonga, Tara-Ika, is the eponymous ancestor of Ngāi Tara and because of this shared whakapapa, many Muaūpoko people also consider themselves Ngāi Tara. The half brother of Tara-Ika was Tautoki, the father of our whanaunga Rangitāne.

Muaūpoko is translated to mean 'head of the fish' or 'people of the head of the fish', the fish being Te Ika a Māui, the North Island of New Zealand. The fish's head is the bottom of the North Island, where Muaūpoko are born of the land. According to some of our people, Muaūpoko are descended from tangata whenua who lived on the land preceding waka arrivals from the Pacific, referred to as Mua-o-tetangata or Muatetangata. But for most, Muaūpoko story of origin began with the arrival of Kupe from Hawaiki on the Matahourua waka, or more recently, the migration of Whātonga on the Kurahaupo waka many hundreds of years ago.

Some Muaūpoko believe the Tararua Range was named after Hotuwaipara and Reretua, the two wives of Whātonga and mothers of Tara-Ika and Tautoki respectively. But others claim the range was named after Tara-Ika himself, who'd already been memorialized in some features of the land where he established his people.

Our mana lives on in our traditional rohe through the names of places and through the connections of our people, stories handed down through our generations.

9.1.1.1 Cultural landscape

Despite warfare and land loss, Muaūpoko retain strong cultural and spiritual associations with the whole of their former territory, and part of the Horowhenua block remains in Muaūpoko ownership today. The Horowhenua Block is the heartland of Muaūpoko people, the health and wellbeing of Punahau/Lake Horowheuna is interconnected with the health and wellbeing of our people.

Lake Horowhenua is traditionally known to our people as Punahau (or Waipunahau), loosely translated as 'the spring of vitality" and central to the wairua, mauri and identifiy of our iwi. The name highlights the once abundant life supporting life capacity of the lake. Punahau was shrouded with dense forest of pukatea, kahikatea, and rata on the lake margin; surrounded by huge wetland areas with a plentiful supply of raupō, harakeke, kākahi (freshwater mussels), īnanga (whitebait), pātiki (flounder) and tuna (eels).

Native birds such as kereru were found in their thousands. These species were food sources were unrivalled source of food for our ancestors. From the lake inland to the Tararua Range stood rangatira (chiefs of the forest) of nikau, miro, karaka, tawa and rimu, among other taonga, which provided food, shelter and other necessities for survival. Lake Horowhenua is connected through groundwaters, headwaters and wetlands from Te Pae Maunga Tararua to Te Moana o Raukawakawa.

For much of the last 120 years the tribe has fought hard to try and protect the Lake from environmental degradation.

There were historically a large number of Muaūpoko hapū. The main hapū active today are Ngai Te Ao, Ngaruhe, Ngāti Hine, Ngāti Pariri, Ngāti Tamarangi, Ngāti Whanokirangi and Punahau. The main marae are Kawiu (a little north of Levin) and Kohuturoa (on the shores of Lake Horowhenua). There are currently more than 3,000 names on the Muaūpoko Tribal Authority (MTA) register of beneficiaries.

9.1.2 Ngāti Raukawa ki te Tonga

Ngāti Raukawa trace descent from Raukawa. He was of Tainui descent and through his mother, Māhinaarangi, he also belonged to peoples of Te Tai Rāwhiti (the eastern districts of the North Island), particularly Ngāti Kahungunu. Raukawa was born 20–25 generations ago at the springs of Ōkoroire and grew up at his father's home of Rangiātea, near Ōtorohanga.

Events in the life of Raukawa are not well known. However, many illustrious ancestors of Ngāti Raukawa have richly influenced the history of the Waikato and southern districts of the North Island. They include the sons of Takihiku, Kapumanawawhiti and Huia. Among the 19th-century ancestors were Te Whatanui, Te Ahukaramū and Te Rauparaha.

Ngāti Raukawa history is full of the triumphs and tragedies of a traditional tribal life.

9.1.3 The children of Raukawa

Tēnā anō rā kei ngā tamariki toa nā Rakamamao

Kei te rangi e haere ana nā Mōtai-tangata-rau.

There go the children of Rakamamao

Across the skies, [the progeny] of the multitudes of Mōtai.

Early tribal history centres on the children of Raukawa – Rereahu, Takihiku, Whakatere and Kurawari. Even today these ancestors are marker points in Ngāti Raukawa history. Except for Kurawari, each of the children was immortalised in the name of a distinct tribe.

The most significant and well-known ancestor in the next generation is Maniapoto, son of Rereahu and ancestor of the Ngāti Maniapoto tribe. Maniapoto succeeded to his father's position even though he had an elder brother, Te Ihinga-a-rangi. Maniapoto had a younger sister named Te Rongorito. She became an important ancestor of many Ngāti Raukawa people. Te Rongorito was a puhi, a sacred woman trained in the teachings of the aristocracy. She gave rise to a very powerful section of Ngāti Raukawa.

Te Rongorito's grandson was Kapumanawawhiti, a man of great prowess in battle who was responsible for taking the name of Ngāti Raukawa far and wide. After a series of successful battles in northern Taranaki, a cousin of Kapumanawawhiti, Parekarau, stated:

He uri tamawahine, māna e takahi te one i Hākerekere.

The descendant of a woman, he shall traverse the shore at Hākerekere.

This is often quoted in Ngāti Raukawa circles to honour Kapumanawawhiti.

Kapumanawawhiti was succeeded by his nephew Ngātokowaru, who also became a famous warrior. However, Ngātokowaru was finally captured in battle and taken to the ailing Te Putu, chief of the Ngāti Mahuta people. As Ngātokowaru leaned over the dying chief of his enemy, he produced a hidden dagger and killed Te Putu, saying, 'Ko te tete o Ngātokowaru, tēnā ka rangona!' (The dagger of Ngātokowaru shall be famous!).

19th-century migrations

In the early 19th century, a significant portion of Ngāti Raukawa migrated from the Maungatautari and Wharepūhunga districts to the southern reaches of the North Island. These people eventually settled in the Rangitīkei, Manawatū, Horowhenua and Kāpiti districts.

The movement was in reaction to ongoing conflict in the north. There were also close ties with Ngāti Toarangatira, who had already left their home of Kāwhia to move to the south.

In the early 1820s, word arrived at Maungatautari that a calamity had befallen the Ngāti Toarangatira tribe, and a travelling group was sent out. Among the leaders of this group, known as Te Heke Karere (the company of messengers), were Ngārangiōrēhua, Te Horohau, Mātenga Te Mātia and Te Ahukaramū. Arriving in the south, they found that tragedy had indeed struck, resulting in the deaths of a number of children.

The invitation

When the travellers prepared to return to Maungatautari, Te Rauparaha invited Ngāti Raukawa to settle in the south. However, the group did not take up his offer. When Te Rauparaha's sister Waitohi heard this, she repeated the invitation, and this time the departing chiefs accepted. On returning to Maungatautari one of the chiefs, Te Ahukaramū, presented the proposal to migrate. When the people remained unconvinced, Te Ahukaramū sent his men to burn their pā and adjoining areas.

The migrations

There were many migrations to the south. These migrations brought Ngāti Raukawa into conflict with the people of the south. Together with Ngāti Toarangatira, they secured tracts of land from Rangitīkei to Kāpiti and settled a large number of sub-tribes. This settlement is reflected in the large number of Ngāti Raukawa marae today, some of which stand on land blocks and entitlements negotiated in the early 19th century.

The 20th century onwards

Twentieth-century Ngāti Raukawa history is diverse and complex. The people experienced great change as they wrestled with such momentous events as the First World War and the depression of the 1930s. After the Second World War, people left their traditional tribal areas and moved to the cities.

In 1975, Ngāti Raukawa initiated a 25-year tribal development plan entitled 'Whakatupuranga rua mano – Generation 2000', which saw the widespread revitalisation of our marae and Te reo Māori, and the establishment of Te Wānangao- Raukawa, the tribe's centre of higher learning in Ōtaki. The importance of these institutions was to preserve, collect and revive the matauranga (knowledge) specific to Ngāti Raukawa prior to the arrival of the missionaries.

Ngāti Raukawa people are involved in a wide range of pursuits, including the arts, sciences, business and the reconstruction of Māori knowledge. The latter half of the 20th century saw the rise of the internationally famous operatic bass Īnia Te Wīata and the composer Kīngi Tāhiwi.

The Ngāti Raukawa of today, through their whakapapa connections, have only grown in strength. Whilst we understand that through kotahitanga and manakitanga we stand strong as an Iwi, this is underpinned by the mana of individual hapū and whanau who make up the foundation of who we are as a collective, as a people and as Māori. Our enduring resilience and our ability to adapt is the result of knowing who we are and where we come from.

As an Iwi we are well represented by the large number of marae and a range of institutions, notably Te Wānanga-o-Raukawa, Rangiātea Church and Raukawa Marae itself, all in Ōtaki. Other organisations include the Raukawa Trust Board in Tokoroa, and the Ōtaki Māori Racing Club and Te Rūnanga o Raukawa (tribal council). But more importantly we are representatives of our tupuna, their wairua and their taonga tuku iho that we are duty bound to uphold through kaitiakitanga of our whenua, our wai, our reo and our people.

9.2 Heritage and archaeology

There are no Heritage New Zealand Pouhere Taonga's (HNZPT) New Zealand Heritage List / Rārangi Kōrero places / areas or New Zealand Archaeological Association (NZAA) recorded archaeological sites located within the proposed Ō2NL Project designations.

Similarly, there are no scheduled or listed significant mana whenua or historic heritage values scheduled in the PNRP[9] and no historic heritage or wāhi tapu sites listed in the One Plan or HDP[10] located within the proposed designations. There are also no wāhi tapu or historic heritage areas scheduled in the KCDP located within the proposed designations. A heritage trail sign (KCDP SCHED7 – Schedule of Historic Heritage B70) is located within the designation that describes the site of overnight camp of Muaūpoko fleeing from Te Rauparaha. The camp itself is located on Pukehou more than a kilometre from the sign and, at its nearest point, between 400 and 500 metres from the Ō2NL Project designation. The sign is located within the current SH1 corridor boundary on a side road that provides access to local properties. The Ō2NL Project proposes that this side road be developed to include a shared use path and will not entail removal or otherwise affect the sign.

While there are no listed archaeological sites, there are 13 verified archaeological sites[11] and 46 potential archaeological sites in the proposed designations.

All verified archaeological sites are 'railways, roads and tracks' sites. The location of these sites is shown in Figure 9-1. The road sites have low heritage value, while the tram site has medium heritage value.

Of the potential archaeological sites, the majority are of low or medium total heritage value. However, two sites at Waiaute Stream and Pukehou may have high archaeological values. Further information and assessment of these two sites is provided in Technical Assessment L (Archaeology) (Volume IV) and summarised in the Archaeology section of Part G.

The New Zealand Heritage List/Rārangi Kōrero and the district plans[12] do not 'list' any sites, buildings or structures located within the proposed designations. Outside of the proposed designations, there are a number of structures in the vicinity that have built heritage values. These are set out in Table 9-1. In all cases, these items are assessed as having medium heritage value.[13]

[9] PNRP 'Schedule C: Sites with significant mana whenua values' and 'Schedule E: Sites with significant historic heritage values'
[10] HDP 'Schedule 2: Historic Heritage – Buildings, Structures & Sites'
[11] A verified archaeological site is a location, building or object that fulfils the statutory requirements to be considered an archaeological site under the Heritage New Zealand Pouhere Taonga Act 2014 and where the location and extent of the site are known to a high precision.
[12] HDP 'Schedule 2: Historic Heritage – Buildings, Structures & Sites' and KCDP 'SCHED7 – Schedule of Historic Heritage'.
[13] Based on the Waka Kotahi 'Guide to assessing cultural heritage effects for State highway projects', dated March 2015.

Figure 9-1 – Verified archaeological sites

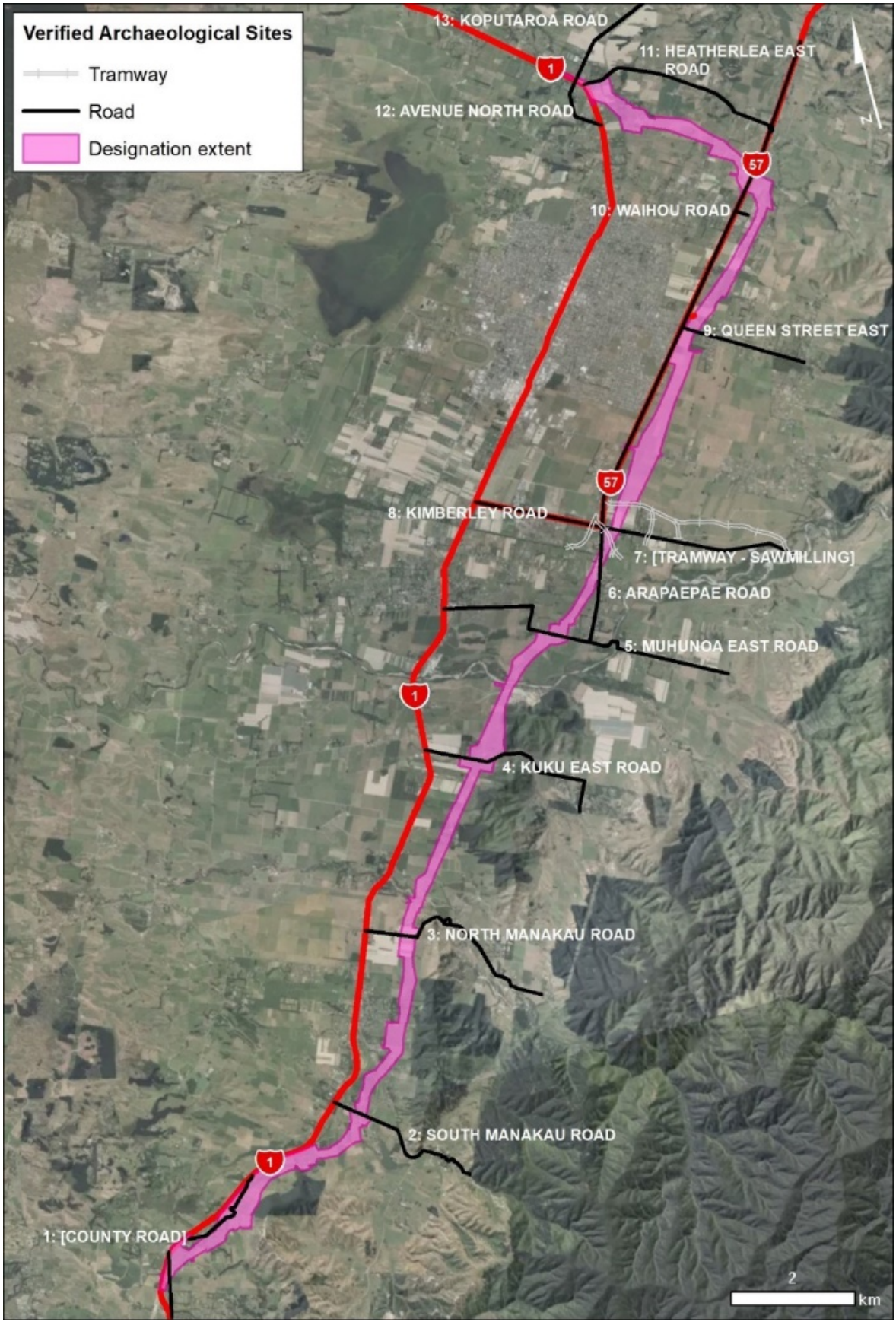


Table 9-1 – Structures with built heritage values

Site Name	Description	Address/Location	Listed/Not Listed	District Plan Reference	HNZ Category and Reference
Manakau school	Primary school	Mokena Kohere street	✓	HDP – H22	Cat 2 No.4064
St Andrews church	Church	23 Mokena Kohere street	✓	HDP – H23	Cat 2 No. 4070
War memorial sarcophagus	Memorial	Honi Tapua street	✓	HDP – H20	Cat 2 No. 4065
Former Manakau post office	Part dwelling and part commercial	33 Honi Taipua street	✓	HDP – H21	Cat 2 No. 4063
'Ashleigh'	Prouse homestead and outbuildings	1024 Queen street east	×	-	-
Manakau hotel	Hotel	39 Honi Taipua street	×	-	-

9.3 Transport

SH1 between Levin and Ōtaki is classified as a National (high volume) Road in the One Network Road Classification (ONRC)[14] and as an Interregional Connector under the One Network Framework (ONF)[15] SH1 is the only route between the two centres and has one lane in each direction.[16]

SH1 through Levin is classified as an Urban Connector, Activity Street and Main Street and north of Levin is classified as a National Road and Peri-urban Road and Interregional Connector under ONF, providing north-south connections between Levin and the rest of the North Island (north and west). The 3.3 kilometre stretch of SH1 within Levin has a single lane in each direction, with a flush median for most of the length. This portion of the road has a 50km/h posted speed limit.

SH57 is an important strategic route that connects SH1 with Shannon, Tokomaru and Palmerston North. SH57 through and north of Levin is classified as a National Road under the ONRC and Interregional Connector under ONF. The intersection of SH1 and SH57 is to the south of Levin town centre.

A number of safety improvements to the existing state highway road network are occurring separately to the Ō2NL Project and will be completed in advance of the Ō2NL Project being opened (and are shown generally on Figure 2 in Part A). These improvements include the formation of a new roundabout at the Queen Street East/SH57 intersection (due to be completed before end of 2022 and shown on the drawings in Volume III) and sections of side barriers and painted wide centre lines on SH57 and SH1 (construction now complete), and sections of median barriers and turnarounds on SH1.

[14] The ONRC is a classification system, which divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available.
[15] The ONF is a new classification system being transitioned to that will eventually replace the ONRC in the 2024-2027 National Land Transport Investment Programme. The ONF is a two-dimensional tool focused on movement and place to help establish function and performance of a corridor.
[16] Passing lanes have been progressively removed /closed in response to increasing safety concerns.

In addition, Waka Kotahi is separately seeking planning approvals for a roundabout at the intersection of Arapaepae Road/SH57 and Tararua Road to safely accommodate projected traffic growth associated with residential development within the Tara-Ika Growth Area. The current programme is for this improvement to be constructed in the next three years.

9.3.1 Local road network

The O2NL Project traverses a number of local roads, which are all either reconnected directly across (under or over) the new proposed State Highway or connected back into the local road network. The following roads and a brief descriptor of their function is provided below:

- South Manakau Road – serves local rural community including rural lifestyle subdivision and connects to Manakau Heights Drive;
- Manakau Heights Drive/Eastern Rise – serve rural lifestyle subdivision;
- North Manakau Road – serves local rural community including rural lifestyle homes, and provides access to a DOC reserve;
- Kuku East Road – serves local rural community including rural lifestyle subdivision;
- Muhunoa East Road - serves local rural community including rural lifestyle subdivision;
- McLeavey Road – serves local rural community including lifestyle subdivision;
- Kimberley Road - serves local rural community including rural lifestyle subdivision. Provides access to Ohau River and reserve areas;
- Tararua Road - serves local rural community including rural lifestyle subdivision. Provides access into Levin industrial areas and town centre;
- Queen Street East - serves local rural community including rural lifestyle subdivision. Provides major access into Levin town centre and Punahau / Lake Horowhenua. Includes shared use path facility, and provides access to Trig Track, the Tararua Range generally including its significant reserve areas and Waiopehu Reserve;
- Waihou Road - serves local rural community including rural lifestyle subdivision;
- Sorensons Road – serves local rural community including rural lifestyle subdivision;
- Heatherlea East Road and Koputaroa Road - serves local rural community including rural lifestyle subdivision.

9.3.2 Traffic volumes

Current (2019) traffic volumes on the state highway network are, as follows:

- south of Taylors Road, there are approximately 16,750 vehicles per day (vpd) travelling along SH1;
- approximately 18,250 vpd including over 1,800 heavy vehicles, along SH1 near Ohau;
- on the section of SH1 north of the SH1/SH57 intersection, the traffic volume through Levin is approximately 14,100 vpd;
- on SH1 north of Levin, the traffic volume is approximately 10,600 vpd; and
- on SH57 north of Queen Street East is the traffic volume is approximately 9,500 vpd.

9.3.3 Walking and cycling

SH1 through Levin mostly has footpaths on either side of the road. There are two pedestrian crossings at signalised intersections, two median pedestrian refuges, and one zebra crossing. There are few formal provisions for cyclists.

SH1 through Manakau and to and through Levin operates at 80km/h. Between and including Manakau and Ohau, apart from the pedestrian underpass at Ohau, there are no signalised intersections or active mode crossing facilities of SH1 resulting in a generally unsafe environment for pedestrians and cyclists.

The rural sections of SH1, between Levin and Ōtaki, and SH57, have sealed shoulders of varying widths (no sealed shoulders on the rail overbridges), so it is also not suitable for walking or cycling.

9.3.4 Public transport

Currently public transport by bus makes up about 0.1% of the mode share for work trips and 14.7% of trips to education in the Horowhenua District. This is due to the limited public bus services available around Levin and surroundings. The current services (one return service per day) are, as follows:

- 'a day out in town bus service' that connects Levin, Waitarere Beach, Foxton, Foxton Beach, and Shannon every Friday;
- Levin to Waikanae service that runs Tuesdays and Thursdays; and
- Levin to Palmerston North commuter bus service that runs Monday to Friday.

There are also longer inter-city bus services that connect Levin with most other major destinations in the North Island.

9.3.5 Rail

NIMT is aligned generally alongside SH1 (SH1 and NIMT crosses three between Ōtaki and Ohau) connecting Ōtaki, Manakau and Levin before heading north east towards Shannon. There is a train station and passenger service from Levin, offering a once a day service between Palmerston North and Wellington. Manakau Train Station closed in 1982.

Rail makes up about 1% of the mode share of trips to work and education in the Horowhenua District, with the Capital Connection providing a daily commuter rail connection between Levin and Wellington.

Rail freight traffic is more frequent, with approximately 13 freight trains a day traversing the route with services operating between Auckland, Palmerston North, Wellington, Christchurch and Dunedin. However, freight trains do not stop for loading / unloading at Levin. It is anticipated that this daily volume of freight trains will grow to 16 by 2029, and to 19 by 2039.

9.3.6 Safety

The sections of SH1 and SH57 that are proposed to be replaced by the Ō2NL Project are amongst the least safe state highway environments in New Zealand. In the five years to 2021 there were 14 fatal crashes and 39 serious injury crashes on SH1 and SH57 in the Ō2NL Project Area. These crashes resulted in 72 deaths and serious injuries. Additionally, there were 107 minor injury crashes and 303 non-injury crashes. Averages of these figures are:

- more than 1 death or serious injury a month (1.2); and
- nearly 2 crashes per week (1.8).

The statistics for the preceding 10 years offer a similar track record.

Reasons for the safety of the route being compromised include:

- poor road geometry and alignment;
- narrow shoulders;
- roadside hazards; and
- a very high number of intersections and accessways.

The deficiencies listed above and the safety impacts of them, will be compounded by the forecast growth in travel demands.

As a result of the large number of high severity crashes on the SH1 and SH57 rural road sections, these roads are classified as High-Risk rural roads.

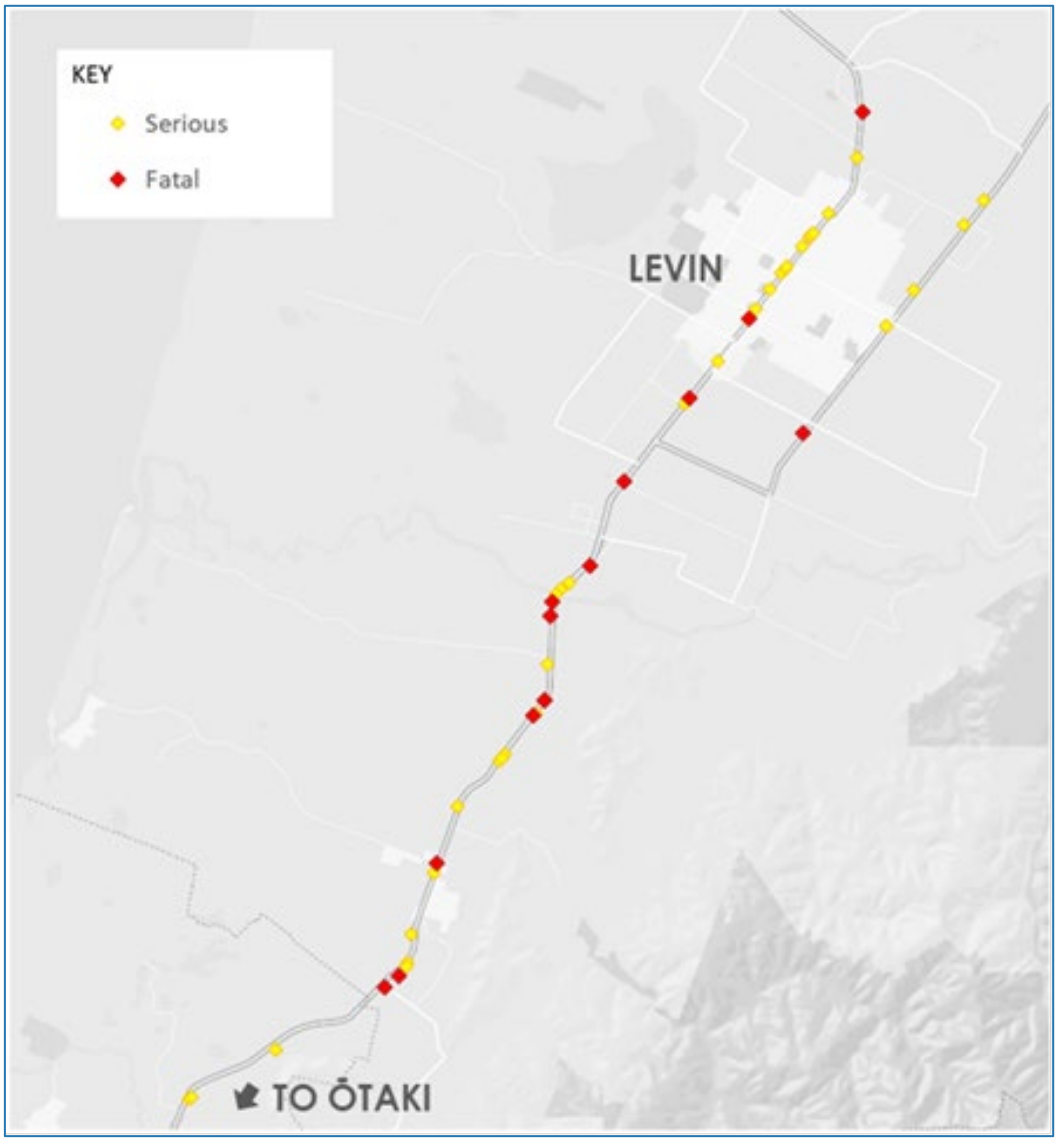
9.3.7 Resilience

There is no alternate route to SH1 between Manakau and Ohau – this section also has ageing structures and is at high risk of closure due to regular flooding. This section of state highway has a 5L (extreme consequence, likely) resilience risk hazard. This rating is forecast to deteriorate to the highest level of risk possible of 5VL (extreme consequence, very likely) by 2050 due to climate change impacts.

SH1 is at a high risk of closure (and the subsequent forming of significant queues) from:

- earthquakes because existing bridges have a high or significant earthquake disruption risk, four of which have no viable alternate route;
- flooding because SH1 passes through a floodplain and is also subject to surface flooding (for example, two recent large-scale events closed the highway between Ohau and Manakau - one for 90 minutes and the other for over 24 hours); and
- high severity crashes (as set out above).

Figure 9-2 – Fatal and serious crashes in the vicinity of the Ō2NL project (2016-2020)[17]



There were also 135 natural events that caused at least cautions, including fires, surface water, flooding, fallen trees, rockfalls, ice, and drop out. The data highlights that since the 2017/18 financial year there have been 28 unplanned closures with the majority related to crash events. The average closure duration across the period was around four hours. Closures on the SH57 section of the project area have been less frequent (5 since 2017/18), with a slightly shorter average closure duration.

When an event occurs that closes SH1 (and where there is no alternative route) the trip from Wellington to Levin needs to be completed via the Wairarapa, which increases trip time by at least two hours; and much more during peak hours and high traffic conditions which eventuate as a consequence of such closure incidents.

9.3.8 Travel times and delays

Afternoon peak (PM peak) travel times for journeys between Ōtaki and SH1 North of Levin currently (2018 data) take on average 26 minutes, journeys between Ōtaki and SH57 North of Levin take on average 23

[17] S = Serious Injury, F = Fatality

minutes while journeys from Ōtaki to central Levin (Queen Street/Oxford Street) take on average 17 minutes. During busy periods, such as long weekends these travel times are increased (including in respect of side road delays).

These PM peak travel times are typically 5-10% longer than an off-peak weekend period. Delays for shorter journeys, for example SH1 through the Levin Town Centre, are over 20% longer during the PM peak when compared to the weekend off-peak.

Delays are also experienced by drivers wanting to turn from side roads onto the highway. Most side roads operate with delays of less than 30 seconds, but there are around 10 intersections where delays are greater than this. Consultation with the community has revealed that delays can extend to several minutes during holiday weekends and high traffic situations. For many of these side roads there are no other alternative routes.

9.4 Land use

The Ō2NL Project is generally located in the rural environment on the periphery of Levin and the smaller villages of Ohau, Kuku and Manakau. The area is characterised farming, horticultural and lifestyle land uses with productive land uses including dairy farming, sheep and beef farming, extensive areas of market gardening, pockets of orchards, glasshouses, poultry farms, and a vineyard. There are small pine plantations on the foothills. The productive uses are interspersed with pockets of lifestyle or rural-residential development.

The land located under the proposed footprint of the Ō2NL Project Concept Design (plus a buffer of 5m) is approximately, as follows (the larger values include land anticipated to be used for construction purposes):

- between 142.0ha and 231.6ha is from sheep and beef land use;
- between 36.9ha and 53.5ha is from market gardening;
- between 37.1ha and 55.8ha is from dairy farming;
- between 14.4ha and 21.7ha is from lifestyle/dwellings;
- between 4.6ha and 6.1ha is from horticulture; and
- less than 1ha each is from forestry or bush.

The Ohau River and Waikawa Stream have waterholes used for swimming. The most notable riverside reserve is Kimberley Reserve that includes a stand of bush and picnic area on the north bank of the Ōhau River. The Waikawa Stream Picnic Area and Campsite is a notable public facility. Both are located more than one kilometre away, to the east of the Ō2NL Project.

9.4.1 Productive land

The Horowhenua District is approximately 105,602 ha in size and about 43,766 ha (41%) is classified as highly productive soil (LUC classes 1 to 3) and 31,639 ha (30%) can be classified as highly versatile soil (contains LUC classes 1 and 2 plus LUC units 3e1 and 3e2). On a national level the Horowhenua district has about 1% of the country's highly productive soil and about 2% of the country's highly versatile soil.

Between 235.6 and 369.9 hectares of land is located within the Ō2NL Project Concept Design (plus a buffer of 5m), where the larger value includes land anticipated as being used for construction purposes (a buffer of 20m from the physical footprint). The land located under the proposed footprint of the Ō2NL Project is between approximately, as follows (again the larger values include land anticipated to be used for construction purposes):

- between 229.5ha and 358.7ha is classified as highly productive land;
- between 100.3ha and 167.4ha is classified as highly versatile land.

These classifications are based on 'the New Zealand Land Resource Inventory' ("NZLRI"). 'Highly productive land' is all the land that is LUC classes 1 to 3 and highly versatile land is LUC classes 1 and 2 plus 3e1 and 3e2 land.

29.4ha of the highly productive land (but not highly versatile land) is in the process of being developed for residential uses as part of Tara-Ika Growth Area.

9.4.2 Contaminated land

A Preliminary Site Investigation ("PSI") undertaken for the area subject to the proposed designations and including an area extending approximately 100 metres either side of the proposed designations.

The Ō2NL Project traverses land that has been or is being used in manner that are identified as potential Hazardous Activity or Industries List ("HAIL") sites. Specifically, the land traversed includes glass houses, market gardens and orchards, where there may have been historic bulk storage and use of persistent pesticides such as dichlorodiphenyltrichloroethane (known as 'DDT'). There is also the potential for storage of fuel, fertilisers, and agri-chemicals to have occurred. Some outbuildings have been constructed from products that use lead and asbestos, which can lead to ground contamination. Other contaminants such as pathogens, nutrients, emerging organic contaminants and viruses may also be present on surrounding land depending on historical use of poultry waste as fertilizer.

Sheep dips may possibly be present on some farm properties through which the Ō2NL Project passes, although there is no record of these in either Horizons or GWRC records.

A HAIL site may be located close to the Ohau River where the use or deposition of hazardous substances has or may have occurred historically. There is also evidence of land fill having occurred at this location.

There is an historic landfill site located beyond and to the west of the proposed designation and south of the Waikawa Stream.

9.4.3 Air quality

For the purposes of the Ō2NL Project an air quality monitoring site was established in July 2021 in Levin at the intersection of Queen Street East and SH57. Monitoring data has also been obtained from the Waka Kotahi monitoring location in Ōtaki (corner of SH1 and Mill Road) to provide a comparison. The Ōtaki monitoring station has been in existence since 2010.

The average NO_2 concentrations at the Project air quality monitoring site in Levin is 7.8 µg/m^3 whereas the average (over the period 2010 to end of 2020) NO_2 concentrations at the Waka Kotahi air quality monitoring in Ōtaki is 16.1 µg/m^3. The 1-hour, 24-hour and annual NO_2 background concentrations are below the World Health Organisation ("WHO") annual average guideline value of 40 µg/m^3 based on monitoring data.

In terms of particulate matter (PM_{10} and $PM_{2.5}$), monitors were established in Manakau and Levin and data gathered over the period 1 August 2021 to 31 May 2022. Based on monitoring data, and existing datasets, annual PM_{10}, 24-hour $PM_{2.5}$, and annual $PM_{2.5}$ background concentrations have been calculated and are set out in Table 9-2 below.

Table 9-2 – Background particulate matter concentrations

Area	24-hr PM_{10}	Annual PM_{10}	24-hr $PM_{2.5}$	Annual $PM_{2.5}$
	($\mu g/m^3$)			
Rural	11.6	8.2	4.3	2.5
Levin	31.2	12.9	20.9	6.6

A small section of the proposed Ō2NL Project designation is located within the gazetted Kāpiti Coast Air Quality Management Area (legal description SO 355936). This area is not considered a polluted airshed by GWRC and no air quality monitoring has been undertaken by the GWRC. The remainder of the Ō2NL Project designation is not located within a defined airshed.

9.4.4 Noise and vibration

The existing noise environment description is based on predicted sound levels from the existing state highway network and a combination of attended and unattended sound level measurements. Results are modelled in terms of annual average daily sound level ($L_{Aeq(24hr)}$), which allows the existing environment to be represented by a single number, but it should be noted that there will be day-to-day variation in road-traffic noise and noise from other sources.

Plans showing the predicted sound levels for the existing environment are included in **Volume III**. The noise environment in the vicinity of the Ō2NL Project is summarised in the Table 9-3 below.

Table 9-3 – Existing noise environment

Locality	Summary of noise environment
North-east Levin	The noise environment for dwellings along the existing SH1 and SH57 is dominated by road-traffic noise, with noise levels increasing where the speed limit changes north of Koputaroa Road on SH1. There is a group of dwellings along Sorenson Road approximately 600m from SH1 where individual vehicle noise is audible at times, for example from trucks cornering on the approach to Levin. In this area, sound levels were measured between 45-55 dB $L_{Aeq(15min)}$ during the day and between 35-45 dB $L_{Aeq(15min)}$ at night. Nature sounds, including birds and wind blowing in trees, were present. The 24h sound level is likely to range between 50-55 dB $L_{Aeq(24h)}$. Further afield, eg at Fairfield Road and Heatherlea East Road, the noise environment reduces to the general hum of distant traffic and urban activities without a clear source.
Levin east	SH57 is the dominant source of noise, especially during morning and afternoon peaks, when there is often a steady stream of traffic. At night, traffic becomes sparse and individual vehicles are audible over longer periods. To the east of the proposed designation are rural properties on Waihou and McDonald Road where sound levels were measured between 45-55 dB $L_{Aeq(15min)\ during}$ the day and between 35-45 dB $L_{Aeq(15min)}$ at night. The 24 hour sound level is likely to range between 47-52 dB $L_{Aeq(24h)}$. To the east of the proposed designation, there are several dwellings on Queen Street East, including 'Ashleigh'. There are also dwellings on Redwood Grove on residential sections. Measured sound levels at Redwood Grove were below 40 dB $L_{Aeq(15min)}$ at night and the 24 hour sound level is likely to range between 40-50 dB $L_{Aeq(24h)}$.

Locality	Summary of noise environment
	To the west of the proposed designation, and west of SH57, there is a relatively dense residential area of Levin. 24 hour sound levels at dwellings immediately adjacent to SH57 likely to range between 55 and 65 dB $L_{Aeq(24h)}$ depending on their setback from the existing state highway.
Ohau east	In the vicinity of Kimberley Road (SH57), road-traffic is a significant contributor to the existing environment with sound levels between 50-55 dB $L_{Aeq(15min)}$ during the day, and 35-45 dB $L_{Aeq(15min)}$ at night. The 24h sound level is likely to range between 47-53 dB $L_{Aeq(24h)}$. South of Kimberley Road (SH57), due to limited traffic on Arapaepae Road South and Muhunoa Road East, traffic is audible as individual vehicle movements, rather than continuous traffic. On these roads, ambient sound levels were measured between 40-45 dB $L_{Aeq(15min)}$ during the day, with nature sounds becoming more dominant. At night, traffic noise was not present and measured sound levels ranged between 35-40 dB $L_{Aeq(15min)}$ with wind noise in vegetation being the main noise source. The 24h sound level is likely to range between 40-45 dB $L_{Aeq(24h)}$.
Manakau	In North Manakau, road-traffic noise from SH1 is audible as a distant rumble without specific character. Daytime sound levels were measured between 40-45 dB $L_{Aeq(15min)}$. Complex topography in places provides localised screening and 24 hour sound level is likely to range between 40-50 dB $L_{Aeq(24h)}$. NIMT will provide intermittent periods of elevated noise. The Western slopes of Manakau are exposed to traffic noise from SH1. Daily average sound levels are predicted between 50-55 dB $L_{Aeq(24h)}$ at the closest properties. Traffic noise is less prominent than nature sounds in the rural lifestyle Manakau Heights area to the south-east of Manakau village. In this area, traffic on SH1 is visible and audible from elevated locations such as Hanawera Ridge/Manakau Heights. In general, traffic is audible as a consistent hum, with no specific character. Sound levels in the area were measured between 40-50 dB $L_{Aeq(15min)}$ during the day and 35-45 dB $L_{Aeq(15min)}$ at night. The 24h sound level is likely to range between 45-50 dB $L_{Aeq(24h)}$.
North Ōtaki	Road-traffic noise from SH1 is a dominant noise source in this area with levels between 55-65 dB $L_{Aeq(24h)}$ for the closest dwellings. At locations more remote from SH1 (for example, Taylors Road), daytime levels are likely to be between 40-45 dB $L_{Aeq(15min)}$. It is noted that dwellings within Ōtaki (that is, south of Waitohu Valley Rd) will experience a substantial reduction in noise once the PP2Ō expressway is operational.

The majority of the Ō2NL Project area is remote from existing sources of vibration. Buildings within 30m of the existing state highways may experience vibration from traffic. The extent of vibration experienced varies based on distance from the road, the condition of the pavement and ground conditions.

9.4.5 Zoning, regional plan and district plan features

As noted above, the proposed Ō2NL Project designations are located within the Manawatū-Whanganui Region; the Wellington Region, the Horowhenua District and Kāpiti Coast District. Appendix Two sets out:

- the relevant operative Greater Wellington Regional Policy Statement ("Wellington RPS") provisions, and the relevant provisions of Plan Change 1 to the Wellington RPS.
- regional plan provisions included in the Appeals Version – Final 2022 of the PNRP;
- the relevant regional policy statement and regional plan provisions included in the operative One Plan;

- the relevant provisions in the operative KCDP, including the relevant planning maps;
- the relevant provisions in the operative HDP, including the relevant planning maps; and
- the provisions, including amended planning maps, as per PC4 to the HDP (under appeal).

Appendix One includes an assessment of the Ō2NL Project against the rules of the PNRP and One Plan, including the identification of activities, or aspects of the Project, that are permitted by these plans.

9.4.5.1 Horizons One Plan

The following sites have site/reach specific Schedule B values of ecological and water quality relevance in terms of the One Plan:

- Ohau River – Site of Significance-Aquatic ("SOS-A"), Trout Fishery ("TF"), Domestic Food Supply ("DFS");
- Waikawa Stream –SOS-A, Site of Significance-Riparian ("SOS-R"), DFS; and
- Kuku Stream, Manakau Stream, Waiauti Stream and 5 unnamed streams – DFS.

The Ō2NL Project traverses the following water management sub-zones:

- Mana_13e (Koputaroa Stream);
- Ohau_1b (Ohau River and Kuku Stream);
- West_9a and West_9b (Waikawa Stream and Manakau Stream); and
- Hoki_1a and Hoki_1b (Lake Horowhenua and Hokio Stream catchment)

9.4.5.2 GWRC Proposed Natural Resources Plan

The Waitohu catchment has the following PNRP values:

- Schedule F1 – rivers and lakes with significant indigenous biodiversity;
- Schedule F1 – threatened or at risk fish habitat; and
- Schedule F1 – migratory fish habitat.

9.4.5.3 Horowhenua District Plan

In Horowhenua District, with the exception of the Tara-Ika Growth Area, the proposed Ō2NL Project designation is primarily over land that is zoned 'Rural' in the HDP. Much of the rural land within the designation (particularly to the north) is also subject to a 'Versatile Land (LUC Class I & II Soil)' notation. At locations where the Project traverses streams and rivers, the HDP includes a 'Flood Hazard Area' notation.

Landscape Domains traversed by the Project are:

- Levin Koputaroa Domain
- Levin Ohau Domain
- Kuku Domain
- Manakau Downlands Domain
- Hill Country Domain

Existing designations relevant to the Ō2NL Project within the HDP are listed in Table 9-4 below:

Table 9-4 Horowhenua district plan designations traversed by the Ō2NL project

Map reference	Notation	Specifics
Planning map 7	Northern Section: Designation D1 (NIMT); D2 (SH1) Southern Section: Designation D4 (SH57)	Northern Section: Short section of Ō2NL route from SH1, over NIMT railway to just west/south of Sorenson Rd Southern Section: From just north of Queens St, through Tara-Ika development area, across Ohau River to south of Kuku East Rd
Planning map 8	Designation D4 (SH57)	Section of Ō2NL route from just west/south of Sorenson Rd, east to SH57, south to mid-way along Tara-Ika Greenbelt Residential Deferred
Planning map 10	Designation D2 (SH1)	Section of Ō2NL route from south of Kuku East Rd to HDC boundary south of Manakau
Planning map 25	Designation D1 (NIMT); D2 (SH1)	Small part of Ō2NL route in Planning Map 25 just west/south of Sorenson Rd.
Planning map 28	Designation D2 (SH1); D4 (SH57)	Small part of Ō2NL route in Planning Map 28 just north of Queen Street East
Planning map 29	Designation D1 (NIMT); D2 (SH1)	Tararua Rd & SH1 intersection – Rural Zone south of Tararua Rd/east of SH1; Industrial Zone north of Tararua Rd; west of SH1
Planning map 30	Greenbelt Residential Deferred Designation D4 (SH57)	Ō2NL route goes through the Tara-Ika development area
Planning map 32	Designation D4 (SH57)	Small part of Ō2NL route from just north of Tararua Rd (Tara-Ika development area, south towards Arapaepae Rd
Planning map 37	Designation D2 (SH1)	Small part of Ō2NL route from just north of Manakau North Rd to just south of South Manakau Rd

The Project traverses land that is zoned ‘Greenbelt Residential Deferred’ in the operative District Plan. The operative District Plan also includes Structure Plan 13 ‘Gladstone Greenbelt Levin - Queen Street / Tararua Road, being an area of land extending east from Arapaepae Road/SH57 and bounded by Queen Street East to the north and Tararua Road to the south. Structure Plan 13 includes a notation for ‘Transport Corridor (Future upgrades)’ which runs adjacent and parallel to the east of SH57 between Tararua Road and Queen Street East.

The Tara-Ika Growth Area covers the same area as the Greenbelt Residential Deferred / Structure Plan 13 and is subject to a plan change process (PC4). PC4 seeks to amend Planning Map 30 to apply a

'Residential Zone' over the Tara-Ika Growth Area and replaces Structure Plan 13 with a new Structure Plan that includes the 'Ō2NL Corridor' (which generally follows the proposed Ō2NL Project designation). PC4 was publicly notified in November 2020 and following a hearing process a decision made and adopted by HDC on 4 July 2022. This PC is now subject to various appeals that are being considered by the Environment Court.

9.4.5.4 Kāpiti Coast District Plan ("KCDP")

Within the comparatively short extent of the Project area within the Kāpiti Coast District, the Project solely traverses land that is in the Rural Production Zone, subject to the Rural Hills Precinct (PREC 24) and the Rural Plains Precinct (PREC 49).

Notable features on the Kāpiti Coast District Planning Maps (22) are:

- two ecological sites. Two small areas shown as 'ecological sites' but not however identified in Schedule 1 – Ecological Sites.
- Special Amenity Landscape (SAL 15 – Pukehou) described as a prominent outlier of the Tararuas on the northern edge of the District – located east/south of the Ō2NL route.

Designations relevant to the Ō2NL Project within the KCDP are listed in the Table 9-4 below:

Table 9-5 Kāpiti Coast District Plan designations traversed by the Ō2NL Project

Map reference	Notation	Specifics	Comment
Planning map 03 – designations & miscellaneous	Main roads (SH1) Designation (SH1) – NZTA-001	Small part of Ō2NL route just north of Otaki where it leaves current SH1 east of Taylors Road	No other notations.
Planning map 22 – designations & miscellaneous	Main roads (SH1) Designation (SH1) – NZTA-001	Covers the remainder of Ō2NL route from where it leaves current SH1 east of Taylors Road to the HDC boundary	Designation of existing SH1 ceases near South Manakau Rd.

9.4.6 Network utilities

In addition to the road transport network, that is described below, the following network utilities and infrastructure are located within or near the proposed designations:

- KiwiRail's NIMT (also discussed above);
- Electra Limited's Mangahao to Levin 33kV sub-transmission line, to the east; and
- a number of other utilities such as local water supply, wastewater, stormwater, telecommunications and electricity supply infrastructure. Utilities traversed by the Ō2NL Project are shown on the Utilities Plan provided in Volume III. More detail is provided in Part C.

9.5 Social

The Ō2NL Project traverses the eastern urban-rural periphery of northeast and east Levin; the eastern rural sector of Ohau and Kuku; the eastern rural sector of North Manakau; the eastern periphery of Manakau Village; the partially established development of Manakau Heights; and the northern rural section of Ōtaki. Outside of the townships of Levin, Ohau, Kuku and Manakau (described below), the area is characterised by farming, horticultural and lifestyle block land uses within which there are rural sub-communities.

9.5.1 Levin

Levin functions as the business, administrative, retail, civic, cultural, social and recreational hub for the surrounding area. These activities provide employment to a large number of people. Social infrastructure in Levin includes Te Takeretanga o Kura-hau-pō (Culture, Community Centre and Library), the Horowhenua Health Centre, two secondary schools and a number of primary and 'intermediate' education options. Figure 9-3 below shows key facilities and services in Levin.

Figure 9-3 - Key social facilities and services in Levin[18]

The community has access to a range of amenities such as parks, beaches and rivers, markets, sports clubs, horse riding facilities and open spaces throughout the town, including the Levin Adventure Park. There are many organised community groups for different sectors of the community, including religious groups, Age Concern and Keep Levin Beautiful.

9.5.2 Ohau and Kuku

Ohau is a village, semi-rural and rural community located directly south of Levin and north of the Ohau River clustered around SH1. The village includes a church, school and reserve, surrounded by low-density housing, equestrian stables and training facilities, which transitions to larger lifestyle lots and rural farms and a vineyard. There is limited commercial industry within Ohau.

Ohau School forms the focal point of the community and is actively utilised for community gatherings and events. The neighbouring Ohau Domain and Ohau Public Hall support a range of sporting and community

[18] HDC GIS 2018.

events. There are two marae located in the Ohau and Kuku communities namely Kikopiri Marae (located on Muhunoa West Road, 2.4km to the west of SH1) and Ngāti Tukorehe Marae (located on the eastern side of and adjacent to SH1).

Recently significant rural lifestyle development has occurred to the west, south east and east of Ohau on Muhunoa West and East Roads.

9.5.3 Manakau

Manakau is a small village, semi-rural and rural community located on SH1 approximately 13km from the centre of Levin and 7km from Ōtaki. The core residential area and most of the key community facilities, such as a church, hotel, school, bowling club and pub are located east of SH1, but a range of commercial facilities (store, diary, museum, market, bistro) and Manakau Domain (Manakau United FC / sports ground) are located west of SH1. Manakau School, along with the domain and hall are the main focal points for community activities.

Numerous rural lifestyle properties are located on the periphery of Manakau. Recently, significant rural lifestyle development has occurred to the south east of the village on Manakau Heights Drive, Eastern Rise and Mountain View Drive. The Manakau District Community Association was founded in 2012.

Ngāti Wehi Wehi Marae is located west and adjacent to SH1, slightly to the north of Manakau. To the east, there are camping facilities with the Waikawa Campsite (North Manakau Road), being part of a DOC reserve within the Tararua Forest Park.

PART C: DESCRIPTION OF THE PROJECT

10 Overview

Part C describes the approach to the development of the concept design (through the CEDF) and summarises the Project's physical design and operational aspects and provides a broad construction methodology, including:

- the design context and standards;
- the highway and roading elements and functions;
- significant structures;
- local road connections and intersections;
- walking and cycling facilities; and
- the anticipated physical works necessary to construct the Ō2NL Project.

These aspects are described in more detail in the Design and Construction Report (DCR), attached as Appendix Four, and shown on the drawings and plans in Volume III.

The following Project description provides the basis for the assessment of actual and potential effects of the Ō2NL Project on the environment. This description of the Project is indicative to the extent that it provides details that are sufficient to assess the actual and potential effects on the environment and to identify appropriate measures to avoid, remedy, mitigate, offset or compensate for adverse effects on the environment as and where appropriate to do so. Any numbers, areas or dimensions outlined in this section are approximate and may change as a result of detailed design and confirmation of the construction methods.

10.1 Cultural and environmental design framework

The CEDF[1] (attached at Appendix Three to this Volume), has been developed in collaboration with the Ō2NL Project Iwi Partners and provides the following design kaupapa tumu / principles:

Tread lightly, with the whenua

- Me tangata te whenua (treat the land as a person)
- Kia māori te whenua (let it be its natural self)

Create an enduring legacy

- Kia māori te whakairo (normalise māori values)
- Me noho tangata whenua ngā mātāpono (embed the principles in all things)
- Tū ai te tangata, tū ai te whenua, tū ai tew ai (elevate the status of the people, land and water.

[1] The CEDF is consistent with the form and content of a preliminary Urban and Landscape Design Framework prepared in accordance with the Waka Kotahi Urban Design Guidelines (https://www.nzta.govt.nz/resources/bridging-the-gap/) and Landscape Guidelines (https://www.nzta.govt.nz/resources/nzta-landscape-guidelines/).

These design kaupapa tumu / principles have informed the Concept Design and will guide the detailed design of the Project and its elements (including the outcomes sought for all streams, stormwater and planting) and highway elements (all structures, earthworks, local connections, the shared use path, etc). Te ao māori, mātauranga māori and te mana o te wai are at the centre of the CEDF. The overarching purpose of the CEDF is to integrate these design elements in response to the context and the design kaupapa tumu / principles.

The detailed design of the Ō2NL Project will be completed in accordance with the kaupapa tumu / principles in the CEDF, once the designations have been confirmed and all necessary resource consents have been granted. The detailed design will be undertaken within the scope of the proposed designations and within the parameters established by conditions of the designations and resource consents that embed measures to avoid, remedy, mitigate, offset or compensate for adverse effects on the environment.

The development of the design will be informed and shaped by ongoing engagement and collaboration with the Project Iwi Partners. This collaboration has, and will continue to, provided an understanding of tangata whenua relationships with the land, water, sites, wāhi tapu, and other taonga and associated cultural values. A Design Audit process forms a part of the CEDF and will be used regularly as the design of the Project develops to assess and guide the ongoing development process, to ensure that these relationships and values are embedded in the design of the Project.

The Design Audit process will continue through the construction period to inform design issues that arise during construction period and also to embed the CEDF in the Project's construction, operation and ongoing maintenance processes. The process is shown in the figure below.

11 Summary of the key features of the Ō2NL Project

The Ō2NL Project involves the construction, operation, use, maintenance and improvement of approximately 24 kilometres of new four-lane median divided state highway (two lanes in each direction) and a shared use path (SUP) between Taylors Road, Ōtaki (and the Peka Peka to Ōtaki expressway (PP2Ō) and State Highway 1 (SH1) north of Levin. The Ō2NL Project includes the following key features:

- a grade separated diamond interchange at Tararua Road, providing access into Levin;
- two dual lane roundabouts located where Ō2NL crosses State Highway 57 (SH57) and where it connects with the current SH1 at Heatherlea East Road, north of Levin;
- four lane bridges over the Waiauti, Waikawa and Kuku Streams, the Ohau River and the North Island Main Trunk (NIMT) rail line north of Levin;
- a half interchange with southbound ramps near Taylors Road and the new PP2Ō expressway to provide access from the current SH1 for traffic heading south from Manakau or heading north from Wellington, as well as providing an alternate access to Ōtaki.
- local road underpasses at South Manakau Road and Sorenson Road to retain local connections;
- local road overpasses to provide continued local road connectivity at Manakau Heights Drive, North Manakau Road, Kuku East Road, Muhunoa East Road, Tararua Road (as part of the interchange), and Queen Street East;
- new local roads at Kuku East Road and Manakau Heights Road to provide access to properties located to the east of the Ō2NL Project;
- local road reconnections connecting:
  - McLeavey Road to Arapaepae South Road on the west side of the Ō2NL Project;
  - Arapaepae South Road, Kimberley Road and Tararua Road on the east side of the Ō2NL Project;
  - Waihou Road to McDonald Road to Arapaepae Road/SH57;
  - Koputaroa Road to Heatherlea East Road and providing access to the new northern roundabout;

- the relocation of, and improvement of, the Tararua Road and current SH1 intersection, including the introduction of traffic signals and a crossing of the NIMT railway line;
- road lighting at conflict points, that is, where traffic can enter or exit the highway;
- signs, including gantries, as required;
- median and edge barriers that are typically wire rope safety barriers with alternative barrier types used in some locations, such as bridges that require rigid barriers or for the reduction of road traffic noise;
- stormwater treatment wetlands and ponds, stormwater swales, drains and sediment traps;
- culverts to reconnect streams crossed by the Ō2NL Project and stream diversions to recreate and reconnect streams;
- a separated (typically) three metre wide SUP, for walking and cycling along the entire length of the new highway (but deviating away from being alongside the Ō2NL Project around Pukehou (near Ōtaki)) that will link into shared path facilities that are part of the PP2Ō expressway (and further afield to the Mackays to Peka Peka expressway SUP);
- spoil sites at various locations along the length of the Project; and
- five sites for the supply of bulk fill /earth material located near Waikawa Stream, the Ohau River and south of Heatherlea East Road.

12 Design context and standards

This section summarises the engineering design principles and standards that have been used to develop the concept design of the Ō2NL Project. These principles and standards, together with the CEDF, will underpin the ongoing design development of the Ō2NL Project. The transport component of the proposed works implement the NZ Government Road Safety Strategy and Safe System Approach[2], being a standard which is able to accommodate high speeds safely.

12.1 Geometric design

The indicative geometric layout for the Ō2NL Project is shown on the general arrangement plans included in the drawings and plans in Volume III. The layout has been developed using Waka Kotahi design standards and guidelines, along with the Austroads suite of road design guidelines[3]. Amongst other matters, the design standards and guidelines set the appropriate (and often minimum) values of the parameters for the vertical and horizonal alignment that should be achieved. Notwithstanding, departures from standards in some instances may be necessary, unavoidable and/or appropriate, provided levels of safety and functionality are retained.

The design standards, guidelines and road design parameters for the Project are further described in the DCR attached as Appendix Four.

12.2 Typical cross sections and lane widths

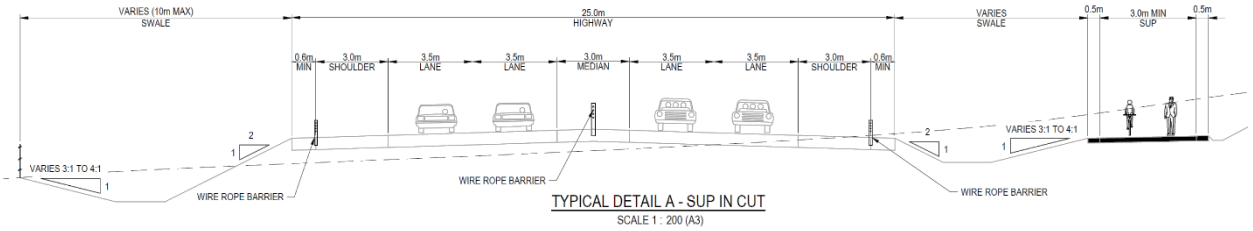
The road carriageway layout generally includes a four-lane (two lanes in each direction), median divided highway comprising:

[2] A whole of system approach to road safety that recognises people make mistakes and a systematic response is required that includes safe roads and roadsides, safe speeds, safe road user behaviour and safer vehicles. https://www.nzta.govt.nz/assets/resources/safe-system/docs/safe-system.pdf
[3] For instance, the Austroads Guide to Road Design Part 3 - Geometric Design, TM-2501 and the State Highway Geometric Design Manual (Draft).

- 3.5m wide traffic lanes (generally, noting that lane widths may be greater on curves and where traffic merges, including leading into a roundabout);
- 3.0m minimum outside shoulders to face of edge barriers (2-2.5m minimum sealed);
- A central median with a minimum width of 4.0m between edge lines (providing for 1.7m median shoulders for a rigid barrier, or 2.0m median shoulders if the preferred wire rope median is adopted); and
- Widening of the outside shoulders and median shoulders where necessary for sight distance past barriers in sharp radius curves.

The carriageway layout is shown on the typical cross section in Figure 12-1 below. Typically, the hard surface /road element of the project is 25 metres in width (varying depending on curvature of if on a bridge structure).

Figure 12-1 Typical cross section



12.2.1 Design Speed and Design Vehicle

A design speed of 110km/h has been adopted for the main alignment and 80km/h for interchange ramps. The design speed on the main alignment allows for overtaking and matches the design speed of PP2Ō and SH1 to the south.

The local road connections will be designed using a case-by-case approach (in consultation with HDC and KCDC as the relevant local road controlling authorities) targeted at producing a safe and appropriate local road network.

The 'design vehicle' for the main alignment is an 18-metre-long quad rear axle semi-trailer[4], as this provides a worst case in terms of tracking paths. Over dimensional vehicles of up to 10.0m wide and 6.0m high per carriageway are also provided for.

12.3 Intersections and interchanges

The ramps that form part of the grade-separated interchanges at Tararua Road (east of Levin) and Taylors Road (north of Ōtaki) will be designed to comply with Austroads Guide to Road Design Part 4C – Interchanges.

All priority-controlled intersections will be designed to meet the requirements for stopping sight distance (SSD), safe intersection sight distance (SISD), approach sight distance (ASD) and, where possible, minimum gap sight distance (MGSD).

12.4 Pavements and surfacing

Pavement design will be based on the requirements of Austroads, Pavement Design – A Guide to Structural Design of Road Pavement 2004 (and New Zealand supplement dated 2007). The final surfacing of the highway is subject to ground conditions and detailed design but is anticipated to be epoxy modified

[4] https://www.nzta.govt.nz/assets/resources/road-traffic-standards/docs/rts-18.pdf

open graded porous asphalt (OGPA) or similar in terms of road operational noise performance properties. The highway roundabout surfacing will be stone mastic asphalt.

OGPA surfacing is generally laid on a chipseal membrane layer typically after a period of 12 months subsequent to the laying of the chipseal membrane. This is to ensure full embedment of stone chips, and settlement of earthworks is achieved prior to laying OGPA, to promote the noise performance function of the OPGA surfacing. During this interim period the road is installed with all the necessary traffic services, including signs and road markings and the road is fully operational.

New local roads will be chip seal surfacing (to match adjacent local road network), but this will be discussed with the local road controlling authority.

12.5 Lighting, signs and road markings

Lighting will be provided at traffic conflict points which include interchanges, on/off ramps, roundabouts and lane merges/diverges. Full highway standard lighting will be provided at:

- Taylors Road half interchange
- Tararua interchange
- SH57 / new highway roundabout
- New highway / Heatherlea East Road / SH1 roundabout

Road lighting will meet the Waka Kotahi M30 Specification for Road Lighting and AS/NZS 1158. LED lighting will be used (consistent with the M30 Specification[5]) and which delivers good standards of directional lighting with limited horizontal and upward light spill (10 lux horizontal or vertical within property boundaries, and upward waste light ratio (sky glow) below 1% of the total light output).

Signs and road markings will be in accordance with Manual of Traffic Signs and Markings and the Traffic Control Device Manual requirements.

Lower levels of lighting will also be provided on the SUP in specific locations such as where the SUP crosses local roads, sections identified through CPTED assessments or identified key conflict points.

12.6 Longitudinal stormwater management

The design philosophy for stormwater management is:

- maximise drainage opportunities through vegetated open channels.
- provide attenuation basins and throttled outlet discharges to reduce peak discharge from the Project alignment into the receiving environment to be equal to, or less than, pre-development flow rates.
- provide a treatment train stormwater approach over each section of the Project with road runoff to pass through some or all of the following before leaving the Project alignment: planted slopes, vegetated swales, sediment forebays, and constructed wetlands. These facilities will maximise the capture and management of waterborne contaminants and sediments from the highway surface within the Project designation prior to ultimately entering the receiving environment.
- provide water sensitive design elements that slow the speed of runoff drainage to maximise opportunities for returning water to the ground (such as treatment swales with shallow gradients and wide bases, constructed wetlands with long detention times, and attenuation basins with ground soakage fields where soils are favourable to long-term soakage performance).
- provide erosion protection measures between the Project outlets and the receiving environment (such as rock lined and planted pools and riffles, and reduced stream gradients along with wider flow cross sections to slow stream velocity and energy) to manage potential scour effects of the Project on stream beds and banks.

[5] https://www.nzta.govt.nz/assets/resources/specification-and-guidelines-for-road-lighting-design/docs/m30-road-lighting-design.pdf

12.6.1 Stormwater capture, conveyance and discharge

The project stormwater run-off collection and conveyance system (including cross drainage of overland flows and streams) will be designed to manage up to a 1:100 annual exceedance probability (AEP) event at 2130, allowing for climate change[6], with the initial surface and collection systems designed to accommodate a 10-minute duration storm event.

The Ō2NL Project stormwater system has been designed to not mix catchments overall, although due to topography and geometric requirements of the road, there are minor adjustments to smaller sub-catchments.

12.6.2 Stormwater treatment

The proposed stormwater management facilities remove and capture contaminants from road runoff and contain the contaminant accumulations within the Ō2NL Project footprint where it can be maintained over the design life. This manages and practicably minimises accumulated contaminants spreading into the receiving environment.

The containment of accumulated contaminants in swales, constructed wetlands and basins within the footprint of the Ō2NL Project allows monitoring and consequent maintenance efforts to be realistically specified for defined areas. Future renewal of treatment components can also then be programmed on the basis of the information gained from monitoring and identifying performance trends over time.

12.7 Transverse drainage

12.7.1 Bridges

Bridges are the preferred solution for crossing the Ohau River, Kuku Stream, Waikawa Stream, Manakau Stream and Waiauti Stream (the Manakau being a combined bridge over the stream and local road), as they minimize hydraulic impacts and provide uninhibited fish passage. The design of the bridges has been informed by:

- a freeboard of at least 0.6m has been set between the soffit of the bridge and the 1:100 AEP event with climate change (RCP6.0 to 2130);
- for the Ohau River and Waikawa Stream, additional width has been provided to allow for some meandering of the river within the natural floodplain. End abutments for these two bridges are spill-through abutments with hard landscaping (rip-rap) embedded to prevent scour around the foundations;
- all other stream bridges are proposed to have 90-degree wing walls, with space for buried scour protection around the abutments and through the throat of the bridge to provide for the passage of natural sediment substrate movement, and minimise impacts on fish and on the passage of flood debris; and
- in the case of the Manakau and Waiauti streams, minor stream realignments are proposed to provide a stationary long term bridge location for these smaller meandering watercourses.

12.7.2 Culverts and stream diversions

Culverts are proposed to convey streams / water courses and overland flow paths across the Project. Culverts are sized into retain near-normal stream flow conditions during low to medium flows (avoiding surcharge up to 1:10 AEP) and allow surcharging in major storm events. Culverts are generally designed to meet the minimum hydraulic capacity and fish passage requirements and other functions of culverts in accordance with Regulations 70 and 71 of the NES-FM, including:

[6] Rainfall adjustment factors for future climate are based on the HIRDS v4 report (derived from IPCC 5th assessment) for a medium-high Representative Concentration Pathway (RCP) 6.0 emissions scenario.

- continuity of geomorphic processes (such as the movement of sediment and debris) from one side of the highway to the other;
- provision of fish passage;
- energy dissipation and scour protection downstream as required, without hindering fish passage; and
- culverts are embedded by 25% of their height and backfilled with substrate (void-filled) to maintain continuity of sediment transport and fish passage.

Due to the existing topography of the proposed corridor, it is necessary to construct stream diversions in order to maintain ecological connectivity. While culvert lengths are generally kept as short as practicable (as culverts detract from habitat diversity compared to open channel), in some instances this can cause further loss of stream channel and increased velocities due to gradient. Hence a balanced approach is required to design, to consider overall performance of water courses.

As per the tables in drawings 310203848-01-C3000 (Rev D) and 310203848-01-C3001 (Rev A), the concept design includes 21 culverted streams all of which provide for fish passage, and 58 overland flow paths, 4 of which provide for fish passage (reference numbers 5, 7, 41, and 42).

12.8 Utilities to be relocated

The Utilities Plans (provided in Volume III) show the existing utilities in relation to the Ō2NL Project. The design and timing of reconnection of utilities effected by the Ō2NL Project will be discussed and developed in consultation with the utility owners.

Utility companies which will be impacted by the Ō2NL Project and consulted with during detailed design include the following:

- Greater Wellington Regional Council (Datum and Stormwater)
- Land Information New Zealand (Datum)
- Electra (Power)
- Vocus (Telecom)
- Chorus (Telecom)
- PowerCo (Gas)
- Spark (Telecom)
- Horowhenua District Council (3 waters)
- Kāpiti Coast District Council (2 waters)

12.9 Shared use path (SUP)

The O2NL Project incorporates a SUP along the length of the proposed highway (though not strictly following alignment itself) to provide connections between communities for recreational and commuter use. It will generally lie on the western side of the highway, and will interface with local roads and footpaths where possible. The SUP is designed with reference to the Waka Kotahi Cycle Network Guidance (CNG)7 and Pedestrian Planning Guide (PPG)[8] and the Austroads Guides for walking and cycling[9].

As detailed further in Section 3.6 of the DCR (Appendix Four), the SUP is expected to be sealed for its full extent to ensure ride quality and reduce maintenance requirements. The surfaced width will generally be a minimum of 3.0 m, plus a 0.5 m buffer strip that is flat and free of all hazards and obstructions (including

[7] Designing a cycling facility | Waka Kotahi NZ Transport Agency (nzta.govt.nz)
[8] Pedestrian planning and design guide | Waka Kotahi NZ Transport Agency (nzta.govt.nz)
[9] 13 AGRD06A-17 | Austroads

vegetation) on both sides of the path. The buffer strip may be paved or surfaced with concrete, asphalt, or gravel, or it can be an extension of the path surfacing and demarcated with a different colour or with a white line where necessary. The SUP may be narrower when on bridges.

The location of the SUP is shown on the General Arrangements drawings (310203848-01-100-C1000 to 310203848-01-100-C1017 (Rev H)).

12.10 Planting and landscaping

Planting concept plans are provided in Volume III and indicate how the current concept design could be integrated into the landscape in accordance with *ki uta ki tai* principles. The concept plans show:

- **indicative typology** – providing detail of the types of planting that could be delivered. A planting species palette for each type is provided in the CEDF (pages 72 – 75)
- **RMA purpose type** – differentiates between planting needed for terrestrial ecology and freshwater mitigation and offset purposes, and for landscape and visual planting, including natural character planting.

The design and location of planting implemented will be determined as part of the design development process and through the Ecology Management Plan. Specifically:

- the plans include more terrestrial offset planting area than is required by the current concept design;
- the proposed natural character planting is subject to landowner agreement;
- freshwater offset planting is subject to landowner agreement;
- wetland rehabilitation work proposed on the Koputaroa Stream is subject to landowner and DOC agreement;
- material supply site rehabilitation will be subject to landowner agreements and the extent to which the material supply sites are used (if at all);
- tree avenue planting shown on existing local roads is subject to road controlling authority agreement and space being available; and
- the location and scale of rehabilitation and restoration planting will depend on re-evaluation of the landscape and visual effects of the final design.

13 Existing state highways

The Ō2NL Project will become the new SH1 and will replace the existing SH1 and that part of the existing SH57 along Arapaepae Road.

Once the Ō2NL Project has been constructed and opened, the existing SH1 and SH57 will function as local roads, providing access for communities to various amenities and uses in the district as well as to the new highway. The existing state highways will also be an alternative route for resilience. Waka Kotahi is likely to request that the Minister of Transport revokes these sections of parallel state highway in accordance with section 103 of the LTMA. The decision on this request is made by the Minister of Transport and subject to entirely separate processes that includes ongoing discussions with HDC and KCDC.

Modifications to the existing SH1 and SH57 are likely to be needed and the design of these modifications will be developed in consultation with the relevant road controlling authorities as well as with iwi partners, stakeholders and local communities.

14 Project construction

The following provides a broad overview of the construction methodology and indicative construction programme for the Ō2NL Project. This information should be read alongside the kuapapa tumu /principles and values provided in the CEDF (attached as Appendix 3).

This information is provided with sufficient detail to assess the potential effects of construction activities on the environment and to identify any measures to avoid, remedy, mitigate, offset or compensate for those adverse effects. Precise construction methodologies and details may change as the design is developed.

14.1 Construction considerations

14.1.1 Management plan framework and Construction Environmental Management Plan

Construction activities, and the actual and potential effects of these activities, will be managed through the implementation of a suite of management plans including a Construction Environmental Management Plan (CEMP) that will include health and safety management and quality assurance plans and processes. The CEMP, in particular, is integral to appropriately addressing effects of the construction of the Ō2NL Project on the environment. The content of management plans, including the means by which they are embedded in conditions of the designations and resource consents, is described in Part H.

14.1.2 Construction methodology parameters

The construction methodology for the Ō2NL Project is influenced by many factors including:

- the location and extent of construction compounds, laydown areas, site accesses and haul routes;
- the location of construction activities relative to sensitive environments or land uses;
- construction water availability;
- approaches to works in, and in the vicinity of, waterways;
- seasonal weather, including storm and flood risks associated with works in waterways and the flood plain;
- conditions imposed on the designations and resource consents (including the associated management plans);
- Waka Kotahi construction guidelines and standards; and
- availability of resources, timing and target completion date.

Where appropriate, Waka Kotahi seeks a degree of flexibility in construction methods to accommodate these factors and to provide further opportunities to enhance efficiency and value and/or reduce the impacts of, and/or duration of, and adverse effects of construction.

14.1.3 Detailed design and construction procurement

The Waka Kotahi Taumata Taiao[10] guides project teams through the process and requirements that give effect to Waka Kotahi environmental and sustainability policies, other strategic objectives, outcomes and legal requirements during the life cycle of infrastructure delivery including maintenance and operations. The guide provides a framework for integrating environmental, sustainability and social commitments into all phases of projects, including the development of detailed design and procurement of construction contractors.

As part of the procurement of contractors for the next phase of the Project, any 'Request for Proposal' documentation for the Ō2NL Project will include Waka Kotahi policies and guides as well as the conditions

[10] https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Environment-and-social-responsibility/Standards-and-guidelines/Z19-Taumata-Taiao-Environmental-and-Sustainability-Standard.pdf

imposed on the designations and resource consents to ensure that the requirements of these conditions are reflected in the detailed design and construction management documentation and practices.

14.2 Indicative construction programme

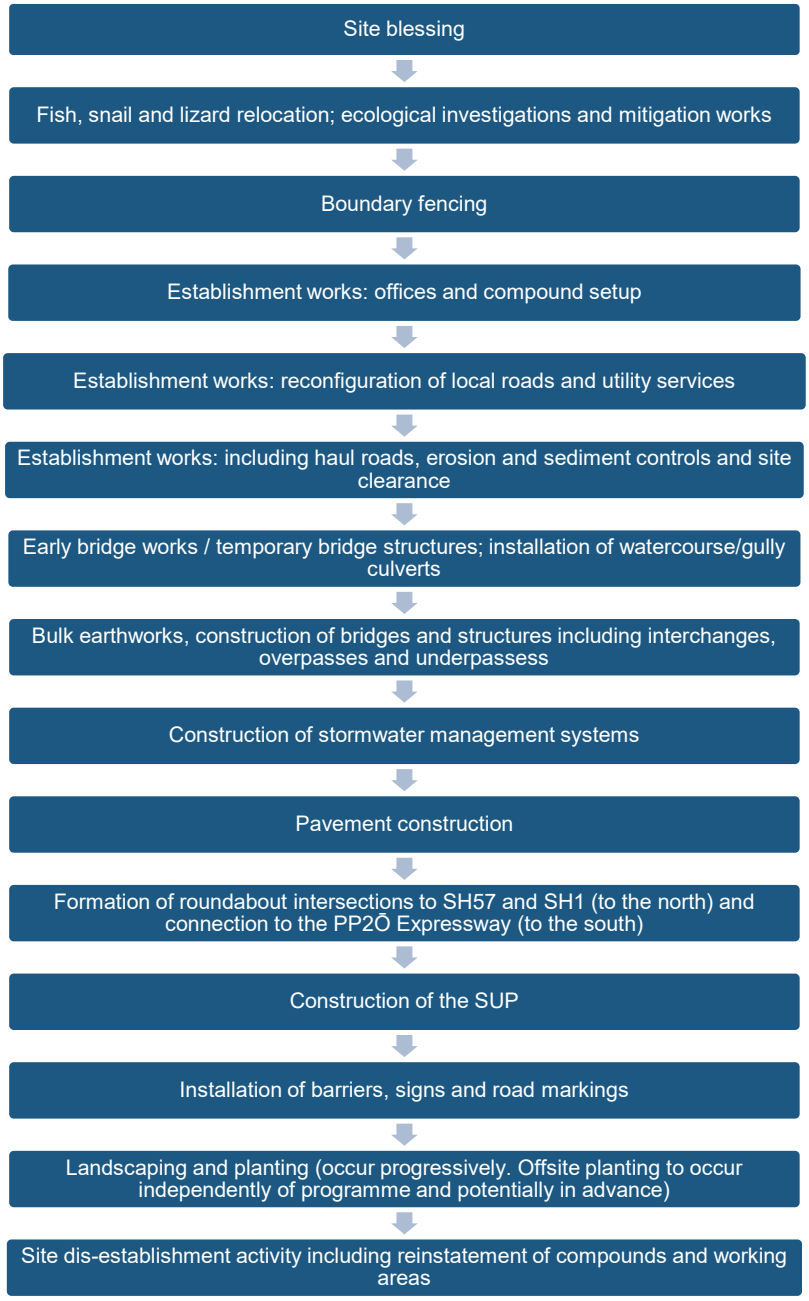
Site establishment and enabling activities (early construction activities) are planned to commence from mid-2024 in preparation of main works construction commencing in 2025. The target date for opening the new road is by the end of 2029.

To achieve the opening date, many elements of the Ō2NL Project are likely to need to be undertaken concurrently during the construction period, including the completion of works in sections. That is, the construction sequence will generally be adhered to for each section. The construction works are likely to be undertaken in the general sequence set out in the figure below.

The construction programme is based on working hours between 7am and 6pm. Activities outside of these times may be required to minimise disruption and provide additional safety (e.g. night works for that interface with the current state highway network or NIMT, road closures at roundabout tie-ins to the local roading network). In addition, extended working times between 5am and 10pm resulting in double shifts may also be needed to achieve the construction programme dates and / or critical path items.

While there are some dependencies between construction elements, the specific staging of the work is subject to land acquisition, the availability of construction contractors and resources (such as materials and construction equipment).

Figure 14-1 – Possible construction sequence



14.3 Establishment works

Site establishment activities will be required prior to the commencement of bulk earthworks and may include:

- site-wide geotechnical investigations (including material re-use testing and earthwork methodology trials);
- topographical surveys;
- ecological, cultural, archaeological and heritage surveys/ baseline monitoring, exploration and assessments including relocation and stabilisation activities;
- contaminated land testing;

- relocation of accesses to properties;
- protection and relocation of utilities;
- formation of site access and haul roads, including temporary stream crossings;
- development of construction access tracks and / or reconfiguration of existing access tracks, and development of the construction yards and main site offices including site compounds and laydown areas;
- works associated with the abstraction of water needed to construct the Project and associated reservoirs (for storage);
- property fencing and demarcation of areas where construction activities will not occur;
- installation of erosion and sediment control measures associated with establishment works;
- clearance of vegetation associated with establishment works (and clearing buildings and other features including relocation of wildlife); and
- management plan production.

14.3.1 Site investigations

It is possible that further site investigation work will be required to inform and support the detailed design. This work may include, but is not limited to:

- geotechnical investigations, comprising of intrusive investigations and surface-based geophysics;
- additional topographical survey;
- ecological, archaeological and heritage surveys, assessments including relocation activities;
- material re-use testing and site laydown trials of materials; or
- preloading trials.

14.3.2 Site compounds and laydown areas

Construction site compounds will be required at a number of locations that are convenient for each main work area and are identified on the Accommodation Plans included in Volume III. Site compounds will typically include the following temporary facilities:

- site offices, lunch rooms and bathroom/toilet facilities (including portable toilets) (including associated temporary power, telecommunication/fibre connections and water supplies);
- refuse and recycling facilities;
- laydown areas and secure storage containers;
- vehicle parking, refuelling, wheel cleaning and other cleaning facilities;
- facilities for fabrication and pre-casting products such as headwalls;
- geotechnical laboratory facilities for materials storing, testing and design validation;
- plant and equipment storage, including plant and vehicle repair and refuelling facilities;
- site testing facilities and possible nursery areas for landscaping; and
- compounds will be designed to include site-specific stormwater management, treatment and disposal.

14.3.3 Site access track and haul roads

In addition to accommodating the site compounds and laydown areas, the area subject to the notices of requirement includes sufficient area to accommodate an access track and haul roads that is needed to enable construction is to be provided along the full length of the Ō2NL Project. Waterway crossings

associated with the construction of the haul road and access track is described below. Temporary works and the specific methods for access to, and within, the site will be confirmed following the completion of detailed design and in conjunction with the construction contractor.

14.4 Construction activities

14.4.1 Earthworks

Earthworks (including at material supply sites) will typically involve the following activities:

- topsoil stripping and associated establishment of stockpiles;
- installation of permanent and temporary drainage systems;
- the establishment of spoil disposal sites;
- cut and fill activities including embankment construction and materials removed from cuttings; and
- landscaping and site reinstatement.

The Ō2NL Project will generate approximately 4,000,000m^3 to 5,000,000m^3 of excavated (cut) material (excluding topsoil). Approximately 3,000,000m^3 to 4,000,000m^3 of this cut material will be placed as structural fill for embankments along the proposed Ō2NL route.

14.4.1.1 Excess material and topsoil

Excess cut material (cut material that is not used for structural fill) will likely be reused within the site in the first instance (including being used to flatten batter slopes or in landscape areas adjacent to structural embankments), then disposed of in spoil sites. The establishment of spoil or landscaping sites at regular intervals along the route will reduce haulage distances and avoid the requirement to haul material off site for disposal.

Approximately 800,000 to 1,200,000m^3 of topsoil will be stripped and stockpiled for re-use within the site or removed to spoil site where opportunities for reuse are not available. Potential spoil sites may be used for the stockpiling or permanent placement of topsoil. In general topsoil will be reused on site for landscaping.

Spoil sites will be contoured, landscaped, and vegetated as construction work is completed.

Suitable erosion and sediment control measures will be installed at the spoil sites and wet materials will be placed behind bunds and/or silt fences to minimise the discharge of sediment. Where overland flow paths are located within the footprint of spoil sites, subsoil drains will be installed below fill material as practicable and subject to final design requirements

14.4.1.2 Cut slopes

Where cut slopes are required (including at material supply sites), material will be excavated mechanically from cut faces and loaded directly onto dump trucks, or other equipment, for transport for immediate use as structural fill; to stockpiles or to waste sites. Motor scrapers may also be used in cuttings where ground conditions require unsuitable overburden to be removed or for cut to fill operations. Groundwater flows or seepage from cut faces will be monitored and appropriate control measures installed as required.

14.4.1.3 Fill embankments

Earth fill must provide the required level and platform for the construction of the road and associated road features such as longitudinal drainage and the SUP. Filling will be carried out as follows:

- remove topsoil and any other unsuitable material;
- diversion of watercourses, where required, and the installation of temporary or permanent culverts, and
- the placement of fill to the level required for access, road pavement or embankment construction.

14.4.1.4 Material supply sites

The current concept design has a net cut fill deficit of up to approximately 2,500,000m^3. The shortfall has arisen due to a number of factors, including:

- site topography;
- the need to stay above flood levels;
- the desirability to reduce cuts in locations to avoid intersecting groundwater, manage potential cultural and landscape effects;
- bridging streams;
- to allow local roads to be built across (and over) the Ō2NL Project; and
- some cut material is unlikely to be able to be used as structural fill.

A study of potential material supply sources is provided in Appendix 4.5 of the DCR (in Volume II) and following assessment of material supply site options, five sites have been identified and are shown on the General Arrangement Plans in Volume III (310203848-01-100-C1000 to 310203848-01-100-C1017, Rev H).

The preferred sites are located on either side of the main water courses of Ohau River and the Waikawa Stream to help avoid needing to use local road network and mindful of overall cut fill balance, i.e. locating sites close to where material is needed to manage / reduce overall mass haul. Sites have been selected taking into consideration a range of environmental factors, including avoiding effects on ecologically sensitive areas and water courses, and with careful consideration of how the site can be integrated into the landscape and, following rehabilitation deliver a positive legacy outcome.

As part of the next phase of detailed design, the overall earthwork requirements of the Project will be developed and determine the extent to which the material supply sites need to be used. Indicative legacy outcomes for each of the material supply sites are shown in the CEDF and include the opportunity to create new open water habitat (in the material supply site located to the north of the Ohau River) and to provide new community access to the south bank of the Waikawa Stream from North Manakau Road and integrated with the proposed SUP.

14.4.1.5 Imported material

Imported hard fill material required for establishment of site compounds and haul roads will likely be sourced from quarries located as close to the site as is practical. Opportunities to supply that material from within site will be explored, with further future consent applications to authorise those opportunities being sought as necessary.

14.4.2 Temporary river and waterway crossings

The construction of the Project requires construction of haul roads and a separate access track the length of the Project. This will allow for the safe movement of all vehicles along the construction footprint.

Where the haul road and access track need to cross a water course then either culverts will be installed or for larger water courses and where practicable temporary bridges will be constructed:

- **permanent culverts:** where practicable culverts will be installed as per the detailed design requirements i.e. the permanent culverts as envisaged for the new highway will be installed;
- **temporary culverts:** in most instances it will be necessary to install temporary culverts to allow earthworks to occur that in turn allow the permanent larger culverts to be formed/ placed consistent with the final design. Temporary culverts will be designed to maintain and not impede fish passage through the temporary structure, unless the culvert is only intended to be used for a very short duration outside of spawning season, or if there is no upstream fish habitat.

  Temporary culverts will sized using a risk based approach where typically temporary culverts are designed to accommodate a 1:10 AEP storm event. Where culverts are only needed for short periods of time e.g. six months or a year then lower specifications would be appropriate. Temporary culvert

lengths will vary by location but are expected to be on average approximately 15m long to allow for a 10m wide haul road;

- **temporary bridges:** where practicable temporary bridges may be used. They will vary in length and typically be overtopped in a 1:5 AEP storm event.

14.4.3 Stream works: diversions and culverts

The construction of permanent stream diversions and culverts will be required to maintain existing flow paths and for the proposed stormwater design. Construction works will take place 'in the dry' and 'offline', i.e. with flows diverted around the works site.

- **stream diversions** – the new channel will be constructed and stabilised with geotextile lining and rip rap. Flows from the original channel can then be diverted into the new channel. The existing channel is then isolated, defished and dewatered to the newly constructed diverted stream channel.
- **culverts in line with stream** – where proposed culverts are aligned with the stream, then a temporary diversion is constructed and the original stream de-fished, de-watered, mucked out and a culvert placed in its final position. The stream is then re-diverted back through the culvert.
- **culverts off-line from stream** – culvert constructed off line and stream diversion channel constructed to connect to the current stream channel. Current stream channel diverted into the new channel and culvert, which is then de-fished and de-watered into the stream.

In all instances works will be undertaken with the project ecologist and in collaboration with iwi partners.

Dewatering may be via a sediment control device then into the stream. The original channel will be cleaned out, with material suitable for re-use in future stream diversions retained for that purpose. Redundant section of the original channel will then be filled in and compacted as described for earthworks.

14.4.4 Bridge structures

Typically bridge construction works will progress once an all-weather access track has been constructed to the bridge site. Bridge construction typically comprises the following activities:

- site set up (laydown areas, site facilities, ESC)
- undertake pile construction;
- construct abutments, settlement slabs and associated retaining walls;
- fabricate precast beams (usually off site);
- lifting and placing of precast bridge beams;
- completion of deck works including final surface and barriers;
- placement of fill behind retaining walls and abutments will be completed progressively;
- placement of scour protection.

14.4.4.1 Temporary bridges / staging

For the larger bridge structures (over the Ohau River and Waikawa Stream), early temporary crossings may be required in order to expedite the earthworks critical path. Temporary bridges will provide:

- access for efficient bridge construction on either river bank; and
- temporary staging from which construction materials may be lifted into place by crane.

Temporary bridges would not interrupt the main channel flow.

14.4.5 Pavement and surfacing

Pavement will be progressively constructed as sections of earthworks and drainage installation are completed. It is likely that pavement will be constructed to sub-base level immediately following the

completion of earthworks to protect the subgrade and minimise dust. Basecourse layers and seal will then be placed to complete the road structure.

As described above, the top layer of the pavement, OGPA, will be installed typically after a period of 12 months after road opening. The initial year allows traffic to compact and stabilize the layer prior to the application of OGPA, which is a process that helps ensure the performance of the OGPA.

Sources for pavement and surfacing materials and bitumen will be determined by the constructor. This could be via existing quarries in the region such as at Ōtaki, Bulls, Palmerston North or Taihape. Opportunities to source and use materials from within the designation or to establish a new quarry facility, will be determined at a later date and will be subject to separate consenting processes.

14.4.6 Night works

Construction activities will generally occur during daytime hours. Night work is likely to be necessary for the following activities in order to minimise disruption and/or to complete particular elements:

- completion of tie-in of existing local roads;
- works within the NIMT rail corridor;
- delivery of overweight or over dimension equipment or materials; and
- bridge and structure construction, particularly in respect of concrete pours.

14.4.7 Winter works

Construction activity will occur year-round including through the winter. It is likely that it will desirable for this work to include winter earthworks. Work is proposed to be undertaken through the winter period in situations where:

- the earthworks are explicitly described and managed as a winter works by a site-specific erosion and sediment control plan; or
- the works do not require erosion and sediment control; or
- the works are necessary maintenance works or are for the purposes of stabilisation.

14.4.8 Water for construction activities

Water will be required for a number of construction activities, including:

- dust suppression;
- moisture conditioning for engineered fill construction or ground improvement (including lime or cement stabilisation);
- pavement aggregate moisture content control during compaction;
- concrete placement and curing;
- pile driving and pile stabilisation;
- irrigation for landscaping to establish a vegetation cover;
- potable water at site offices; and
- vehicle tyre cleaning to minimise the tracking of any sediment on to roads.

Water demand for the Project is estimated to be on average 2,350m^3/day, with a peak maximum daily demand of 3,900m^3/day during construction. The amount of water needed is much smaller at the start of construction and the requirement increases over the construction period.

14.4.8.1 Sources of water and storage

Construction water will be sourced from existing watercourses, including the Ohau River and Koputaroa, Waikawa, Manakau and Waiauti Streams. If necessary, such as during extended periods of low river

flows, water may also be brought to the site by truck. While existing bores may be used as a source of water, these are subject to separate processes including property negotiation processes and securing rights to use any existing water bore for construction purposes.

Water storage is necessary as it will allow water-carts to be filled rapidly from a pond, while the pond itself would be filled up at a much slower rate from a nearby stream (topped up by boreholes and alternative sources wherever practicable). Storage ponds are proposed to be located close to water courses and offset by a practical pumping distance. In some instances, ponds either side of the stream will be provided to increase the number of water supply points and thereby reduce cartage. Preference will be given to using stormwater ponds as water storage facilities; these can be lined during construction to enable water storage and converted to stormwater ponds post construction, minimising earthworks.

The total proposed storage capacity (along the alignment) is 80,352m^3. This allows for 34 days of storage at an average demand of 2,350m^3/day, and 20 days of storage at a peak demand of 3,900m^3/day.

14.4.8.2 Global consent for water take

Consent is sought for a global-type consent covering water abstraction and storage along the length of the Ō2NL alignment, in both the Greater Wellington and Horizons regions. This will allow Ō2NL Project to take a capped total amount of water each day, but within a limit for each water course. No water abstraction will occur below the Minimum Flows in each water course.

The global water take is for a maximum of 3,900m^3/day across the alignment as required using the following parameters:

- water abstraction only above the Minimum Flow defined in the relevant Regional Plans for each water course;
- water abstraction to be no greater than a maximum daily rate consistent with the flow regime of the particular water course, except where water flows are at or above median flows when daily maximum takes could be exceeded, with water to be taken at a rate of no more than 10% of flow rates;
- continuous trickle supply (within maximum abstraction rates) of water to storage ponds for later construction use
- water take equipment (including rate of take) to be designed and located to avoid effects on ecology, notably fish and aquatic life;
- at peak construction, an average abstraction across all takes of 2,350m^3/day; and
- at peak construction, a maximum abstraction across all takes of 3,900m^3/day.

14.4.9 Planting and landscaping

Planting and landscaping within the designation will take place progressively as sections or areas of the works are completed, in order to meet the planting and landscaping requirements as mentioned above in Section 12.10.

During construction, various stabilising measures will be adopted in line with industry best practice to manage erosion and sediment and this may include the progressive hydroseeding or mulching of recently completed earthworks. Where planting is required for erosion control, for example in swales or overland flow paths, these will be phased as early as practicably possible to enable early establishment of the plants. Planting for mitigation and landscaping will also be sequenced with earthworks.

Significant planting areas fall beyond the designation and are required for natural character, terrestrial and freshwater offset purposes. The timing of the planting of these areas is to degree independent of construction phasing, although overall labour and nursery supply will be a critical factor. Where practicable planting outside of the designation will be undertaken in parallel or in advance of construction. It may be necessary to direct resources to planting in designation as part of earthworks stabilisation and to achieve effective integration of the Project into the landscape ahead of opening.

An overall landscape planting programme will be developed ahead of construction starting.

14.4.10 Lighting and signage

Traffic services include lighting, overhead sign gantries, other signage, traffic barriers and road markings will generally be included in the works at the time of, or immediately after the pavement and surfacing have been constructed. The works consist of ducting, erection of hardware, and painted or other road markings.

14.5 Post-construction activities

Following completion of construction, the following de-establishments activities are anticipated:

- removal of buildings, temporary structures and all stockpiles and equipment;
- reinstatement of hard-standing, car parking and circulation areas, access tracks and worked areas that do not form part of the ongoing operation and maintenance of the new state highway and areas replanted and returned to former use or as determined as part of the design;
- removal of perimeter fencing and erosion and sediment controls; and
- establishment of final fencing and gateways along its maintenance and operational boundaries.
- ongoing post-construction activities are likely to include ongoing maintenance and management of stormwater assets, landscaping and planting areas associated with ecological works. These activities will seek to ensure that plants establish and perform to expectations.

PART D: STATUTORY CONTEXT AND RMA APPROVALS REQUIRED

15 Overview

The following sets out the key matters that are relevant to the Ō2NL Project under the RMA, including the approvals required and a commentary on the relevant statutory considerations.

An assessment of the Ō2NL Project against the provisions of relevant planning documents, and against all relevant statutory considerations, is included in Part I.

Other statutes and their requirements, where these are particularly relevant to the Ō2NL Project, are also described below, including where further approvals may be necessary. Some of these may not be matters relevant to the consideration of the NoRs and applications for resource consents but provide context to the Ō2NL Project.

16 RMA – Purpose and principles

Consideration of the NoRs and of the applications for resource consent are subject to the purpose and principles in Part 2 of the RMA. Sections 5 to 8 make up Part 2 of the RMA as set out in Table 16-1.

Table 16-1 – Part 2 of the RMA

Section	Content
Section 5 (Purpose)	States the purpose of the RMA, being to promote the sustainable management of natural and physical resources, and sets out what sustainable management means as follows: *"(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.* *(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—* *(a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and* *(b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and* *(c) avoiding, remedying, or mitigating any adverse effects of activities on the environment."*
Section 6 (Matters of national importance)	Describes the matters of national importance that all persons exercising functions and powers under the RMA must recognise and provide for when managing the use, development, and protection of natural and physical resources as follows:

Section	Content
	"(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:* *(g) The protection of protected customary rights:* *(h) The management of significant risks from natural hazards."*
Section 7 (Other matters)	Sets out other matters to which all persons exercising functions and powers under the RMA must have particular regard to in relation to managing the use, development, and protection of natural and physical resources. Those that are relevant to the Ō2NL Project are: *"(a) kaitiakitanga:* *(aa) The ethic of stewardship:* *(b) The efficient use and development of natural and physical resources:* *(ba) The efficiency of the end use of energy:* *(c) The maintenance and enhancement of amenity values:* *(d) Intrinsic values 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:* *(i) The effects of climate change: …".*
Section 8 (Treaty of Waitangi)	Requires all persons exercising functions and powers under the Act in relation to managing the use, development, and protection of natural and physical resources, to take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

17 RMA duties and restrictions

Part 3 of the RMA sets out a number of restrictions on the use of resources (including land and rivers), and on activities that impact on resources (such as the discharge of contaminants).

Section 9 of the RMA imposes restrictions on the use of land. The Ō2NL Project will involve a number of activities controlled by section 9 of the RMA. Pursuant to this section, resource consents are required to use land:

- in a manner that contravenes a national environmental standard (section 9(1)); and

- in a manner that contravenes a regional rule (section 9(2)).

Where it is proposed to use land in a manner that contravenes a district rule (section 9(3)), such activities are to be authorised by the designations sought for the Project (described further below). In this regard, section 176 of the RMA states that:

> *"(1) If a designation is included in a district plan, then–*
>
> *(a) section 9(3) does not apply to a public work or project or work undertaken by a requiring authority under the designation; …"*

Section 13 of the RMA imposes restrictions on activities in, on, under and over the beds of lakes and rivers. There are rivers, streams and channels in the Ō2NL Project area that will be subject to modification including through the construction of bridges, culverts, and temporary and permanent diversion.

Section 14 of the RMA relates to any take, use, damming or diversion of water, including coastal water. The Ō2NL Project will involve the taking and diversion of groundwater, surface water and stormwater during construction, as well as temporary damming for the purposes of establishing structures within waterways. There will be ongoing taking, damming and diversion of water, including realignment of watercourses through new channels, around and across the Ō2NL Project, including through culverts.

Section 15 of the RMA restricts discharges into or onto air, land or water. The Ō2NL Project will involve:

- discharge of contaminants or water to water, including in stormwater;
- discharge of contaminants onto or into land in circumstances which may result in that contaminant entering water, including contaminants from road surfaces; and
- discharge of contaminants to air from construction activities.

Section 16(1) of the RMA requires that every occupier of land (including any premises and any coastal marine area), and every person carrying out an activity in, on, or under a water body or the coastal marine area, shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level. The potential noise effects of the Ō2NL Project and the methods that avoid, remedy and mitigate those effects are described in Part G and embedded in the proposed conditions in Appendix Five.

Section 17(1)(b) of the RMA sets out that every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of the person, whether or not the activity is carried on in accordance with a national environmental standard, a rule, a resource consent, or a designation. Conditions are proposed to apply to the designations and resource consents for the Ō2NL Project. These conditions are designed avoid, remedy, mitigate, offset and compensate for the effects of the Ō2NL Project and are included as Appendix Five to this volume.

18 Designations

18.1 Notices of requirement for designation

As set out in Part A of this volume, Waka Kotahi is a requiring authority and can give notice of its requirement to designate land for the transport network in accordance with its statutory functions. The Ō2NL Project includes two notices of requirement to designate land; one NoR within Horowhenua District and one NoR within Kāpiti Coast District. The extent of the designation in each territorial authority jurisdiction is shown on the drawings in Volume III.

In addition, as explained in Part A of this volume and below, in February 2022 Waka Kotahi gave notice for a NoR to designate land for the Ō2NL Project over the area subject to Proposed PC4 (Tara-Ika Growth Area).

The process for giving the NoRs is set out in Part 8 (sections 166 – 186) of the RMA. Section 168(2) provides as follows:

> *"(2) A requiring authority for the purposes approved under section 167 may at any time give notice in the prescribed form to a territorial authority of its requirement for a designation–*
>
> *(a) For a project or work; or*
>
> *(b) In respect of any land, water, subsoil, or airspace where a restriction is reasonably necessary for the safe or efficient functioning or operation of such a project or work. …"*

The prescribed form for an NoR is Form 18 included in Schedule 1 to the Resource Management (Forms, Fees, and Procedure) Regulations 2003. The NoRs for the Ō2NL Project (included in Volume I) have been prepared in accordance with these regulations.

Section 169 of the RMA directs the procedures in relation to further information, notification, submissions and hearings for a notice of requirement. Section 169(1) establishes that a territorial authority's decision to notify a notice of requirement is under section 149ZCB(1) to (4), 149ZCC(1) to (4), 149ZCE, and 149ZCF where reference to 'the EPA' is read as reference to a 'territorial authority' and reference to an 'applicant' is reference to a 'requiring authority'.

Section 149ZCB(2) states that:

> *"(2) Despite subsection (1), the EPA must publicly notify an application or notice if—*
>
> *(a) …*
>
> *(b) the applicant requests public notification of the application or notice; or …"*

Waka Kotahi, as the requiring authority giving notice of its requirement for designations, requests that the NoRs be publicly notified under sections 169(1) and 149ZCB(2) of the RMA.

Section 171 sets out the matters that must be considered by a territorial authority in making a recommendation on a notice of requirement as follows:

> *"(1A) When considering a requirement and any submissions received, a territorial authority must not have regard to trade competition or the effects of trade competition.*
>
> *(1) When considering a requirement and any submissions received, a territorial authority must, subject to Part 2, consider the effects on the environment of allowing the requirement, having particular regard to—*
>
> *(a) any relevant provisions of—*
>
> *(i) a national policy statement:*
>
> *(ii) a New Zealand coastal policy statement:*
>
> *(iii) a regional policy statement or proposed regional policy statement:*
>
> *(iv) a plan or proposed plan; and*
>
> *(b) whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work if—*
>
> *(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or*
>
> *(ii) it is likely that the work will have a significant adverse effect on the environment; and*
>
> *(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought; and*
>
> *(d) any other matter the territorial authority considers reasonably necessary in order to make a recommendation on the requirement.*

(1B) The effects to be considered under subsection (1) may include any positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from the activity enabled by the designation, as long as those effects result from measures proposed or agreed to by the requiring authority.

(2) The territorial authority may recommend to the requiring authority that it—

(a) confirm the requirement:

(b) modify the requirement:

(c) impose conditions:

(d) withdraw the requirement.

(3) The territorial authority must give reasons for its recommendation under subsection (2).”

A decision is made by the requiring authority under section 172 as follows:

“(1) Within 30 working days of the day on which it receives a territorial authority’s recommendation under section 171, a requiring authority shall advise the territorial authority whether the requiring authority accepts or rejects the recommendation in whole or in part.

(2) A requiring authority may modify a requirement if, and only if, that modification is recommended by the territorial authority or is not inconsistent with the requirement as notified.

(3) Where a requiring authority rejects the recommendation in whole or in part, or modifies the requirement, the authority shall give reasons for its decision.”

18.2 Outline plans

Section 176A of the RMA provides that an outline plan must be submitted to a territorial authority before commencing construction of a project or work under a designation unless certain circumstances apply. These circumstances are set out in section 176A(2) as follows:

“(2) An outline plan need not be submitted to the territorial authority if—

(a) the proposed public work, project, or work has been otherwise approved under this Act; or

(b) the details of the proposed public work, project, or work, as referred to in subsection (3), are incorporated into the designation; or

(c) the territorial authority waives the requirement for an outline plan.”

Section 176A(3) states that:

“(3) Any outline plan must show—

(a) the height, shape, and bulk of the public work, project, or work; and

(b) the location on the site of the public work, project, or work; and

(c) the likely finished contour of the site; and

(d) the vehicular access, circulation, and the provision for parking; and

(e) the landscaping proposed; and

(f) any other matters to avoid, remedy, or mitigate any adverse effects on the environment.”

Within 20 working days of receiving an outline plan, a territorial authority may request changes to the outline plan under section 176A(4) of the RMA. The requiring authority may accept or reject the requested

changes. If any of the requested changes are rejected, the territorial authority may appeal to the Environment Court under setion 176A(5) of the RMA.

Outline plans will be prepared in respect of the design and construction of the Ō2NL Project. That said, Waka Kotahi seeks that the requirement for an outline plan is waived in respect of establishment works. Establishment works are those works that are required to be undertaken before construction activities can commence, that is, the works are necessary to enable construction. Establishment works are described in further detail as 'pre-construction activities' in Part C and defined in the proposed conditions.

Establishment works are limited in scale and have minor adverse effects. Further, establishment works are generally permitted by the rules in the relevant District Plan. It is on this basis that Waka Kotahi seeks to waive the requirement for an outline plan for establishment works. This is confirmed in the proposed conditions in Appendix Five.

18.3 Review of designations

The NoRs include land required to be used for temporary and permanent works. Following the completion of construction of the Project, the extent of the designations will be reviewed to identify any areas that are no longer necessary for the on-going operation or maintenance of the new state highway or SUP, or for on-going measures to address adverse effects of the Ō2NL Project. Waka Kotahi may then give notice that the designation/s be removed from any identified areas under section 182 of the RMA.

18.4 Designation lapse period

Section 184 provides for the lapsing of designations that have not been given effect to as follows:

> *"(1) A designation lapses on the expiry of 5 years after the date on which it is included in the district plan unless—*
>
> *(a) It is given effect to before the end of that period; or*
>
> *(b) The territorial authority determines, on an application made within 3 months before the expiry of that period, that substantial progress or effort has been made towards giving effect to the designation and is continuing to be made and fixes a longer period for the purposes of this subsection; or*
>
> *(c) The designation specified a different period when incorporated in the plan."*

Under section 184(1)(c) Waka Kotahi seeks a lapse period of 10 years from the date the designations are included in the respective district plans (Horowhenua District Plan and Kāpiti Coast District Plan).

18.5 Designations of other requiring authorities

Where a designation is in a district plan section 176(1)(b) of the RMA directs:

> *"(b) No person may, without the prior written consent of that requiring authority, do anything in relation to the land that is subject to the designation that would prevent or hinder a public work or project or work to which the designation relates, including—*
>
> *(i) undertaking any use of the land; and*
>
> *(ii) subdividing the land; and*
>
> *(iii) changing the character, intensity, or scale of the use of the land."*

Where a designation is over land that is subject to an earlier designation section 177(1)(a) requires that:

> *"(a) The requiring authority responsible for the later designation may do anything that is in accordance with that designation only if that authority has first obtained the written consent of the authority responsible for the earlier designation or order …"*

The Ō2NL Project traverses land that is subject to an existing designation for 'railway purposes' in the Horowhenua District Plan (designation reference D1). KiwiRail Holdings Limited (KiwiRail) is the requiring authority responsible for this designation.

Where the Ō2NL Project designation is over the existing KiwiRail designation, written consent under section 177(1)(a) will need to be obtained from KiwiRail before construction activities that traverse the designation can commence. Where the Ō2NL Project, but not the designation for the Project, is over the existing KiwiRail designation, written consent under section 176(1)(b) will similarly need to be obtained.

Waka Kotahi has engaged with KiwiRail and will seek this written consent following the completion of detailed design and prior to the commencement of construction activities that affect the land subject to the NIMT designation. In this regard, Waka Kotahi and KiwiRail are discussing an over-arching Project agreement between the two organisations.

Further, from discussions with HDC it is understood that RMA approvals for the construction of an arterial road (known as the East-West Arterial) in the Tara-Ika Growth Area will be sought in the near future. This proposed East-West Arterial crosses the land required for the Ō2NL Project NoR and so approvals to allow its construction will be required from Waka Kotahi either under s176(1)(b) or s177(1)(a) of the RMA.

18.6 Other Waka Kotahi designations

There are also locations where the Ō2NL Project is over existing designations in the KCDP and HDP for state highway purposes (SH1 and SH57). Waka Kotahi is the requiring authority for these designations.

Within the Kāpiti Coast District, for several hundred metres, the SUP is located outside of the Ō2NL designation, but within the existing SH1 designation (Designation NZTA-001, 'State Highway Purposes', in the KCDP). Waka Kotahi will either prepare an outline plan to provide of the construction and operation of SUP in this location in respect of the existing designation or, should the works be permitted by the rules in the KCDP, Waka Kotahi may request that the requirement for an outline plan be waived.

Similarly, within Horowhenua District, the works to relocate and improve the Tararua Road and existing SH1 intersection are in part within the existing SH1 designation (Designation D2, 'State Highway 1 - To undertake maintenance, operation and use of, and improvement of a State Highway'). Waka Kotahi will either prepare an outline plan to provide of the construction and operation of the upgraded intersection where it is within the existing designation or, should the works be permitted by the rules in the HDP, Waka Kotahi may request that the requirement for an outline plan be waived.

A NoR has also been given by Waka Kotahi to HDC in February 2022 for the section of the Ō2NL Project that lies within the Tara-Ika Growth Area to the east of Levin. That NoR continues to have interim effect, under section 178 of the RMA, until it is either confirmed as a designation and included in the Horowhenua District Plan or is withdrawn.

19 Resource consents

The activities that require resource consents pursuant to sections 9(2), 13, 14 and 15 of the RMA, the NES-F, the NES-CS, One Plan and the PNRP are described in detail within the Rule Assessment at Appendix One and summarised below. Appendix One also sets out the permitted activity rules applicable to the Ō2NL Project.

All regional resource consents required for the Ō2NL Project are being sought as part of this application, whether they are explicitly specified or not.

If, after detailed design is complete, further or different consents are required these will be sought at the time. In this regard it is noted that one or more concrete batching plants and/or bitumen production plants may be established and operated for the duration of the construction activities. Any resource consents necessary to authorise air discharges from those activities will be sought later when plant locations can be defined and additional air discharge modelling undertaken.

19.1 Earthworks, land disturbance and vegetation clearance

19.1.1 Horizons One Plan

Rule 13-2 of the One Plan provides for large-scale land disturbance, including earthworks as a controlled activity, subject to compliance with a range of standards and terms, as follows:

> *"Except as regulated by Rules 13-6, 13-8 and 13-9, any land disturbance pursuant to s9(2) RMA of a total area greater than 2500 m^2 per property per 12-month period and any ancillary:*
>
> *a. Diversion of water pursuant to s14(2) RMA on the land where the land disturbance is undertaken, or*
>
> *b. Discharge of sediment into water pursuant to s15(1) RMA resulting from the land disturbance."*

The standards and terms that apply to Rule 13-2 are as follows:

> *"a. The activity must not take place on land that is within a coastal foredune,*
>
> *b The activity must be undertaken in accordance with an Erosion and Sediment Control Plan.*
>
> *c Any ancillary discharge of sediment into water must not, after reasonable mixing, cause the receiving water body to breach the water quality standards for visual clarity set out in Schedule E for that water body.*
>
> *d. The activity must not occur on land that is in, or within 5m of:*
>
> *i. the bed of a river that is permanently flowing,*
>
> *ii. the bed of a river that is not permanently flowing and has an active bed width greater than 1m,*
>
> *iii. the bed of a lake.*
>
> *e. The activity must not occur on land that is in, or within 10m of:*
>
> *i. A wetland as identified in Schedule F,*
>
> *ii. Sites valued for Trout Spawning as identified inSchedule B,*
>
> *iii. Sites of Significance - Aquatic as identified in Schedule B."*

Rule 13-5 of the One Plan provides for vegetation clearance, as a permitted activity, as follows:

> *"Except as regulated by Rules 13-6, 13-8 and 13-9, any vegetation clearance pursuant to s9(2) RMA and any ancillary:*
>
> *a. Diversion of water pursuant to s14(2) RMA on the land where the vegetation clearance is undertaken,*
>
> *b. Discharge of sediment into water pursuant to s15(1) RMA resulting from the vegetation clearance."*

The standards and terms that apply to Rule 13-5 are as follows:

> *"a. The activity must not take place on land that is within a coastal foredune.*
>
> *b. Any ancillary discharge of sediment into water must not, after reasonable mixing, cause the receiving water body to breach the water quality standards for visual clarity set out in Schedule E for that water body.*
>
> *c. The activity must not occur on land that is in, or within 5m of:*
>
> *i. The bed of a river that is permanently flowing*

ii. The bed of a river that is not permanently flowing and has an active bed width greater than 1m

iii. The bed of a lake

d. The activity must not occur on land that is in, or within 10m of:

i. A wetland as identified in Schedule F

ii. Sites valued for Trout Spawning as identified in Schedule B."

Rule 13-6 provides for land disturbance in a Hill Country Erosion Management Area. The Project does not traverse a Hill Country Erosion Management Area and therefore Rule 13-6 is not relevant.

Rule 13-8 relates to some activities within at-risk habitats and Rule 13-9 relates to some activities 'at-risk', 'rare' and 'threatened' habitats. The Project works are within the habitats in Table 19-1 – 'At-risk', 'rare' and 'threatened' habitats under schedule F to the one plan in Table 19-1.

Table 19-1 – 'At-risk', 'rare' and 'threatened' habitats under Schedule F to the One Plan

One plan schedule F habitat type	
Threatened	Hardwood/broadleaved species forest or treeland Swamp and marsh wetland
Rare	Seepage and spring wetland
At-risk	Riparian margin Indigenous forest or scrub containing *Powelliphanta* land snails

In some circumstances, the Ō2NL Project cannot comply with Rule 13-2, Standard (d) and Standard (e)(i) because physical works are necessary within and/or near rivers and wetlands identified in Schedule 7. Similarly, the Ō2NL Project cannot achieve Standard (c) and Standard (d)(i) that apply to Rule 13-5.

Rule 13-7 provides for (amongst other matters) land disturbance and vegetation clearance (including disturbance of the bed of a river pursuant to section 13(1) of the RMA; diversion of water authorised by Rule 13-2 or Rule 13-5 pursuant to section 14(2) of the RMA; discharge of sediment or slash authorised by Rule 13-2 or Rule 13-5 pursuant to section 15(1) of the RMA) as a discretionary activity when located outside of a 'rare', 'at-risk' or 'threatened' habitat defined by Schedule F of the One Plan.

Rule 13-8 and Rule 13-9 provides for the following as a discretionary activity in an 'at-risk' habitat and a non complying activity respsectively in a 'rare' or 'threatened habitat:

- land disturbance;
- vegetation clearance;
- activities restricted by section 13(1) or section 13(2) of the RMA in the beds of rivers;
- the taking, using, damming or diverting of water pursuant to section 14(2) of the RMA; and
- The discharge of water or contaminants into water or onto or into land pursuant to section 15(1) or section 15(2A) of the RMA.

The earthworks, land disturbance and vegetation clearance that form part of the Ō2NL Project require resource consent as follows:

- a land use consent as a **controlled activity** under sections 9(2), 14 and 15 of the RMA and Rule 13-2 for large scale earthworks (including any ancillary diversion of water or discharge of sediment to water) that is not in a 'rare', 'at-risk' or 'threatened' habitat; not within 5m of the bed of a permanently flowing river; not within 5m of the bed of a river that is not permanently flowing and has a width greater than 1m; or not within 10m of a wetland identified in Schedule F.
- a land use consent as a **discretionary activity** under sections 9(2), 13, 14 and 15 of the RMA and Rule 13-7 for land disturbance and vegetation clearance (including any ancillary disturbance of the

bed of a river division of water and discharge of sediment or slash) that is not in a 'rare', 'at-risk' or 'threatened' habitat but is within 5m of the bed of a permanently flowing river; or within 5m of the bed of a river that is not permanently flowing and has a width greater than 1m; or within 10m of a wetland identified in Schedule F.

- a land use consent as a **discretionary activity** under sections 9(2) and 13 of the RMA and Rule 13-8 for land disturbance and vegetation clearance within an 'at-risk' habitat.
- a water permit as a **discretionary activity** under section 14 of the RMA and Rule 13-8 for the diversion of water within an 'at-risk' habitat.
- a discharge permit as a **discretionary activity** under section 15 of the RMA and Rule 13-8 for the discharge of water or contaminants to water or land within an 'at-risk' habitat.
- a land use consent as a **non-complying activity** under sections 9(2) and 13 of the RMA and Rule 13-9 for land disturbance and vegetation clearance within a 'rare' or 'threatened' habitat.
- a water permit as a **non-complying activity** under section 14 of the RMA and Rule 13-9 for the diversion of water within a 'rare' or 'threatened' habitat.
- a discharge permit as a **non-complying activity** under section 15 of the RMA and Rule 13-9 for the discharge of water or contaminants to water or land within a 'rare' or 'threatened' habitat.

19.1.2 Proposed Natural Resources Plan for the Wellington Region

Rule R101 permits the use of land, and the associated discharge of sediment into water or onto or into land where it may enter water from earthworks up to a total area of 3,000m^2 per property per 12-month period, subject to compliance with standards.

Given that the volume of earthworks proposed in the Wellington Region will exceed the permitted volume in Rule R101, a land use consent is sought pursuant to sections 9(2) and 15 of the RMA and Rule R107 of the PNRP as a **discretionary activity** for earthworks that cannot comply with the permitted Rule R101 (including any associated discharge of sediment).

The Project includes the reclamation of part of a valley floor wetland in the Wellington Region. The wetland is not a Natural Wetland listed in Schedule 3A of the PNRP, however all wetlands in the region are classified as Significant under the Regional Policy Statement for the Wellington Region. Therefore, a land use consent is sought pursuant to sections 9(2), 14 and 15 of the MRA and Rule R118 as a **non-complying activity** to authorise the project works within the wetland including reclamation and land disturbance, and diversion of surface water and associated discharges.

19.2 Discharges to land and water

19.2.1 Horizons One Plan

Chapter 14 of the One Plan includes the rules for discharges to water and land (not within a rare, threatened or at-risk habitat).

Rule 14-12 provides for the discharge of water to water as a permitted activity subject to permitted activity standards. This rule provides for the discharge of dewatering water to water and also the discharge of surface water the holding ponds. Any dewatering water that is entrained with sediment or not able to meet the other conditions of this Rule 14-12, will be treated and therefore subject to the resource consent requirements under Chapter 13.

Rule 14-18 provides for discharges of stormwater to surface water and land as a permitted activity, subject to compliance with a range of standards where the discharges are not within an at-risk, rare or threatened habitat. Operational stormwater discharges are able to comply with the relevant permitted activity standards in Rule 14-18 and therefore no resource consent is sought.

In respect of Rule 14-18, Standard (a)(ii), there is the potential for stormwater to be discharged from contaminated land where the contaminants of concern may be entrained by the stormwater. To prevent

this from occurring, the proposed conditions include requirements for testing prior to construction, with any effects being managed on a site specific basis through the resource consents that may be required under the NES-CS and One Plan (Rule 14-24 or Rule 14-28).

Rule 14-25 provides for the discharge of contaminants to a reach of a river or its bed with Schedule B values of 'Sites of Significance – Aquatic' as a discretionary activity. The Ohau River and the Waikawa Stream are listed as 'Sites of Significance-Aquatic'. Because direct discharge of treated stormwater will occur to these water bodies resource consent is required under Rule 14-25.

Rule 14-21 provides for the discharge of cleanfill material onto or into land as a permitted activity subject to standards. Rule 14-21 applies in circumstances where filling (including the disposal of excess cut material) occurs using material sourced from the Project (that is, the material is not imported) and where material imported to the Project site is used as engineered fill and for track and road surfacing. The standards in Rule 14-21 include locational requirements and a requirement that the rate of cleanfill material discharge must be no more than 2,500m^3/y per property. The Project will not comply with Standards (b) and (c). Rule 14-30 therefore applies, and provides for the placement of cleanfill material as a discretionary activity.

By way of summary the following consents are required under Chapter 14 of the One Plan:

- a discharge permit as a **discretionary activity** under section 15 of the RMA and Rule 14-25 for the discharge to a reach of a surface water body or its bed with Schedule B values of Sites of Significance – Aquatic.
- a discharge permit as a **discretionary activity** under section 15 of the RMA and Rule 14-30 for the placement of cleanfill.

19.2.2 Proposed Natural Resources Plan for the Wellington Region

Rule R49 provides for the discharge of stormwater into water, or onto or into land where it may enter a surface water body from a new or redeveloped state highway associated with earthworks up to a total area of 3,000m² as a permitted activity. Earthworks necessary for the Ō2NL Project in the Wellington exceed the 3,000m² permitted activity volume limit in Rule R49. Rule R50 provides for circumstances where stormwater discharges are not permitted by Rule R49 as a restricted discretionary activity.

Waka Kotahi is separately preparing a 'stormwater management strategy' in accordance with Schedule N to the PNRP with a view to securing a discharge permit for all stormwater discharges from state highways in the Wellington Region. When such a consent is secured, it is the intention of Waka Kotahi to formally surrender project specific discharge permits such as the consent sought for discharges from the Ō2NL Project under Rule R49 under section 138 of the RMA.

As set out above there is the potential for stormwater to be discharged from contaminated land where the contaminants of concern may be entrained by the stormwater. To prevent this from occurring, the proposed conditions include requirements for testing prior to construction, with any effects being managed on a site specific basis through the resource consents that may be required under the NES-CS and PNRP (Rule R82). Detailed site investigations are explicitly permitted by Rule R81.

Rule R80 provides for the discharge of cleanfill material onto or into land, or onto or into land where a contaminant may enter water as a permitted activity subject to compliance with standards. These standards include a requirement for the volume of cleanfill to not exceed 400m^3 per property per year. The volume of cleanfill required for the Ō2NL Project within the Wellington Region will exceed this Standard and, instead, default Rule R94 requires a resource consent as a discretionary activity for the discharge of cleanfill.

In summary, the following consents are required by PNRP for discharges to land and water:

- a discharge permit as a **discretionary activity** is sought under section 15 of the RMA and Rule R50 for the discharge of treated stormwater to land and water;
- a discharge permit as a **discretionary activity** is sought under section 15 of the RMA and Rule R94 for the discharge of cleanfill.

19.3 Discharges to air

19.3.1 Horizons One Plan

Rule 15-16 of the One Plan provides for the discharges of contaminants into air from specified mobile sources as a permitted activity, subject to compliance with standards.

Because of the nature of the ground conditions that the Ō2NL Project traverses, and the volumes and duration of earthworks involved in the construction of the Ō2NL Project, there is the potential for the permitted activity standards in Rule 15-16 to be temporarily breached during times of extreme wind conditions or other unforeseen events.

Rule 15-17 of the One Plan provides for the discharge of contaminants to air that do not comply with the conditions in Rule 15-16 as a discretionary activity. Therefore a discharge permit is sought on a precautionary basis, for the discharge of contaminants to air pursuant to section 15 of the RMA and Rule 15-17 of the One Plan as a **discretionary activity**.

19.3.2 Proposed Natural Resources Plan for the Wellington Region

Chapter 5.1 of the PNRP includes rules that relate to air quality. The following rules allow for discharges to air from specific activities that form part of the Ō2NL Project works as a permitted activity:

- Rule R27: Handling of bulk solid materials;[1]
- Rule R28: Cement storage;
- Rule R33: Petroleum storage or transfer facilities; and
- Rule R34: Mobile source emissions.[2]

Rules R27, R28 and R33 require compliance with the following standard:

> "*...discharge shall not cause noxious, dangerous, offensive or objectionable odour, dust, particulate, smoke, vapours, droplets or ash beyond the boundary of the property.*"

In addition, Rule R32 has an additional standard as follows:

> "*there is no emission of hazardous air pollutants as identified in Schedule L2 (air pollutants) beyond the boundary of the property that does, or is likely to, cause adverse effects on human health, ecosystems or property*"

For the reasons set out above, there is the potential for the permitted activity standards in Rules R27, R28 and R33 to be temporarily breached during times of extreme wind conditions or other unforeseen events.

Rule R42 of the PNRP provides for the discharge of contaminants into air that are not permitted, controlled, discretionary, non-complying or prohibited as a discretionary activity. Therefore a discharge permit is sought on a precautionary basis, for the discharge of contaminants to air from the handling of bulk solid materials, cement storage and petroleum storage or transfer facilities pursuant to section 15 of the RMA and Rule 42 of the PNRP as a **discretionary activity**.

The discharge of contaminants to air from mobile sources is a **permitted activity** under section 15 of the RMA and Rule 34 of the PNRP and therefore no discharge permit is required.

[1] 'Bulk solid material' is defined by the PNRP as "*materials consisting of, or including, fragments that could be discharged as dust or particulate. These materials include but are not limited to: gravel, quarried rock, quarry overburden, fertiliser, coal, flour, rock aggregate, grains, compost and woodchip*".
[2] 'Mobile sources' is defined by the PNRP as "*a mobile source that discharges contaminants into air including, but not limited to, motor vehicles (cars), trucks, light utility vehicles, buses, aircraft, trains, vessels (boats), and lawn mowers, port mobile plant, and forklifts.*"

19.4 Take, use and diversion of water

19.4.1 Horizons One Plan

Chapter 16 of the One Plan includes rules for the take, use, damming or diversion of water (not within a rare, threatened or at-risk habitats).

Rule 16-5 provides for the taking and use of surface water as a controlled activity subject to the following Standards:

> *"a. Water must only be taken when the river is above its minimum flow, as assessed in accordance with Schedule C.*
>
> *b. The amount of water taken, when assessed in combination with all other water takes must not exceed the relevant cumulative core allocation limits set out in Schedule C.*
>
> *c. The amount of water taken from a river must not lower the water level in any wetland that is a rare habitat or threatened habitat.*
>
> *d. The take must not be from any rare habitat, threatened habitat or at-risk habitat."*

Waka Kotahi proposes to abstract water from the Koputaroa Stream, Ohau River, Waikawa Stream, Manakau Stream and Waiauti Stream. The parameters for these water takes are set out in Table 19-2.

Table 19-2 - Abstraction Rates, Minimum Flows, and Storage in Manawatū-Whanganui

Water Course and Region	Proposed Maximum Abstraction per day* and instantaneous rate of 10% of flow up to the maximums specified*	Available allocation (m^3/day)	Allocation remaining in event Ō2NL Project Abstraction consented (m^3/day)	Minimum Flow (L/s)	Proposed storage capacity (m^3)	Estimated consecutive days per year when below Minimum Flow
Koputaroa stream	231 m^3/day 6 L/s	351	120	**	11,800	5 (10-yr ARI) 12 (20-yr ARI)
Ohau river	409m^3/day 70 L/s	409	0	820	28,500	2 (10-yr ARI) 6 (20-yr ARI)
Waikawa stream	2,998 m^3/day 70L/s	4,498	1,500	220	23,100	2 (10-yr ARI) 5 (20-yr ARI)
Manakau and Waiauti stream	102 m^3/day 6L/s	156	54	40	8,386	14 (10-yr ARI) 20 (20-yr ARI)

*The maximum abstraction rate per day can be exceeded when water in a watercourse is at or above median flows.
**It is proposed to take 10% of the Koputaroa Stream flow estimated at McDonald Road, based on the recorded flows at Tavistock Road. Water take would cease on the Koputaroa Stream when Manawatū River is below 12,240L/s.

As set out above, the proposed water takes are able to comply with the controlled activity standards in Rule 16-5 and therefore a water permit is sought pursuant to section 14 of the RMA and Rule 16-5 of the One Plan as a controlled activity for the taking of water for construction activities. Rule 16-5 also provides for the taking and use of water that is stored as part of construction activities.

Rule 16-2 provides for minor takes and uses of groundwater as a permitted activity, subject to compliance with standards. While the extent of dewatering necessary for the Project is limited, it is anticipated that construction and ongoing dewatering may be required at a rate or volume that exceeds the permitted activity standards in Rule 16-2. Therefore, as a precaution, consent is sought under Rule 16-9 for the

taking of groundwater (dewatering) as a discretionary activity. Dewatering in 'at-risk', 'rare' or 'threatened' habitats is addressed through Chapter 13 of the One Plan.

The Ō2NL Project is indicatively anticipated to involve diversion of approximately 1890m of waterways, the vast majority of which is within the Horizons region. Consent is sought pursuant to Rule 16-13 of the One Plan as a discretionary activity for the diversion of streams on the basis that the proposed diversions cannot meet the permitted activity standards that apply to diversions (as a permitted activity) in Rule 16-12.

By way of summary the following consents are required under Chapter 16 of the One Plan:

- a water permit is sought pursuant to section 14 of the RMA and Rule 16-5 of the One Plan as a **controlled activity** for the taking of water for construction activities;
- a water permit is sought pursuant to section 14 of the RMA and Rule 16-9 of the One Plan as a **discretionary activity** for the taking of groundwater for the construction and operation of the Project;
- a water permit is sought pursuant to section 14 of the RMA and Rule 16-13 of the One Plan as a **discretionary activity** for the diversion of streams.

19.4.2 Proposed Natural Resources Plan for the Wellington Region

Rule R152 provides for the taking and use of water from a surface water body or groundwater as a permitted activity subject to a number of Standards as follows:

"a. the total take and use per property shall not exceed the following rates and volumes, and

Property size	***Rate***	***Volume per day***
Greater than 20ha	*2.5L/s*	*20m^3*
Less than 20ha	*2.5L/s*	*10m^3*

b. the take of groundwater does not adversely affect reliability of supply from properly constructed, efficient and fully functioning nearby bores, and

c. where the take and use is from a surface water body:

i. a fish screen with a maximum mesh size of 3mm shall be installed to prevent fish entering the intake, and

ii. the fish screen shall be constructed of smooth material to prevent damage to any fish coming into contact with the screen, and

iii. the fish screen shall be placed parallel to river flow and located to minimise the length of river bed affected by its placement, and

d. the water is not taken from a natural wetland, or from within 50m of a natural wetland, and

e. no water shall run to waste, and

f. at the written request of the Wellington Regional Council a water meter is installed and daily water use records are kept and provided to the Wellington Regional Council."

In Wellington it is proposed to abstract water from the Waitohu stream. The parameters of this water take are in Table 19-3.

Table 19-3 - Abstraction Rates, Minimum Flows, and Storage in Wellington

Water Course and Region	Proposed Maximum Abstraction per day* and instantaneous rate of 10% of flow up to the maximums specified*	Available allocation (m^3/day)	Allocation remaining in event Ō2NL Project Abstraction consented (m^3/day)	Minimum Flow (L/s)	Proposed storage capacity (m^3)	Estimated consecutive days per year when below Minimum Flow
Waitohu stream	2,160m^3/day 50L/s	3,240	1,080	140	8,566	13 (10-yr ARI) 18 (20-yr ARI)

The proposed water take from the Waitohu Stream exceeds the permitted rate and volume in Rule R152. A resource consent is therefore required for a discretionary activity pursuant to section 14 of the RMA and Rule R158 of the PNRP. Where this water is stored and subsequently used, the take and use of water from a water storage facility is permitted by Rule R156.

In addition, the PNRP includes whaitua catchment specific provisions. The proposed water take is located in the Kāpiti Coast Whaitua. Rule K.R1 in Chapter 10 – Kāpiti Coast Whaitua of the PNRP also applies to the proposed water take. Rule K.R1 allows for the take and use of water from the Waitohu River and its tributaries (being one of the rivers listed in Table 10.2 and 10.3 of Chapter 10) as a restricted discretionary activity subject to compliance with a range of conditions relating to minimum flows and allocations. The proposed water take is able to comply with these conditions and therefore a water permit is also sought for the proposed water take under Rule K.R1.

Rule R159 provides for the take of groundwater and the associated diversion and discharge of that water for the purpose of dewatering a site as a permitted activity subject to a number of conditions. It is possible that project related dewatering could exceed the permitted activity standards in Rule R159 (including in respect of duration). As a result, and on a precautionary basis, consent is sought as a discretionary activity pursuant to sections 9(2), 14 and 15 of the Rule and Rule R160 of the PNRP.

Permanent and temporary diversion of water within streams (for example, to facilitate culvert installation) will be required. Rule R147 is a default rule for the damming or diverting of water within or from a river that is not provided for by a range of other rules. It is considered that the proposed works are not provided for by other rules and therefore Rule R147 applies. This Rule is subject to two standards that relate to minimum flows and any river identified in Schedule A1. The proposed diversions comply with these standards and therefore a water permit is sought pursuant to section 14 of the RMA and Rule R147 of the PNRP as a discretionary activity for diversion of streams.

In summary, the following consents are required, and sought, for the taking, use and diversion of water in Wellington under the PNRP:

- a water permit is sought pursuant to section 14 of the RMA and Rules R158 and K.R1 of the PNRP as a **discretionary and restricted discretionary activity** respectively for the taking and use of water from the Waitohu Stream.
- a water permit and discharge permit are sought pursuant to sections 14 and 15 of the RMA and Rule R160 of the PNRP as a **discretionary activity** for construction and on-going dewatering.
- a water permit is sought pursuant to section 14 and Rule 147 of the PNRP as a **discretionary activity** for the diversion of streams.

19.5 Activities in watercourse, beds of lakes and rivers and damming

19.5.1 Horizons One Plan

Chapter 17 of the One Plan contains rules for activities involving the beds of rivers and lakes (not within a rare, threatened, or at-risk habitat).

The Ō2NL Project includes bridges over the Waiauti, Manakau, Waikawa and Kuku Streams and the Ohau River. The following sites have site/reach specific Schedule B values of ecological and water quality relevance:

- the Ohau River at the site of the bridge crossing is identified as a Site of Significance-Aquatic (SOS-A), Trout Fishery (TF), Domestic Food Supply (DFS); and
- the Waikawa Stream at the site of the bridge crossing is identified as a Site of Significance-Aquatic (SOS-A), Site of Significance-Riparian (SOS-R), Domestic Food Supply (DFS).

Accordingly, a land use consent is sought pursuant to Rule 17-3 of the One Plan as a discretionary activity for the placement of a bridge over the Ohau River and Waikawa Stream (and associated disturbance, diversion, deposition and discharges) because they are both identified as a Schedule B – Site of Significance – Aquatic.

The proposed bridges over the Waiauti, Manakau and Kuku Streams are over reaches of these water bodies that have Schedule B values Flood Control and Drainage in the One Plan and therefore Rule 17-15 applies that provides for 'activities affecting Schedule B Value of Flood Control and Drainage' and land use consent is sought pursuant to sections 9(2), 13, 14 and 15 of the RMA and Rule 17-15 as a discretionary activity.

The subsequent use of the bridges once they are consented and constructed is a permitted activity under Rule 17-4 of the One Plan.

Rule 17-10 of the One Plan provides for installation of culverts and ancillary works as a permitted activity subject to compliance with standards. Of the culverts proposed, the majority cannot meet the permitted activity standards, mainly due to the length, diameter, embedment depth, and alignment of the culverts.

Accordingly, a land use consent is sought pursuant to Rule 17-23 as a discretionary activity for the proposed culverts and associated disturbance, diversion, deposition and discharges, within watercourses which cannot comply with Rule 17-10.

By way of summary, the following consents are required under Chapter 17 of the One Plan:

- a land use consent is sought pursuant to sections 9(2), 13, 14 and 15 of the RMA and Rule 17-3 of the One Plan as a discretionary activity for the placement of a bridge over the Ohau River and Waikawa Stream (and associated disturbance, diversion, deposition and discharges).
- a land use consent is sought pursuant to section13 of the RMA and Rule 17-23 of the One Plan as a discretionary activity for the placement of culverts (and associated disturbance, diversion, deposition and discharges);
- a land use consent is sought pursuant to sections 9(2), 13, 14 and 15 of the RMA and Rule 17-15 of the One Plan as a discretionary activity for the placement of a bridge over the Waiauti, Manakau and Kuku Streams (and associated disturbance, diversion, deposition and discharges).

19.5.2 Proposed Natural Resources Plan for the Wellington Region

There are no rivers or streams in the section of the Project within the Wellington region where bridge structures are required. Several minor watercourses are traversed by the Ō2NL Project and culverts will be installed at these locations.

Rule R126 provides for the placement of a culvert or an ancillary culvert structure that is fixed in, or on, the bed of a river as a permitted activity subject to a number of Standards. The culverts required for the Ō2NL

Project are generally not able to comply with the permitted activity Standards in Rule R126 primarily due to their length and size. Where the Standards cannot be met, land use consent is required pursuant to sections 13, 14 and 15 of the RMA and Rule R145 of the PNRP as a discretionary activity for the placement of culverts (but not reclamation or diversion of water). It is anticipated that a resource consent under Rule R145 would also authorise ancillary construction related activities within a riverbed that are not otherwise permitted by the rules in the PNRP.

In addition, some of the proposed culverts result in the realignment of a watercourse. As a result those culverts cannot be regarded as forming a 'reasonable crossing point' for the purposes of the PNRP rules, and therefore instead are considered as 'piping and reclamation' for the purpose of the PNRP. Rule R142 provides for the reclamation of rivers as a discretionary activity in certain circumstances. These circumstances are not relevant to the Project and as such, consent is required under Rule R143 as a non-complying activity for the reclamation of the beds of the relevant waterways to allow for the piped realignment of the waterway.

19.6 Resource Management (National Environmental Standards for Freshwater) Regulations 2020

Part 3 of the NES-F includes a suite of regulations for activities that relate to freshwater. In addition to the provisions of the One Plan and the PNRP, these NES-F regulations are relevant to the Ō2NL Project, and particularly:

- specified infrastructure in natural wetlands (Subpart 1, Regulation 45);
- the reclamation of rivers (Subpart 2, Regulation 57); and
- the passage of fish affected by structures (Subpart 3, Regulations 70 and 71).

19.6.1 Specified infrastructure in natural wetlands

Regulation 45 provides for the following as a discretionary activity:

> *"(1) Vegetation clearance within, or within a 10 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.*
>
> *(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure.*
>
> *(3) Earthworks or land disturbance outside a 10 m, but within a 100 m, setback from a natural wetland is a discretionary activity if it—*
>
> *(a) is for the purpose of constructing specified infrastructure; and*
>
> *(b) results, or is likely to result, in the complete or partial drainage of all or part of the natural wetland.*
>
> *(4) The taking, use, damming, diversion, or discharge of water within, or within a 100 m setback from, a natural wetland is a discretionary activity if it is for the purpose of constructing specified infrastructure."*

'Specified infrastructure' is defined in the National Policy Statement for Freshwater Management 2020 (NPS-FM) as follows:

> *"(a) infrastructure that delivers a service operated by a lifeline utility (as defined in the Civil Defence Emergency Management Act 2002);*
>
> *(b) regionally significant infrastructure identified as such in a regional policy statement or regional plan*
>
> *(c) any public flood control, flood protection, or drainage works carried out:*
>
> *(i) by or on behalf of a local authority, including works carried out for the purposes set out in section 133 of the Soil Conservation and Rivers Control Act 1941; or*

(ii) for the purpose of drainage by drainage districts under the Land Drainage Act 1908"

The state highway network is 'specified infrastructure' because:

- Part B of Schedule 1 to the Civil Defence and Emergency Management Act (Clause 6) lists *"an entity that provides a road network (including State highways)*" as a lifeline utility;
- The One Plan in Regional Policy Statement in Policy 3.1 lists "*the road and rail networks as mapped in the Regional Land Transport Strategy*" as infrastructure or regional or national importance;
- the Regional Policy Statement for the Wellington Region (GRPS) includes 'the Strategic Transport Network, as defined in the Wellington Regional Land Transport Strategy 2007-2016' in a definition of 'regionally significant infrastructure'; and
- the PNRP includes 'the Strategic Transport Network (including ancillary structures required to operate, maintain, upgrade and develop that network)' in a definition of 'regionally significant infrastructure and the 'Strategic Transport Network' is defined as including "*All existing and proposed state highways*".

Wetlands in both the Manawatū-Whanganui and Wellington Regions will be impacted by the Ō2NL Project, either directly or through works within 100m of the edge of the wetlands. Therefore land use consents and water permits are sought pursuant to sections 9(2), 14 and 15 of the RMA and Regulation 45 of the NES-F for a **discretionary activity** for vegetation clearance, earthworks, land disturbance and the taking, use, damming, diversion, or discharge of water within or near natural wetlands for the purposes of constructing specified infrastructure.

19.6.2 Reclamation of rivers

Regulation 57 of the NES-F provides for the reclamation of the bed of any river as a discretionary activity.

'Reclamation' is defined by Regulation 3 of the NES-F with reference to the relevant National Planning Standards 2019 as "*the manmade formation of permanent dry land by the positioning of material into or onto any part of a river (with certain exclusions)*".

Because the Ō2NL Project include the 'loss of stream' length where culverts are installed such works could be interpreted as being a 'reclamation' under the NES-F. On this basis, Waka Kotahi has elected to take a precautionary approach and therefore resource consent as a **discretionary activity** is sought pursuant to section 13 and Regulation 57 of the NES-F.

19.6.3 Passage of fish

Regulation 70 of the NES-F provides for the placement, use, alteration, extension, or reconstruction of a culvert in, on, over, or under the bed of any river or connected area is a permitted activity if it complies with the following conditions:

"(2) The conditions are that—

(a) the culvert must provide for the same passage of fish upstream and downstream as would exist without the culvert, except as required to carry out the works to place, alter, extend, or reconstruct the culvert; and

(b) the culvert must be laid parallel to the slope of the bed of the river or connected area; and

(c) the mean cross-sectional water velocity in the culvert must be no greater than that in all immediately adjoining river reaches; and

(d) the culvert's width where it intersects with the bed of the river or connected area (s) and the width of the bed at that location (w), both measured in metres, must compare as follows:

(i) where $w \leq 3$, $s \geq 1.3 \times w$:

(ii) where $w > 3$, $s \geq (1.2 \times w) + 0.6$; and

(e) *the culvert must be open-bottomed or its invert must be placed so that at least 25% of the culvert's diameter is below the level of the bed; and*

(f) *the bed substrate must be present over the full length of the culvert and stable at the flow rate at or below which the water flows for 80% of the time; and*

(g) *the culvert provides for continuity of geomorphic processes (such as the movement of sediment and debris)."*

It is expected that the majority of the culverts to be installed for the Ō2NL Project will be able to comply with the NES-F permitted activity standards. However, at the time of detailed design there is the potential that some may not be able to comply with the hydraulic and morphological culvert standards. As a result, resource consents are sought on a precautionary basis to authorise culverts that are unable to comply with the NES-F permitted activity standards as a **discretionary activity** pursuant to section 13 of the RMA and Regulation 71 of the NES-F.

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

The NES-CS seeks to ensure that land affected by contaminants in soil is appropriately assessed and made safe for human use. Under the NES-CS, if a proposed activity involves any of the following on land that is being used, or has been used, or is more likely than not to have been used for an activity described on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL), then the Regulations apply:

- removing or replacing a fuel storage system;
- soil sampling;
- soil disturbance;
- subdivision of land; or
- a change in land use.

A preliminary site investigation (PSI) has identified that there are 35 potential HAIL sites within or adjacent to the proposed designations for the Ō2NL Project, with 26 of these HAIL sites identified as market gardens and orchards and one site identified as historic cleanfill/landfill. The Project will disturb the soil in, and change the land use of, the HAIL sites and therefore the NES-CS applies to the Ō2NL Project.

Waka Kotahi will undertake detailed site investigations (DSIs) including soil testing of sites traversed by the Ō2NL Project in subsequent design phases and once land access becomes available. Informed by the DSI results, if necessary Waka Kotahi will then apply for any resource consents required by the NES-CS regulations and/or the relevant Regional Plans. Waka Kotahi will share the results of the DSI with the relevant district and regional council when they are completed.

19.8 Offsetting sites

Restoration and riparian planting, along with stream and wetland restoration are required by the conditions of the resource consents to offset residual effects on terrestrial and freshwater ecology. It is possible that some of these activities will require resource consents under the One Plan and/or the NES-F depending on the nature and location of the particular activities.

Once the offsetting sites have been confirmed; landowner agreements are in place, and the detailed plans for the sites have been developed, any necessary resource consents can be obtained. This approach is considered appropriate because it allows for ongoing engagement to occur with landowners and for the

development of a detailed approach (noting the information requirements in Schedule 2 to the NES-F for instance) to be developed alongside the certification of the Ecology Management Plan.

19.9 Bundling of applications for resource consents

Given the extent to which the activities for which resource consents are required in each region are interrelated and overlapping, they cannot realistically be considered separately. Therefore, it is appropriate for the resource consent applications to be 'bundled' together and considered jointly. As the most restrictive status for consents sought in both the Manawatū - Whanganui region and Wellington region is non-complying, the overall 'bundled' activity status for the application suite in each region is non-complying.

19.10 Resource consent duration and lapse periods

Section 123 of the RMA defines the maximum duration for which consents may be granted. Under section 123(c) the maximum period for any land use consent granted pursuant to section 13 of the RMA is 35 years and, under section 123(d), a maximum duration of 35 years also applies to resource consents granted pursuant to section 14 and 15 of the RMA. No maximum duration applies to resource consents granted under section 9(2) of the RMA.

Where resource consents are sought for on-going activities, such as structures in water bodies, stream diversions, and certain discharges, these consents will need to remain in place to authorise such activities on an enduring basis. For this reason, the maximum duration of 35 years is sought for these resource consents. Where resource consents are sought for construction activities, a duration of ten years is sought to provide a conservative timeframe for the completion of construction activities.

Under section 125 of the RMA, a resource consent lapses on the date specified in the consent, or (for discharge permits, water permits and land use consents) five years after the consent commences if no date is specified. In this instance, Waka Kotahi seeks a specified date, being ten years from resource consents being granted. This timeframe aligns with the lapse period sought for the proposed designations. Details of the resource consents being sought, including their expiry and lapse periods is included in the proposed conditions in Appendix Five.

19.11 Summary of resource consents sought

19.11.1 Construction phase resource consents

The resource consents that are sought for the construction phase of the Ō2NL Project are summarised in Table 19-4.

Table 19-4 – Construction phase resource consents

Rule reference	Activity status	Consents required
Manawatū-Whanganui Region		
One Plan Chapter 13 land use activities and indigenous biological diversity rule 13-2 large scale land disturbance including earthworks	Controlled activity	A land use consent is sought pursuant to sections 9(2), 14 and 15 of the RMA and Rule 13-2 for large scale earthworks (including the ancillary diversion of water and the discharge of sediment to water) where the earthworks are not: - in a rare, at risk or threatened habitat; - within 5m of the bed of a permanently flowing river; - within 5m of the bed of a river that is not permanently flowing and has a width greater than 1m; or - within 10m of a wetland identified in Schedule F.

Rule reference	Activity status	Consents required
One Plan Chapter 13 land use activities and indigenous biological diversity Rule 13-7 vegetation clearance, land disturbance, cultivation or forestry that does not comply with Rules 13-1 to 13-6	Discretionary activity	A land use consent is sought pursuant to sections 9(2), 13, 14 and 15 of the RMA and Rule 13-7 for land disturbance and vegetation clearance (including any ancillary disturbance of the bed of a river division of water and discharge of sediment or slash) that is not in a 'rare', 'at-risk' or 'threatened' habitat and is: - within 5m of the bed of a permanently flowing river; - within 5m of the bed of a river that is not permanently flowing and has a width greater than 1m; or - within 10m of a wetland identified in Schedule F but outside of a rare, at risk or threatened habitat.
One Plan Chapter 13 land use activities and indigenous biological diversity rule 13-8 Some activities within 'at-risk' habitats	Discretionary activity	A land use consent is sought pursuant to sections 9(2) and 13 of the RMA and Rule 13-8 for large scale earthworks and vegetation clearance within an at-risk habitat.
		A water permit is sought pursuant to section 14 of the RMA and Rule 13-8 for the diversion of water within an at-risk habitat.
		A discharge permit is sought pursuant to section 15 of the RMA and Rule 13-8 for the discharge of water or contaminants to water or land within an at-risk habitat.
One Plan Chapter 13 land use activities and indigenous biological diversity rule 13-9 some activities within rare habitats and threatened habitats	Non-complying activity	A land use consent is sought pursuant to sections 9(2) and 13 of the RMA and Rule 13-9 for large scale earthworks and vegetation clearance within a 'rare' or 'threatened' habitat.
		A water permit is sought pursuant to section 14 of the RMA and Rule 13-9 for the diversion of water within a 'rare' or 'threatened' habitat.
		A discharge permit is sought pursuant to section 15 of the RMA and Rule 13-9 for the discharge of water or contaminants to water or land within a 'rare' or 'threatened' habitat.
One Plan Chapter 14 discharges to land and water 14-30 discharges of water or contaminants to land or water not covered by other rules in this plan or chapter	Discretionary activity	A discharge permit is sought pursuant to section 15 of the RMA and Rule 14-30 for the discharge or placement of cleanfill.
One plan Chapter 15 air discharges Rule 15-17 Other discharges	Discretionary activity	A discharge permit is sought pursuant to section 15 of the RMA and Rule 15-17 of the One Plan for the discharge of contaminants to air.
One Plan Chapter 16 Takes, Uses and Diversions of Water, and Bores Rule 16-5 Takes and uses of surface water complying with core allocations	Controlled activity	A water permit is sought pursuant to section 14 of the RMA and Rule 16-5 for the taking of surface water.

Rule reference	Activity status	Consents required
One Plan Chapter 16 Takes, Uses and Diversions of Water, and Bores Rule 16-9 Other takes and uses of water	Discretionary activity	A water permit is sought pursuant to section 14 of the RMA and Rule 16-9 for the taking of water for construction related dewatering outside of an 'at-risk', 'rare' or 'threatened' habitat.
One Plan Chapter 17 Activities in Artificial Watercourses, Beds of Rivers and Lakes, and Damming 17-3 Structures and disturbances involving a reach of river or its bed with Schedule B Values of Natural State, Sites of Significance - Aquatic and Sites of Significance - Cultural.	Discretionary activity	A land use consent is sought pursuant to sections 9(2), 13, 14 and 15 of the RMA and Rule 17-3 of the One Plan as a discretionary activity for the placement of a bridge over the Ohau River and Waikawa Stream (and associated disturbance, diversion, deposition and discharges).
One Plan Chapter 17 Activities in Artificial Watercourses, Beds of Rivers and Lakes, and Damming Rule 17-15 Activities affecting Schedule B Value of Flood Control and Drainage	Discretionary activity	A land use consent is sought pursuant to sections 9(2), 13, 14 and 15 of the RMA and Rule 17-15 of the One Plan for the placement of a bridge over the Waiauti, Manakau and Kuku Streams (and associated disturbance, diversion, deposition and discharges).
NES-F Construction of specified infrastructure Regulation 45	Discretionary activity	A land use consent is sought pursuant to sections 9(2) of the RMA and Regulation 45 of the NES-F for vegetation clearance, earthworks and land disturbance within or near natural wetlands for the purpose of constructing specified infrastructure.
Wellington Region		
PNRP Rules 5.1 Air Quality Rule R42 All other discharges	Discretionary activity	A discharge permit is sought pursuant to section 15 and Rule R42 on a precautionary basis for discharge to air from the Ō2NL Project works during the construction phase.
PNRP 5.2.15 All Other Discharges Rule R94 All other discharges	Discretionary activity	A discharge permit is sought pursuant to section 15 of the RMA and Rule R94 for the discharge of cleanfill to land and water.
PNRP Water Allocation Rules 5.5 Rule R158 All other take and use	Discretionary activity	A water permit is sought pursuant to section 14 and Rule R158 for the taking of surface water.
PNRP 10. Kāpiti Coast Whaitua Rule K.R1: Take and use of water in the Kāpiti Coast Whaitua	Restricted Discretionary activity	A water permit is sought pursuant to section 14 and Rule K.R1 for the taking of services water in Kāpiti Whaitua.

Rule reference	Activity status	Consents required
NES-F Construction of specified infrastructure Regulation 45	Discretionary activity	A land use consent is sought pursuant to sections 9(2) of the RMA and Regulation 45 of the NES-F for vegetation clearance, earthworks and land disturbance within or near natural wetlands for the purpose of constructing specified infrastructure.

19.11.2 Operational phase resource consents

The resource consents that are sought for activities that form part of the operational phase of the Ō2NL Project are summarised in Table 19-5. The activities set out below are those that require ongoing authorisation once the construction of the Project is complete.

Table 19-5 - Operational phase resource consents

Rule reference	Activity status	Consents required
Manawatū-Whanganui Region		
One plan Chapter 13 land use activities and indigenous biological diversity rule 13-8 some activities within 'at-risk' habitats	Discretionary activity	A water permit is sought pursuant to section 14 of the RMA and Rule 13-8 for the diversion of water associated with large scale earthworks and vegetation clearance within an at-risk habitat
		A discharge permit is sought pursuant to section 15 of the RMA and Rule 13-8 for the discharge of sediment to water associated with large scale earthworks and vegetation clearance within an at-risk habitat.
One plan Chapter 13 land use activities and indigenous biological diversity rule 13-9 some activities within rare habitats and threatened habitats	Non-complying activity	A water permit is sought pursuant to section 14 of the RMA and Rule 13-9 for the diversion of water associated with large scale earthworks and vegetation clearance within a 'rare' or 'threatened' habitat.
		A discharge permit is sought pursuant to section 15 of the RMA and Rule 13-9 for the discharge of sediment to water associated with large scale earthworks and vegetation clearance (and associated diversion of water and discharge of sediment) within an at-risk habitat.
One plan Chapter 14 discharges to land and water Rule 14-25 discharges of contaminants to a reach of a river or its bed with schedule B values of natural state and sites of significance - aquatic	Discretionary activity	A discharge permit is sought pursuant to section 15 of the RMA and Rule 14-25 of the One Plan as a discretionary activity for the discharge of treated stormwater to a reach of a surface water body or its bed with a Schedule B Value of Sites of Significance – Aquatic.
One Plan Chapter 16 Takes, Uses and Diversions of Water, and Bores Rule 16-9 Other takes and uses of water	Discretionary activity	A water permit is sought pursuant to section 14 and Rule 16-9 of the One Plan for the taking of water for operational related dewatering outside of an 'at-risk', 'rare' or 'threatened' habitat.

Rule reference	Activity status	Consents required
One Plan Chapter 16 Takes, Uses and Diversions of Water, and Bores Rule 16-13 Diversions that do not comply with permitted activity and controlled activity rules	Discretionary activity	A water permit is sought pursuant to section 14 of the RMA and Rule 16-13 of the One Plan for the diversion of water outside of an 'at-risk'. 'rare' or 'threatened' habitat.
One Plan Chapter 17 Activities in Artificial Watercourses, Beds of Rivers and Lakes, and Damming Rule 17-23 Activities that do not comply with permitted activity, controlled activity or restricted discretionary activity rules and all other s13(1) RMA activities not covered by this chapter.	Discretionary activity	A land use consent is sought pursuant to section 13 of the RMA and Rule 17-23 for the placement of culverts (and associated disturbance, diversion, deposition and discharges)
NES-F Construction of specified infrastructure Regulation 45	Discretionary activity	A water pemit is sought pursuant to sections 14 and 15 of the RMA and Regulation 45 of the NES-F the taking, use, damming, diversion, or discharge of water within or near natural wetlands for the purposes of constructing specified infrastructure.
NES-F Reclamation of rivers Regulation 57	Discretionary activity	A land use consent is sought pursuant to section 13 and Regulation 57 of the NES-F of the reclamation of stream beds.
NES-F Culverts Regulation 71	Discretionary activity	A land use consent is sought pursuant to section 13 of the RMA for the placement, use, alteration, extension, or reconstruction of a culvert in, on, over, or under the bed of a river.
Wellington Region		
PNRP Discharges to Land and Water (Rules 5.2) R50 Stormwater from new subdivision and development	Restricted Discretionary	A discharge permit is sought pursuant to section 15 of the RMA and Rule R50 of the PNRP as a discretionary activity for the discharge of treated stormwater from the Ō2NL Project.
PNRP Rules 5.3 Land Use Rule R107 Earthworks and vegetation clearance	Discretionary activity	A land use consent is sought pursuant to sections 9(2) and 15 of the RMA and Rule R107 for earthworks (including any discharge of sediment).
PNRP Wetlands and beds of lakes and rivers (Rules 5.4) R118 Activities in Natural Wetlands	Non-complying activity	A land use consent is sought pursuant to sections 9(2), 14 and 15 of the RMA and Rule R118 of the PNRP as a non-complying activity for the works within, and reclamation of, a wetland.
PNRP 5.4.6 Reclamation and placement of a dam	Non-complying activity	A land use consent is sought pursuant to sections 13 of the RMA and Rule R143 of the PNRP the reclamation of streams associated with the installation of culverts.

Rule reference	Activity status	Consents required
Rule R143 Reclamation of the bed of a river or lake outside of a site identified in Schedule A1 (outstanding rivers), Schedule A2 (outstanding lakes) or Schedule C (mana whenua)		
PNRP Wetlands and beds of lakes and rivers (Rules 5.4) Rule R145 All other use of river and land beds	Discretionary activity	A land use consent is sought pursuant to sections 13, 14 and 15 of the RMA and Rule R145 of the PNRP as a discretionary activity for the placement of culverts (but not reclamation or diversion of water)
PNRP Wetlands and beds of lakes and rivers (Rules 5.4) R147 Damming or diverting water within or from rivers	Discretionary activity	A water permit is sought pursuant to section 14 of the RMA and Rule R147 of the PNRP for diversion of streams.
PNRP Water Allocation (Rules 5.5) Rule R160 Dewatering	Discretionary activity	A water permit is sought pursuant to section 14 of the RMA and Rule R160 of the PNRP for dewatering.
		A discharge permit is sought pursuant to section 15 of the RMA and Rule R160 of the PNRP for dewatering.
NES-F Construction of specified infrastructure Regulation 45	Discretionary activity	A water pemit is sought pursuant to sections 14 and 15 of the RMA and Regulation 45 of the NES-F the taking, use, damming, diversion, or discharge of water within or near natural wetlands for the purposes of constructing specified infrastructure.
NES-F Reclamation of rivers Regulation 57	Discretionary activity	A land use consent is sought pursuant to section 13 and Regulation 57 of the NES-F of the reclamation of stream beds.
NES-F Culverts Regulation 71	Discretionary activity	A land use consent is sought pursuant to section 13 of the RMA for the placement, use, alteration, extension, or reconstruction of a culvert in, on, over, or under the bed of a river.

19.12 Permitted activities

Resource consents are not required for activities that are permitted activities under the RMA and the relevant regional or district plan.

As set out above and in Appendix One, resource consents are not considered to be required in the circumstances set out below.

19.12.1 Manawatū-Whanganui Region

- Vegetation clearance (and associated diversion of water and discharge of sediment), pursuant to sections 9(2), 14 and 15 of the RMA and Rule 13-5 is a permitted activity where the vegetation clearance is not:
  - in a rare, at risk or threatened habitat;
  - within 5m of the bed of a permanently flowing river;

- within 5m of the bed of a river that is not permanently flowing and has a width greater than 1m; or
- within 10m of a wetland identified in Schedule F.

- The discharge of water to water from dewatering and surface water take for construction activity outside of a 'rare', 'threatened' or 'at-risk' habitats and when the discharge is not directly to a reach of a river or its bed with Schedule B values of 'Sites of Significance – Aquatic' is a permitted activity pursuant to section 15 of the RMA and Rule 14-12.
- The discharge of construction and operational stormwater outside of 'rare', 'threatened' or 'at-risk' habitats and when the discharge is not directly to a reach of a river or its bed with Schedule B values of 'Sites of Significance – Aquatic' is a permitted activity pursuant to s15 of the RMA and Rule 14-18.
- Minor takes of surface water for establishment works that meet the relevant standards is a permitted activity pursuant to section 14 of the RMA and Rule 16-1.
- Bore testing that meets the relevant standards is a permitted activity pursuant to section 14 of the RMA and Rule 16-4.
- The taking, discharge and diversion of drainage water outside of an 'at-risk', 'rare', or 'threatened' habitat that meets the relevant standards is a permitted activity pursuant to sections 14 and 15 of the RMA and Rule 16-11.
- The use of a structure located in, on, under or over the bed of a river (including ancillary diversions and discharges) is a permitted activity under Rule 17-4 of the One Plan.

19.12.2 Wellington Region

- The discharge of contaminants to air from mobile sources is a permitted activity pursuant to section 15(1) of the RMA and Rule R33 of the PNRP.
- Undertaking a detailed site investigation is a permitted activity pursuant to section 9(2) of the RMA and Rule R81 of the PNRP.
- The removal of vegetation from the bed of any river is a permitted activity pursuant to section 13 of the RMA and Rule R137 of the PNRP
- The take and use of water from storage ponds in the Wellington Region is a permitted activity pursuant to section 14 of the RMA and Rule R156 of the PNRP.

19.12.3 Horowhenua District

In some locations the SUP is located outside of area subject to the proposed designation and, as set out above, the works to relocate and improve the Tararua Road and existing SH1 intersection are, located outside of the proposed designation and partially within the existing SH1 designation (Designation D2, 'State Highway 1 - To undertake maintenance, operation and use of, and improvement of a State Highway'). Where the SUP and intersection are not within the existing or proposed designations, the rules in the HDP apply.

The SUP and intersection works are located in the Rural Zone and Industrial Zone in the HDP. The rules that apply to both zones provide for 'the construction, operation, maintenance and minor upgrading of network utilities'[3] as a permitted activity subject to compliance with standards.[4] The standards require compliance with the permitted activity standards that apply in the respective zone and the permitted activity standards for network utilities in Chapter 22 of the HDP. It is anticipated that the construction and operation of the proposed SUP and relocated intersection (where outside of Waka Kotahi designations)

[3] 'Network utility' is defined by the HDP as including 'roading'. 'Roading' is not defined by the HDP. The RMA defines 'road' by reference to the section 315 of the Local Government Act 1974 ("LGA 1974"). The LGA 1974 clearly anticipates that roads include footpaths and cycle tracks, for instance in section 319(1)(f) that sets out the powers councils have in respect of roads.
[4] Rural Zone Rule 19.1(m) and Industrial Zone Rule 16.1(m).

can be undertaken in manner that achieves compliance with all relevant permitted activity standards and, on this basis, no resource consent is required.

19.13 Existing water permits

As part of the acquisition of land for the Ō2NL Project, Waka Kotahi may acquire land where the owner holds a water permit for the taking and use of groundwater. In such circumstances, the water permit may be transferred to Waka Kotahi, under section 136 of the RMA so that Waka Kotahi may use that water for construction related activities and mitigation.

PART E: CONSIDERATION OF ALTERNATIVES

20 Overview

This Section explains the process that has been undertaken by Waka Kotahi to consider alternative sites, routes and methods for the Ō2NL Project. The assessment of alternatives has been guided by the identified problems with the existing state highway corridor (in particular safety and resilience issues), Part II of the RMA and the closely related Ō2NL Project objectives.

A wide range of strategic alternatives was considered for addressing the problems, including land use changes, public transport improvements, speed management, upgrading the existing route and different extents of new routes. The assessment of these strategic alternatives showed the provision of a new offline highway as the only solution that appropriately addressed the problems identified with the current network.

Following confirmation of an offline highway for the Ō2NL Project was the detailed consideration of alternative route corridors. The start and end points for the Ō2NL Project are the northern end of the PP2Ō expressway just north of Ōtaki, and SH1 just north of Levin (to provide for a bypass of the Levin town centre). A wide range of possible corridors were considered to connect those two points.

Constraints were identified and a “long list” of broad corridor alternatives were formulated and considered. Public and stakeholder consultation and engagement on the corridor long list resulted in a "short list" of corridors being identified and then further considered and assessed. That process culminated in the identification of a preferred 300m wide corridor option in the Indicative Business Case (IBC)[1] for the Ō2NL Project in 2018. Based on the IBC, the Waka Kotahi Board determined[2] that an off-line highway in a corridor to the east of Levin was the preferred alternative to be taken forward into more detailed phases of consideration.

Following the confirmation of the preferred corridor, the subsequent assessment stages undertaken during the Detailed Business Case (DBC)[3] phase of the Project in 2020-22 included a comprehensive and increasingly refined assessment of the highway route alignment, interchange forms and locations, and local road connection alternatives, as summarised below:

- long listing/short listing and analysis of potential highway route options within the preferred corridor;
- selection of preferred highway route; and
- refinement of route, local road connections and interchange connections.

A number of methods and tools have been used to help evaluate alternatives and guide decisions throughout the alternatives assessment process, including:

- technical specialist evaluations;

[1] https://www.nzta.govt.nz/assets/projects/otaki-to-north-of-levin/docs/technical-reports/ibc/Otaki-to-North-of-Levin-IBC-20181128.pdf
[2] See Board Meeting minutes from Friday 14 December 2018 (i.e. Resolution 2): https://www.nzta.govt.nz/assets/About-us-2/docs/board-meeting-minutes-2017/minutes-20181214.pdf
[3] The reports that set out the alternatives considerations undertaken during the DBC phase are available at https://www.nzta.govt.nz/otaki-to-north-of-levin/consent-applications.

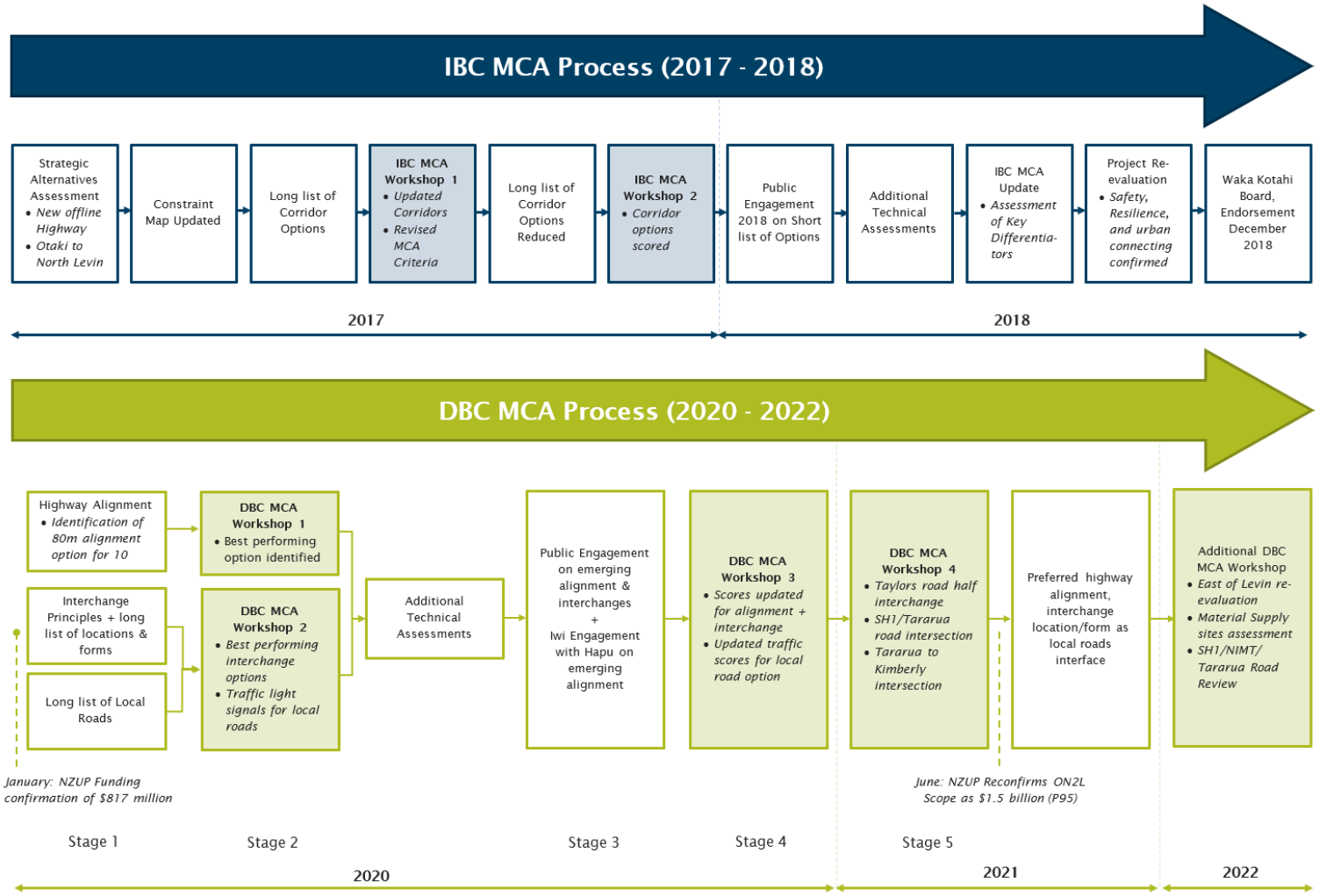
- Multi Criteria Analysis (MCA) – a tool that can be used to compare and evaluate alternatives and options; and
- project iwi partner, stakeholder, community and landowner engagement.

The Material Supply and Spoil Sites selection reports (attached as Appendices 4.4 and 4.5 to the Design and Construction Report (DCR) (Appendix Four to Volume II) should be referred to for more detail on the alternatives and site selection process undertaken for those sites that are within the boundaries of the proposed NoR.

Overall, the identification, evaluation and refinement of alternatives for the Ō2NL Project has been subject to a comprehensive process of information gathering and careful analysis undertaken by broad multi-disciplinary teams and informed by engagement with the Project Iwi Partners, HDC, KCDC, stakeholders and the community. Part F of the AEE summarises the process and the outcomes from the consultation and engagement undertaken for the Ō2NL Project that have assisted in informing the consideration of alternatives process.

Figure 20-1 below sets out the timeline of the consideration of alternatives processes followed since 2017. This process is further explained in the following sub-sections of this report.

Figure 20-1 Timeline of the alternative's consideration processes followed since 2017



21 Statutory requirements

21.1 Resource Management Act 1991 (RMA)

In relation to considering the Notices of Requirement, Section 171(1)(b) of the RMA requires that the Territorial Authorities shall have particular regard to:

> *b) Whether adequate consideration has been given [by Waka Kotahi] to alternative sites, routes, or methods of undertaking the work if –*
>
> > *(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or*
> >
> > *(ii) it is likely that the work will have a significant adverse effect on the environment…*

Waka Kotahi does not at this stage have all the property interests necessary to undertake the work and accepts that the Project is also likely to have significant adverse effects on the environment before mitigation and offsetting/compensation is taken into account.

For the resource consents, there are two relevant requirements under Schedule 4 of the RMA:

- *Clause 6(1)(a) requires that an AEE must include a description of possible alternative locations or methods for undertaking the activity where it is likely that the activity will have a significant adverse effect on the environment; and*
- *Clause 6(1)(d)(ii) requires that in relation to applications for discharge permits, "any possible alternative methods of discharge, including discharge into any other receiving environment" be assessed. This also aligns with section 105 requirements.*

Consideration of alternatives is also identified as relevant to the application of several policies within the One Plan RPS and Regional Plan, particularly in respect of discharges; activities that will have ecological impacts; natural hazards; and natural character in respect of critical infrastructure. These policy orientated alternative matters are specifically addressed in the assessment of relevant planning documents in Part I of this AEE.

22 Defining the problems and setting project objectives

The problems that the Ō2NL Project addresses, and as developed as part of the IBC and confirmed in the DBC, are set out below:

Problem 1 – Safety

A high and increasing demand for travel coupled with inadequate transport infrastructure is resulting in increasing numbers of deaths and serious injuries on the roading network.

Problem 2 – Resilience

The lack of resilience in the existing transport system means that connections, particularly inter regional, are regularly impaired or lost.

Problem 3 – Horowhenua Development

Growth may not be realised as efficiently as possible as safety and traffic concerns are stymying the efficient development of planned growth areas.

Problem 4 – Levin Town Centre Amenity

High volumes of traffic, including trucks, through the centre of Levin is reducing attractiveness of the main retail area and limiting investment and development.

These problem statements informed the Project objectives for the NoRs[4], which are:

- to enhance safety of travel on the state highway network.
- to enhance the resilience of the state highway network.
- to provide appropriate connections that integrate the state highway and local road network to serve urban areas.
- to enable mode choice for journeys between local communities by providing a north-south cycling and walking facility.
- to support inter-regional and intra-regional growth and productivity through improved movement of people and freight on the state highway network.

The problems and the project objectives, in turn closely inform the process of developing and then assessing alternatives for works to address them.

23 The use of multi-criteria analysis in alternatives consideration

The Multi-Criteria Analysis ("MCA") process has been used by Waka Kotahi throughout the alternatives assessment and refinement process to compare different alternatives and options and help to inform decision making. Detailed provision of the methodology used throughout the alternatives consideration process can be found in the MCA Reports attached to the IBC and in the DBC MCA report[5]. This section provides a summary.

MCA provides a best practice approach to ensure a robust, replicable and transparent assessment of alternatives and can effectively be used to assess multiple criteria, both quantitative and qualitative. MCA is a tool to indicate which alternatives perform better than others to assist decision makers in making informed decisions. However, other factors, such as the likelihood of securing resource consents under the RMA, can also influence final decision making.

For the Ō2NL Project, all MCA processes have been led by the Project team with specialist technical advice provided by independent subject matter experts on a range of relevant topics, including:

- cultural values and effects
- landscape / visual;
- ecology (terrestrial and freshwater);
- heritage;
- archaeology;
- impact on dwellings / noise and vibration;
- productive land values;
- social / community / recreation

[4] The problem statements also informed the development of the investment objectives identified in the IBC and DBC

[5] https://www.nzta.govt.nz/otaki-to-north-of-levin/consent-applications

- property; and
- project objectives (safety, resilience and transport access/ connections).

The technical topics, together with other matters directly relevant to the Ō2NL Project MCA, were used as assessment criteria for the MCA exercises. Overall, the criteria included a range of objectives, cultural, environmental, property, land use, social, economic and engineering based aspects.

The criteria that have been used remained similar throughout the alternatives assessment process, with adjustments and additions made as appropriate to ensure the criteria remained fit for purpose for that stage and scope of assessment. For example, in earlier stages noise and visual amenity impacts on property were captured under the 'impact on dwellings' criterion, but in later stages were split out with explicit noise, landscape and visual and social impact assessment criteria used.

A number of stakeholders were involved in scoring the criteria as relevant. This included iwi Partners who have provided input on cultural values and effects, and HDC and KCDC who provided input on matters relating to the local road network and other relevant district matters (such as future urban development).

The Ō2NL Project has utilised the decision conferencing method for MCA scoring and evaluating options. This is a group-based assessment approach, reflecting the range of inputs required from different specialists, iwi and Councils. Decision conferencing provides a structured format in a facilitated workshop setting. This exercise is undertaken on the basis of agreed assessment criteria and an agreed scoring approach. Technical / subject matter specialists typically first independently establish provisional scores based on known evidence (usually completed prior to the workshop). At the workshop, each SME presents their own ideas and scores. These scores are then discussed, challenged and moderated (if considered appropriate by the relevant expert) during the workshop.

23.1 Scoring

The majority of the Project's MCAs utilised a 5 or 6 point scoring system to inform the short list of emerging preferred alignments and interchanges (as explained later, local road options were scored using a mixture of scoring point scale and "traffic light" assessment). The scoring system has a range to sufficiently discern the benefits, disbenefits and/or effects of the various options. The scoring system is described in Table 23-1 and has been used for all MCAs with the exception of when "traffic light signal" assessments have been undertaken.

Table 23-1 Six point score system

Score	Description
1	The option presents few difficulties on the basis of the criterion being evaluated and may provide significant benefits in terms of the attribute.
2	The option presents only minor aspects of difficulty on the basis of the criterion being evaluated and may provide some benefits in terms of the criterion.
3	The option presents some aspects of reasonable difficulty in terms of the criterion being evaluated and problems cannot be completely avoided. There are few apparent benefits in terms of the criterion.
4	The option includes clear aspects of difficulty in terms of the criterion being evaluated, and very limited perceived benefits.

Score	Description
5	The option includes significant difficulties or problems in terms of the criterion being evaluated and no apparent benefits.
F ('fatal flaw')	The option will result in completely unacceptable adverse effects that cannot be appropriately avoided, remedied or mitigated (including offsetting).

MCA scoring for the Project also involved weighting of the criteria. A number of different weighting scenarios were developed to test different perspectives on the relative importance of the criteria, these included: a workshop weighting, RMA Section 6, social, environment, cultural and economic weighting scenarios. Scoring was firstly undertaken with all criteria having equal weighting (referred to as "the unweighted scores"). The sensitivity of the results was then examined by exploring their sensitivity to weighted changes to different criteria. All changes to weighting/data were done systematically to assess their effect on the unweighted results. All scoring and weighting exercises were documented in the relevant MCA reports which recorded the specific MCA processes undertaken at the time.

The use of unweighted scoring, and a range of weighting scenarios to test their sensitivities, was intended to generate as much information as possible from the MCA processes. The purpose of the MCA processes was not to arrive at a single set of scores, to then enable the 'best' scoring option to be picked. Instead, gathering a broad range of information (including via weightings) enabled decisions to be made on an overall and informed basis.

24 Historical project investigations and studies

24.1 Historical studies

The alternatives consideration process undertaken for the Ō2NL Project builds on a range of historical transport studies and assessments undertaken in the Ōtaki to north of Levin area since the late 1980s. This history of study and investigation indicates the longevity and severity of the safety and resilience problems that have given rise to the Ō2NL Project.

Reports arising from those previous studies included:

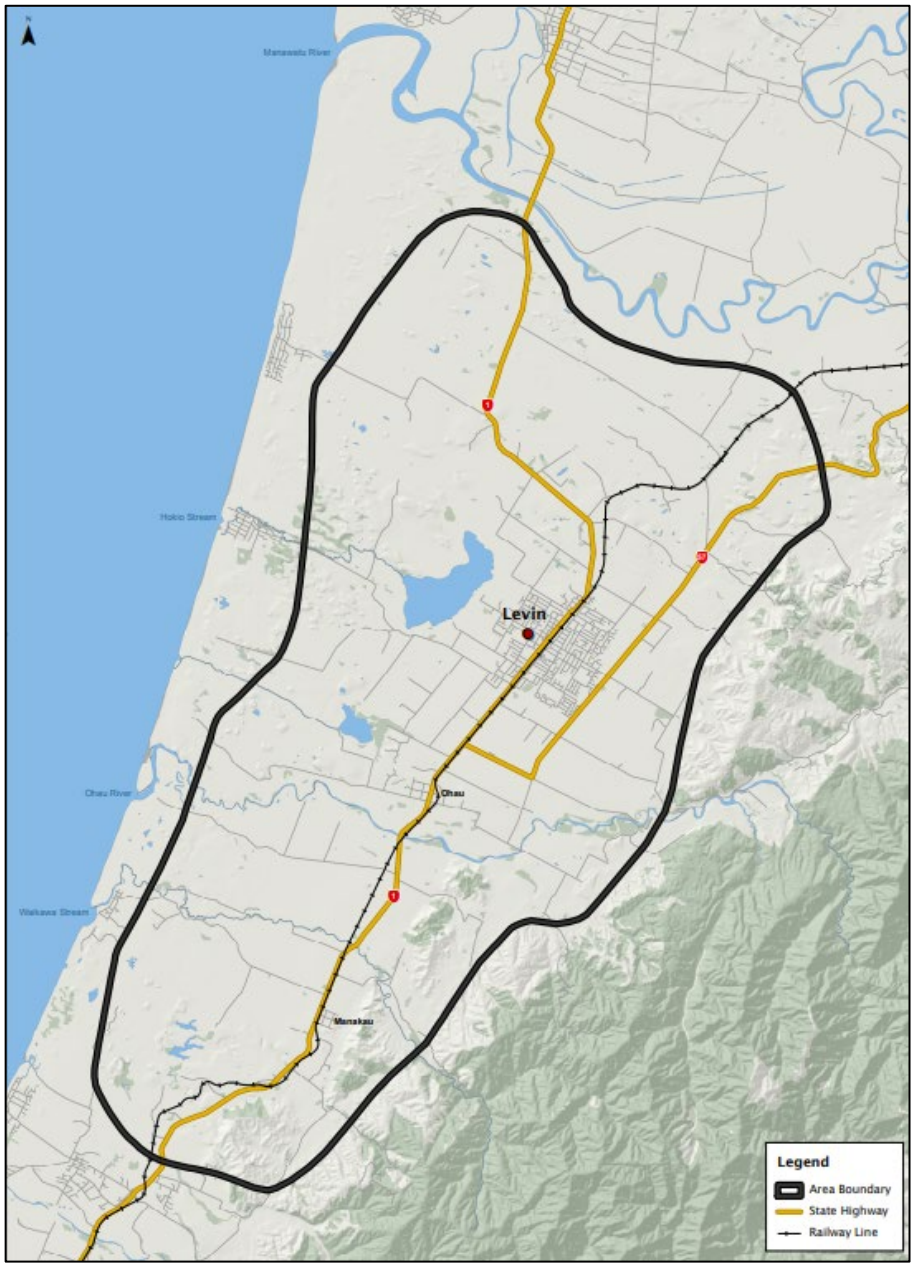
- Levin Bypass Scoping Report, 1989, Works Consultancy Services
- Levin Bypass Project Investigation, 1990, Works Consultancy Services
- Levin Transportation Study, 1995, Traffic Design Group
- SH1 Horowhenua District Strategy Study, 1996, Works Consultancy Services
- Himatangi to Waikanae - Review and Development Study, 2000, Worley
- Himatangi to Waikanae - Strategy, 2000, Worley
- SH1 Levin to Ōtaki Expressway – Proposed Designation Methodology, 2000, Meritec
- Roads of National Significance (RoNS) Wellington Airport to North of Levin Scoping – Taylors Road (Ōtaki) to North of Levin, 2010, New Zealand Transport Agency
- Taylors Road to Pukehou Rail Overbridge – RoNS Corridor Study, 2010, Opus

- A review of these studies and assessments was presented in the Ōtaki to North of Levin Expressway Scoping Report (MWH, July 2012). That scoping report summarised what had previously been identified as key concerns and the associated options and proposals to mitigate and address those concerns.
- While the preference of the older studies was to bypass Levin to the west, later studies recommended an eastern bypass. Several factors contributed to this change:
  - Increasing cultural awareness that acknowledged the impact on iwi of routes across land which is known to contain sites of cultural and historical significance. Areas to the west of Levin are expected to contain large numbers of such sites which have not yet been identified.
  - The number of unknown cultural and historical sites is expected to decrease from west to east, thus impacts on these aspects are expected to be lower for an eastern bypass.
  - Previously unused land between Levin and Punahau/ Lake Horowhenua had been developed for housing.
  - The western route shortens the length of SH1, which used to carry most of the traffic north of Levin, thus a western route was attractive economically. Changing traffic patterns increased traffic volumes using SH57 relative to SH1; with later counts showing slightly more traffic using SH57 than using SH1 north of Levin. A western route increases the travel distance for traffic using SH57, reducing the economic benefits of a western route significantly. Considering the network as a whole leads to consideration of network benefits, not just benefits for SH1.
  - Increasing environmental awareness had placed more emphasis on the environmental impacts of a western bypass, particularly close to Punahau/ Lake Horowhenua.
  - Increasing awareness of the potential effects of earthquakes on a new state highway had prompted a move away from the lower ground and soft liquefiable sediments that occur on the western route. The land is higher to the east and is less prone to liquefaction in an earthquake.
  - Public consultation was firmly in favour of an eastern bypass.

24.2 Scoping reports and further investigations up to 2017

The study area for the 2012 MWH Scoping Report (referred to above) was defined as the termination of the Peka Peka to Ōtaki project to the south, to a point 500m south of the Manawatū River to the north, encompassing the foothills of the Tararua Ranges to the east, and the coastal area (except coastal settlements) to the west. See Figure 24-1 below.

Figure 24-1 Initial study area in 2012



The 2012 MWH Scoping Report included mapping of constraints, traffic modelling, identification of possible route alternatives (using QUANTM software), cost estimates, and a high-level MCA. In total, 81 route alternatives were identified across the entire study area and associated drawbacks of these highlighted.

To consider alternatives to an offline highway, investigations were undertaken in 2013-2015 to assess a range of safety improvement options on the existing highways. The investigations were published in a range of Project Feasibility Reports ("PFRs") as well as a Programme Business Case ("PBC") for north of Levin improvements. Safety improvements for SH1 were progressed to implementation in the Manakau and Ohau townships, and a DBC was prepared for implementing improvements in respect of SH1's Waitarere Beach Road curves (to the northwest of the Ō2NL Project).

Further considerations of options for a shorter offline highway with four-lanes between Taylors Road (to the north of Ōtaki) and the Ōhau River were undertaken later in 2015, with a subsequent study in 2016

undertaking additional investigations into a 4-lane highway between Taylors Road (to the north of Ōtaki) and SH57 to the south of Levin.

Through those processes, Waka Kotahi and its advisors had gained significant insight into the issues creating the key problems on driving the Ō2NL Project, the potential solutions to those problems, possible corridors for a new state highway, and the physical and environmental constraints through which the state highway network needed to operate. The investigations into options on the current highway and options for offline highway corridors provided a strong basis for undertaking a comprehensive assessment of strategic alternatives and corridor options as part of the IBC process for the Project (discussed below).

25 Assessment of strategic alternatives

The starting point for the IBC corridor option development and assessment processes was the evaluation of a range of strategic alternatives that might be able to address the problems impacting on the transport network between Ōtaki and north of Levin. The long list of alternatives considered included:

- **integrated planning** – land use growth and development located spatially so as to maintain current levels or even reduce overall the amount of journeys made by private motor vehicles (including trucks).
- **public transport improvements** – to reduce the demand on the road network.
- **speed management** – a quick low-cost way to partially address the serious safety issue.
- **online expressway solutions** – upgrade the existing state highway to an expressway standard road (2 lanes and then 4 lanes).
- **minor safety improvements –** includes installing signs, line-marking, surfacing, barriers and intersection improvements to reduce the crash risk/severity.
- **localised highway upgrades** – infrastructure upgrades to the existing network at the major problematic areas on the current highway network.
- **larger highway upgrades** – combining some of the nearby localised upgrades to provide a more consistent road environment south of Levin new offline state highway – from the Peka Peka to Ōtaki expressway to the current state highway around Ohau.
- **Taylors Road to north of Levin new offline state highway –** extending the expressway from the south to also bypass Levin.

The following strategic alternatives were not advanced to the short list MCA as they fundamentally would not address the problems in a comprehensive manner:

- Given the nature of Levin (as a rural service centre and through route for SH1) an integrated planning approach would be unlikely to make significant reductions in overall private vehicle travel demand in the short to medium term.
- Investment in public transport would provide benefits for the travelling public but would not fundamentally address the identified problems for this network. In particular, to significantly reduce the number of vehicle crashes, a very large and unrealistic level of mode shift is required, and to deliver on the resilience problem, a separate route would still be required.
- While speed management should always be considered when addressing a safety problem, and it has been relatively effective for the Manakau and Ohau Township improvements implemented in recent years, implementing a lower speed limit over 20km of a National Strategic High Volume state highway outside of urban areas is not an appropriate long-term treatment. In addition, speed management measures in isolation are unlikely to result in significant long-term benefits. The current

average speed along SH1 is well below the posted speed limit, which means that most drivers are already managing their speed rather than driving at the speed limit. Therefore, speed management measures alone will not address the identified problems.

The online option, which considered whether the existing highway from Ōtaki to north of Levin could be upgraded to an expressway standard or similar, was considered to be unachievable for the following reasons:

- The requirement for replacing five old sub-standard bridges (at the railway and river crossings) necessitated the new highway needing to be offline through those sections.
- To meet design standards whilst avoiding historical constraints, the highway would also need to be significantly realigned at a number of deficient curves.
- Parallel service roads would likely be required to service the remaining frontage properties (there are approximately 400 accessways on the rural sections of SH1 and SH57. As a result the ”footprint” of the Project would be much larger which in turn would generate additional physical impacts and costs.
- There are a large number of constraints adjacent to the existing alignment including Marae, Urupa and historic buildings which would be affected as part of the upgrade either by road widening or by the need to provide service lanes. In addition, these constraints would significantly limit opportunities for future four laning (should that be needed).
- The current SH1 alignment traverses through the Ohau and Manakau townships. Should a four-lane state highway be needed in these locations then that would involve removal of an entire row of commercial/residential properties adjacent to the highway, and modifying or curtailing remaining access. Such four laning would also cause very significant severance between the eastern and western sides of these established communities.

Furthermore, by minimising effects on constraints and improving the alignment to current design standards, the Project Team identified that over 70% of the on-line alignment would need to be actually offline and would inevitably cause significant environmental effects.

The short-listed strategic alternatives were then subjected to analysis by the Project Team against project outcomes (i.e. from addressing the IBC problems), the 2018 Government Policy Statement objectives, potential social, environmental cultural, economic impacts, property impacts, “part of an enduring solution” and major risks. The results of the strategic alternatives MCA are summarised in Table 25-1 below.

Table 25-1 Short list of strategic alternatives assessment outcomes

Considerations[6]	Strategic alternative						
	Do Nothing	Minor Safety Improvements	Localised Highway Upgrades	Larger Highway Upgrades	Online Express-way to South of Levin	Ōtaki to South of Levin New Offline Highway	Ōtaki to North of Levin New Offline Highway
Problem 1: Safety	NO	NO[7]	Partially	Partially	Partially	YES	YES
Problem 2: Resilience	NO	NO	Partially	Partially	Partially	YES	YES
Problem 3: Regional Growth	NO	NO	Partially	Partially	Partially	Partially	YES
Problem 4: Levin Town Centre	NO	NO	NO	NO	NO	NO	YES
Reduces Community Blight	NO	NO	NO	NO	YES	Partially	YES
Has Iwi Support	NO	NO	NO	NO	NO	YES	YES
(Part of) Enduring solution	NO	YES	Possibly[8]	Possibly[9]	NO	YES	YES

The key outcomes of the above short list evaluation analysis can be summarised as follows:

- The **do nothing** option would not address the problems, and therefore the problems would become worse over time due to district and regional population and employment growth.
- **Minor safety improvements** would not address the fundamental safety problems (and would not address the resilience problem at all). Even with this investment in safety SH1 to south of Levin will remain high risk as the fundamental form of the highway (two-lane two-way curvilinear highway with deficient bridges, no median barrier, and high access frequency) would remain inconsistent with the

[6] 1. Safety – Does the alternative significantly reduce deaths and serious injuries
2. Resilience – Does the alternative replace the at-risk bridges or provide an alternative route
3. Regional Growth – Does the alternative support new growth locations
4. Levin Town Centre – Does the alternative reduce traffic volumes and heavy traffic in Lein
5. Reduced Community Blight – Does the alternative provide certainty for landowners along potential offline highway routes
6. Has Iwi Support – Does the alternative have support from local iwi
7. Part of Enduring solution – Does the alternative form part of the long term solution that addresses all the problems

[7] Whilst DSIs would be reduced, increased traffic would result in future DSIs being similar to current numbers

[8] Enables new four lane offline highway at any location in the future. Online upgrades may be greater that what is required for revocation.

[9] Could upgrade to four lanes but it has significant impacts and may not meet long term outcomes. Could still build new offline route, but this online option would be much greater than revocation needs.

highway's national high volume highway function. It is likely that a high number of fatal and serious crashes would continue to occur on this highway.

- **Localised improvements** to the existing highway network would result in reasonable crash savings, however this approach would not satisfactorily resolve the resilience problem (i.e. there would still be only one route between Manakau and Ōhau), increasing traffic volumes would continue to impact on access to and from the highway and there would be no opportunity to improve the Levin town centre. Furthermore, this option would not be enduring as it could not be upgraded to four lanes.
- **Taylors Road to South of Levin New Offline Highway** would address the problems for the southern part of the state highway corridor in terms of safety, resilience and access. It would not however address the problems identified for the Levin Town Centre. This option would have high costs.
- **Taylors Road to North of Levin New Offline Highway** would address all of the problems but would be the most expensive option.

Overall, the strategic alternatives MCA process identified that the provision of an off-line highway from Taylors Road to North of Levin would be the most appropriate response to the problems.

26 Assessment of corridor options

The corridor identification and evaluation process for the **Taylors Road to North of Levin New Offline Highway** is documented in the IBC. In summary the process was undertaken in four stages:

- Stage 1: constraints and opportunities identification and "IBC design philosophy";
- Stage 2: Development and review of a preliminary "long list' of corridor options;
- Stage 3: Corridor "long list" assessment and refinement;
- Stage 4: Confirmation of the corridor "short list".

26.1 Stage 1 – constraints and opportunities identification

Before any long list corridors were identified, information about environmental and social constraints and opportunities within the Project Area was gathered. The following aspects were investigated and mapped using GIS software:

- relief and hydrology;
- landscape and urban design quality;
- landscape absorption capability;
- heritage values;
- tangata whenua values;
- lifelines (civil defence);
- population distribution;
- geological constraints;
- ecological values;
- land use capability;
- natural hazards;

- land ownership;
- district and regional plan maps (zoning and specifically identified areas); and
- contaminated land/hazards.

These constraints helped inform the identification of a long list of corridor options and assisted in the review of those corridor options later in the process.

Consultation/ engagement exercises (refer to Part F of this report) also helped to confirm and identify additional constraints and opportunities in the Project Area and helped informed the future identification of potential corridor options.

26.1.1 IBC design philosophy

The following high-level design philosophy was developed to identify the key design characteristics of the highway corridor to be evaluated:

- **standard**: Expressway standard throughout;
- **speed** and geometry: a design speed of 110 km/h (operational speed of 100 km/h);
- **capacity**: two lanes in each direction, median divided;
- **access**: all access to the highway via grade-separated interchanges, no direct side road intersections or direct property access; and
- **interchanges**: initial consideration was given to these including how they would serve the current and future urban form and their technical requirements (noting that interchange location would not significantly impact corridor route choice because interchanges would generally be able to be accommodated in the broad corridors being considered and so the scoring of corridors would likely also encapsulate or provide a proxy for the performance of an interchange).

The next step in the IBC process was to develop and assess a long list of approximately 300m wide corridor routes for the new Taylors Road to North Levin off-line highway.

The approximate 300m width for the corridor routes allowed flexibility to locate the new highway within the corridor whilst leaving room to avoid any key constraint features and address other adverse effects that may come to light during subsequent development of the DBC.

26.2 Stage 2 – development of long list of corridors

Public engagement carried out in 2016/17 indicated community interest in a wide geographic spread of routes across the Ōtaki to north of Levin area. Due to the array of investigations undertaken prior to 2017 (as explained earlier), the outcomes of those previous studies were used as a starting point for the development of corridor options.

To recap, the Ōtaki to north of Levin Expressway - Scoping Report (MWH 2012), Taylors Road to Ohau River Four Laning Preliminary Options Report (MWH 2015), Further Options Report (MWH, 2015) and Taylors Road to Levin Northern Connection, Report on Identification and Assessment of Options (MWH 2016) had all identified options that warranted further consideration (generally referred in those reports as the 'shortlisted' options).

In addition to those previously identified options, other options were generated to ensure that western corridors were included and assessed to reflect the community's interest in considering options to the west of Levin.

The corridors were split into southern and northern sections. The southern and northern sections join south of Ōhau or in the vicinity of SH57/Arapaepae Road. The southern and northern sections could be combined in various ways to create multiple whole-of-route options.

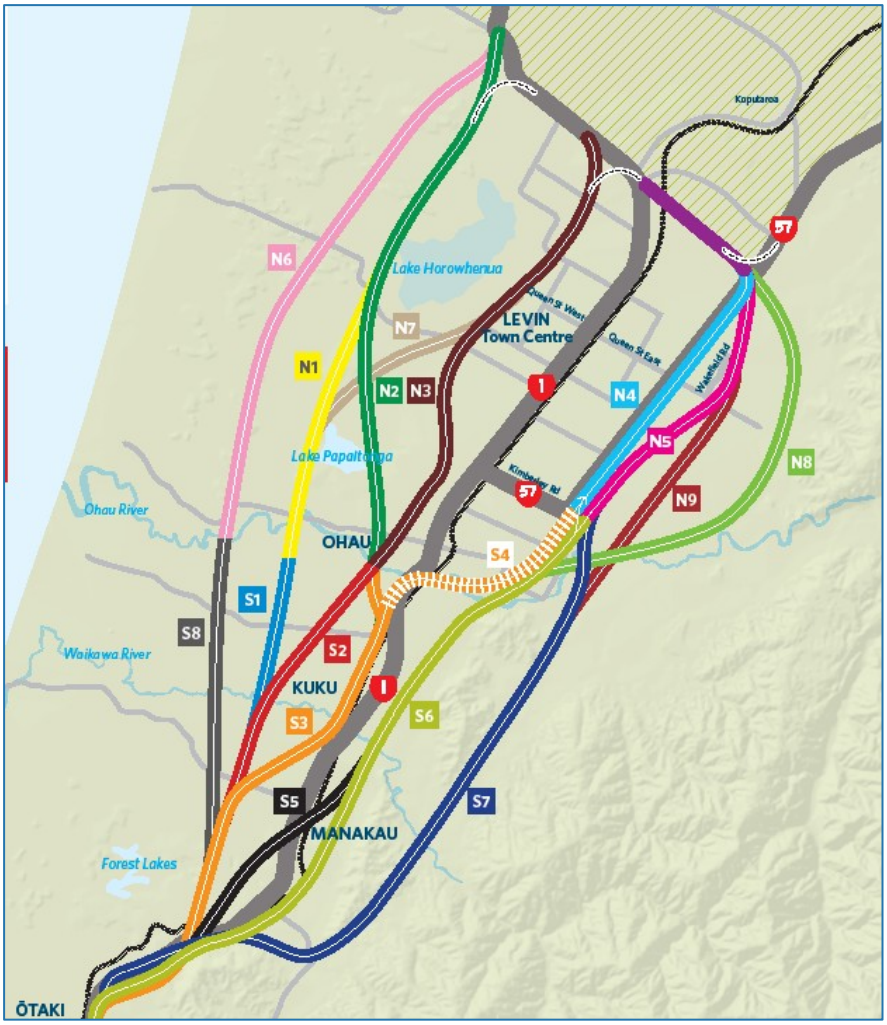
The resulting preliminary set of "longlist" corridor options was then considered at IBC MCA Workshop 1, held in August 2017. This workshop was attended by technical experts, representatives of Muaūpoko Tribal Authority, Ngāti Raukawa ki te Tonga, the local community, HDC and KCDC, Greater Wellington and Horizons regional councils, and DOC.

The purpose of this workshop was to review and revise the preliminary corridor long list and the options evaluation criteria. During IBC MCA Workshop 1 there was a request that additional options be added into the analysis to avoid a number of sensitive values impacted by proposed preliminary corridor options and to utilise existing electricity distribution line corridors. This was agreed and additional corridor options were identified and added into the process as follows:

- S8 / N6 – a far western, whole-of-route option
- N7 – a western option which connects in the south to S1 and which follows the N1 alignment to the west of Papaitonga and then crosses to the east of Lake Horowhenua joining the N3 alignment
- N8 – a far eastern option which connects to any of S4, S5, S6 and S7 in the south
- N9 – an eastern option which broadly follows the existing electricity distribution line and connects to S7 in the south.

The finalised list of options following the additions made at IBC MCA Workshop 1 are set out in Figure 26-1. All preliminary corridors were indicated generally as a 300-metre-wide band.

Figure 26-1 Final long list of corridor options



As can be seen in Figure 26-1 above, the long list consisted of nine southern options (including alternatives) and nine northern options, with some northern and southern options having multiple connections (for example option “S1” from the south linked to options “N1” and “N7” in the north).

26.3 Stage 3 – corridor long list assessment and refinement

Following the development of the long list of corridor options, IBC MCA Workshop 2 was held in late August 2017 to evaluate the corridor option long list.

At IBC MCA Workshop 2, the decision conferencing process (as explained above) was utilised. The workshop included members of the local community (who had expressed an interest to be involved in the investigation), council organisations, iwi representatives, technical specialists and Waka Kotahi project and specialist staff.

The MCA assessment criteria and the proposed five-point scoring system was generally discussed at the workshop. Next, each assessment criterion was discussed by the relevant MCA assessor, identifying issues relevant to each route option. Following this, the workshop attendees were able to raise questions or matters relating to the implications of a particular route option and the score proposed by a specialist for each route option. Extensive use was made of virtual aerial “fly-overs” and other materials during the explanations and discussions.

Each assessment criterion was scored firstly for the southern options and then secondly for the northern options. In most cases a single agreed score was awarded per option for each criterion. However, in a few cases the workshop process did not reach a single score. In such circumstances, both scores were recorded (see Table 26-1 and Table 26-2). The various Iwi representatives present provided separate scores for the sections relevant to them.

Table 26-1 Scoring of southern options

Criteria	Landscape/visual impact	Ecological impacts	Impact on heritage	Tāngata Whenua cultural values	Productive land values	Social/community / recreation	Impact on dwellings	District development	Fit to project objectives	Property degree of difficulty	Engineering considerations	Cost
S1	2	1	4	5/4	3	2	3	1	3	5	3	2
S2	2	2	4	5/5	3	2	3	1	1	5	3	2
S3	3	3	4	5/5	3	2	3	1	1	5	3	2
S4	4	5	4	3/5	4	3	5	2	2	5	3	4
S5	4	4	4	4/4	4	5	5	3	1	5	2/3	4
S6	2	2	2	2/2	4	5	5	3	1	4	2	3
S7	3	5	2	3/3	4	2	4	1	3	4	3	4
S8	2	1	4	5/5	2	1	3	1	3	5	3	2

Table notes:

1. Cells containing two scores are reflective of different views at the workshop.
2. Separate scores for Tāngata Whenua Cultural Values were provided by representatives of Ngāti Wehi Wehi (noted first) and Ngāti Tukorehe (noted second).

Table 26-2 Scoring northern route options

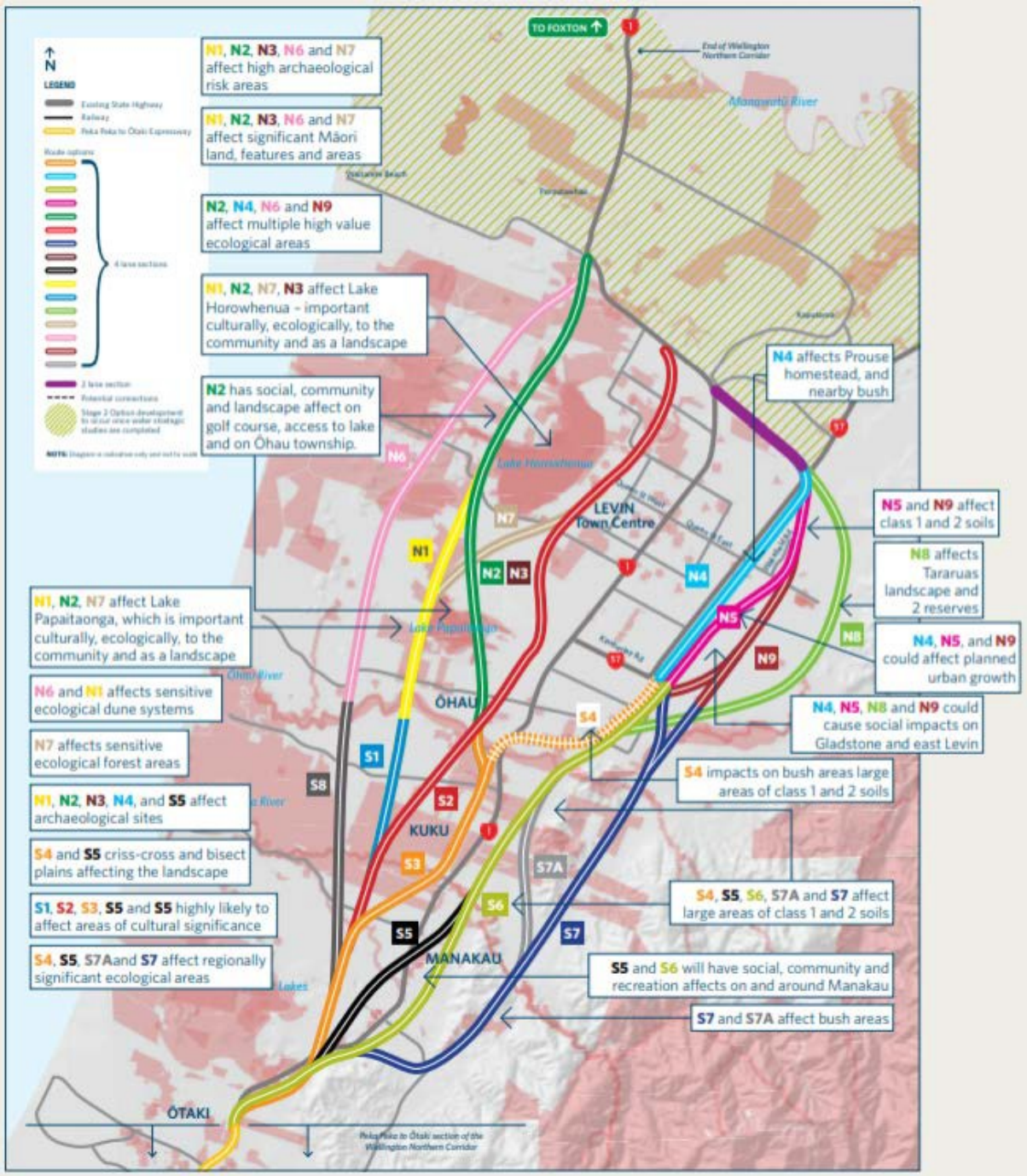
Criteria	Landscape/visual impact	Ecological impacts	Impact on heritage	Tāngata Whenua cultural values	Productive land values	Social/community/ recreation impacts	impact on dwellings	District development	Fit to project objectives	Property degree of difficulty	Engineering considerations	Cost
N1	5	4	4	5*	2	3	3	1	3	4	3	2
N2	5	5*	4	5*	2	3/4	4	1	3	4	3/4	3
N3	4	2	4	5*	3	5	5	4	1	5	2/3	2
N4	2	4/5	4	3	3	4	5	4	1	3	2	1
N5	2	1	2	3	3	3/4	5	4	1	3	2	1
N6	2	5	4	5	2	2	3	1	3	4	3/4	4
N7	5	4	4	5*	3	5	4	4	3	4	3/4	2
N8	4	1	2	3	4	4	5	3	3	3	2	2
N9	1	5	2	3	4	3/4	5	4	1	3	2	2

Table notes:

1. Cells containing two scores are reflective of different views at the workshop, or lack of workshop resolution.
2. Single scores under Tāngata Whenua Cultural Values were provided by representatives of Muaūpoko.
3. A score of 5* indicates where the MCA workshop groups considered that an adverse effect in relation to a criterion may be a fatal flaw

Figure 26-2 is a summary image prepared for consultation which highlighted the key issues identified by participants at IBC MCA Workshops 1 and 2. This image was not used during the MCA process but is a good visual summary of the major issues identified.

Figure 26-2 Route options showing key issues that were identified by participants at workshops 1 & 2



To help further examine the scores, weighting scenarios were applied to help test each option against different sensitivities. Weighting was applied by placing more emphasis on certain criteria (when 'averaging' scores for each corridor option across criteria).

A “workshop” weighting was discussed and agreed upon at the end of IBC MCA Workshop 2. To maximise the level of information gathered from the assessment, additional weighting systems were also developed. The weighting systems used were:

- **Workshop weighting:** weightings for each assessment criteria were assigned by the MCA assessors and other attendees at the workshop.

- **RMA Section 6 scenario**: weightings were assigned to the assessment criteria in accordance with the matters of national importance as set out in section 6 of the RMA
- **Social weighting scenario:** weightings were assigned to the assessment criteria based on their social elements. For example, the Social / Community / Recreation and direct impact on dwellings assessment criteria were assigned the highest weighting.
- **Environment weighting scenario:** weightings were assigned to the assessment criteria based on their physical environmental elements. For example, the ecology criterion was assigned the highest weightings.
- **Cultural weighting scenario**: weightings were assigned to the assessment criteria based on their cultural elements. For example, Tangata Whenua Cultural Values and archaeology/heritage were afforded high weightings.
- **Economic weighting scenario**: weightings were assigned to the assessment criteria based on their economic elements. For example, Project Objectives, Engineering Degree of Difficulty and Property Degree of Difficulty assessment criteria were assigned high weightings.
- **Draft MCA Guide:** at the time of the workshop, Waka Kotahi had recently released a draft guideline on MCAs. A weighting system based on this was developed for comparative purposes. This distributes weightings of one third to criteria relating to project objectives, one third to those relating to implementability (in this case spread between property degree of difficulty, cost and engineering) and one third towards impacts (in this case allocated equally across the remainder of the criteria).

Two further weighting systems were developed to reflect matters identified as important to the community Project Reference Group (PRG)[10]:

- PRG1 - with a relatively lower weighting of heritage and cultural values
- PRG2 - with a relatively higher weighting of heritage and cultural values

Table 26-3 and Table 26-4 below summarise the unweighted scores (focusing on the number of 4 or 5 scores each option received) and weighted scenario scores (showing an average score across criteria, but with more emphasis on certain criteria in arriving at the average) of the analysis for the southern and northern sections. In these tables, the asterisked figures show the highest scores, or 'worst' two performing, options.

[10] The PRG was established in May 2017. It comprised members of the community and its purpose was to provide a forum for a community voice on the project, to help the Project Team understand local issues and opinions and provide feedback directly to their whanau and community

Table 26-3 Analysis of southern route sections (scores x weights for different weighting systems)

	Un-weighted		Weighting Systems								
	Number of 5s	Number of 4s	Workshop Weighting	RMA part 2	Social	Natural environment	Cultural	Economic	Draft MCA guide	PRG1	PRG2
S1	2	1	2.87	2.68	2.82	2.07	3.11	2.84	2.94	2.62	2.76
S2	1	2	2.87	2.92	2.86	2.56	3.47	2.63	2.36	2.58	2.78
S3	1	2	3.04	3.18	2.99	3.11	3.69	2.63	2.44	2.76	2.94
S4	4	3	3.72*	3.70*	3.69*	4.04*	3.75*	3.65*	3.25*	3.64*	3.61*
S5	6	3	3.87*	3.87*	3.99*	3.89*	4.22*	3.76*	2.93	3.88*	3.89*
S6	2	2	2.97	2.60	3.15	2.33	2.67	3.35	2.38	3.16	3.05
S7	4	1	3.17	3.07	3.03	3.52	2.83	3.24	3.22	3.07	3.02
S8	1	2	2.78	2.73	2.76	2.07	3.25	2.63	2.90	2.43	2.65

Table 26-4 illustrates that Options S4 and S5 performed poorly compared to the other southern options, across the range of criteria and weighting scenarios Options S4 and S5 where therefore discounted from further consideration.

Table 26-4 Analysis of northern route sections (scores x weights for different weighting systems)

	Un-weighted		Weighting Systems								
Option	Number of 5s	Number of 4s	Workshop weighting	RMA Part 2	Social	Natural environmental	Cultural	Economic	Draft MCA guide	PRG 1	PRG 2
N1	3	2	3.42	3.67	3.29	3.74	4.19	2.67	3.13	3.16	3.30
N2	3	3	3.65	3.92*	3.55	4.11*	4.36*	2.98	3.32*	3.39	3.51
N3	3	4	3.70*	3.68	3.90*	3.26	4.33	3.35*	2.67	3.73*	3.82*
N4	4	1	3.24	3.30	3.29	3.41	3.53	2.71	2.21	3.41	3.40
N5	1	1	2.59	2.38	2.77	2.07	2.58	2.57	1.96	2.78	2.77
N6	3	2	3.27	3.52	3.17	3.56	3.72	2.98	3.22	2.93	3.10
N7	5	3	4.02*	4.17*	4.03*	4.19*	4.56*	3.39*	3.42*	4.04*	4.10*
N8	2	1	3.09	2.75	3.15	2.44	3.00	3.08	2.86	3.27	3.21
N9	2	2	3.07	3.02	3.06	3.48	2.78	2.88	2.24	3.27	3.21

Table 26-4 illustrates that Options N2, N3 and N7 performed worse than the other northern options. Those options had the highest number of 4s and 5s in the unweighted score analysis, and consistently had the worst weighted averages in the weighted score analysis. Options N2, N3 and N7 were therefore discounted from further consideration.

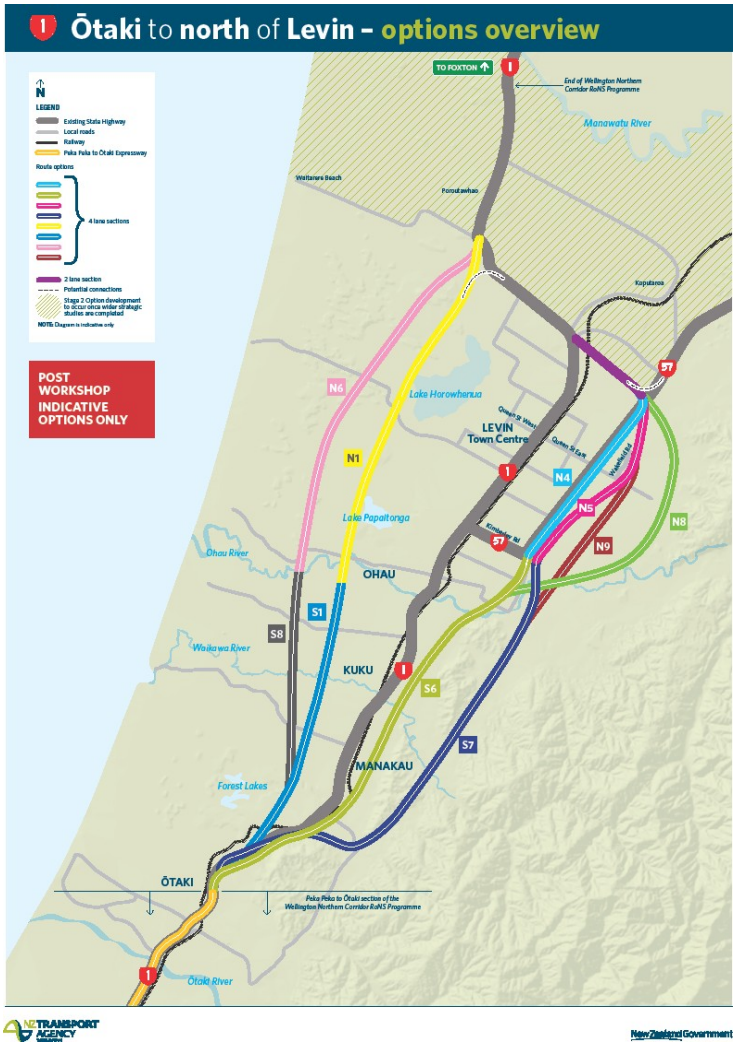
The overall analysis was also performed without the cost scores included. This did not change the overall preferences in the tables above.

With the worst performing individual sections removed as a consequence of the above processes (as well as options that only tied into removed options, e.g. S2 was also removed as it only tied into N2 and N3), it became more practicable to combine the southern and northern corridor options into possible overall corridors. Ten potential combined corridor options remained, making up a refined longlist of corridor options. The remaining corridors comprised of:

- two western options (S8N6 and S1N1); and
- eight eastern options:
- four with S6 in the south (referred to as S6 options); and
- four with S7 (referred to as S6 options).

These ten eastern and western corridor options are summarised in Figure 26-3 below.

Figure 26-3 Post IBC MCA workshop 2 refined options



The scores by weighting are shown for each combined route in Table 26-5. These scores are the sum of the two relevant route sections from Table 26-3 and Table 26-4 rounded to one decimal place. Lowest scores indicated better performing options overall, and highest scores worst.

Table 26-5 Analysis of combined route options

Combined Options	Workshop Weighting	RMA Part 2	Social	Natural environment	Cultural	Economic	Draft MCA	PRG1	PRG2
S8N6	6.1	6.3	5.9	5.6	7.0	5.6	6.1	5.4	5.7
S1N1	6.3	6.4	6.1	5.8	7.3	5.5	6.1	5.8	6.1
S6N4	6.2	5.9	6.4	5.7	6.2	6.1	4.6	6.6	6.5
S6N5	5.6	5.0	5.9	4.4	5.3	5.9	4.3	5.9	5.8
S6N8	6.1	5.4	6.3	4.8	5.7	6.4	5.2	6.4	6.3
S6N9	6.0	5.6	6.2	5.8	5.4	6.2	4.6	6.4	6.3
S7N4	6.4	6.4	6.3	6.9	6.4	6.0	5.4	6.5	6.4
S7N5	5.8	5.5	5.8	5.6	5.4	5.8	5.2	5.9	5.8
S7N8	6.3	5.8	6.2	6.0	5.8	6.3	6.1	6.3	6.2
S7N9	6.2	6.1	6.1	7.0	5.6	6.1	5.5	6.3	6.2

Table 26-5 indicates that some routes performed better than others under most weighting scenarios. In particular:

- Of the western options S8N6 generally rated better than S1N1 in all except one weighting system (economic), however both performed poorly compared to the other options under RMA Part 2 and cultural weightings.
- Of the S6 options, the variant with N5 as the northern section performed better in all weighting systems. The same was true of the S7 options.

As can be seen from the scoring tables set out above, no option was free of issues or environmental impacts. It was also acknowledged that further investigation into a few discreet areas could help further differentiate between options. Accordingly, all ten options were subjected to further analysis, focusing on the following key issues identified during the MCA process:

- Tāngata Whenua Impact. Some of the corridors were considered fatally flawed by iwi representatives in Workshop 2 due to their significant impact on sites of cultural significance, areas of previous occupation and the need to take extensive areas of Māori land.
- Traffic Modelling. Some of the routes did not appear to provide for appropriate access from the offline highway to the key destinations of Levin or SH57 north of the Project area.
- Constructability of Option S7. Some of the alignments traversed parts of the Project area which had not previously been considered in detail in terms of constructability. In particular, further investigation needed to be undertaken on route S7 which was not accessible or viewable via public land.

In addition, at IBC MCA Workshop 2, the PRG had identified an additional southern corridor option for consideration. That corridor, referred to as '7A', used the southern part of S7 and then joined onto S6 to the north, past Manakau. Option 7A was not considered in detail at IBC MCA Workshop 2 but was

subject to further analysis following this workshop. The above considerations are discussed in more depth as follows.

26.3.1 Tangata whenua impact

The area to the west of Levin is of much greater significance to iwi than the area to the east, as this is historically where Māori lived or where particularly important resources, often food sources, were located. The major settlements and occupation sites and key food sources of the various local iwi were predominantly located in the coastal dune belt and in and adjacent to the major rivers, streams, swamps, lagoons and inland lakes. The forested land to the east was used primarily for resource gathering and therefore fewer sites of significance are located there.

A map of the archaeological risk across the corridors is shown below. The map clearly shows the difference between the areas east and west of Levin. This is also reflected in Tangata Whenua Areas of Significance constraint map, which is also shown below.[11]

Figure 26-4 Estimated archaeological risk

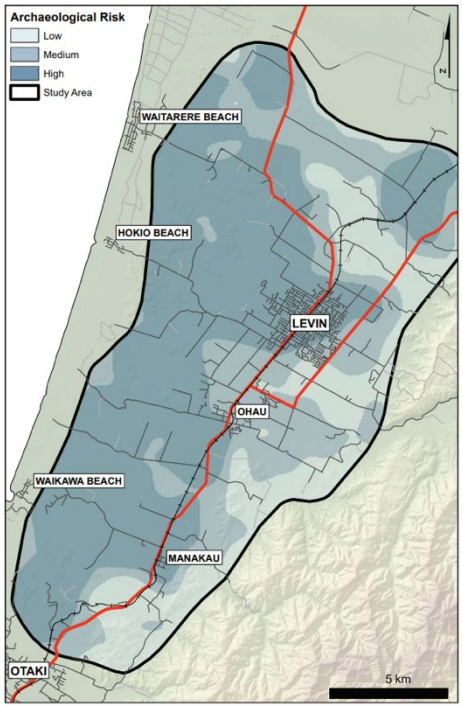
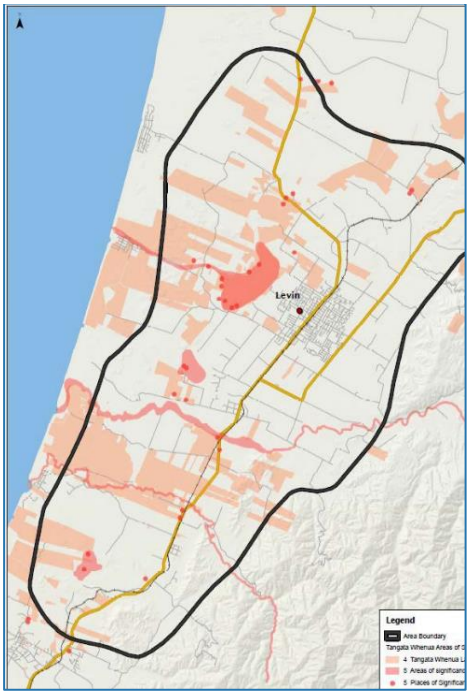


Figure 26-5 Tāngata Whenua areas of significance



Further discussions with Ngāti Raukawa ki te Tonga and Muaūpoko Tribal Authority confirmed that they had fundamental concerns with all of the corridors that were located west of SH1 and Levin. As shown above, these options traverse and effect areas of cultural significance, including urupa, marae, Punahau /Lake Horowhenua, Lake Papaitonga and land holdings. These concerns are exacerbated in relation to options that traverse sand dunes, are close to or impact on lakes and water courses. The western options will affect a dense area of known sites of cultural significance and dense clusters of Te Tura Whenua Māori land holdings.

Ngāti Raukawa and Muaūpoko also had concerns about options located to the east of SH1, as they also affect land holdings, water ways (that feed into Lake Horowhenua and Lake Papaitonga) and areas of

[11] This is not a complete record of sites of significance. Iwi advised that there are many more sites of significance to the west of Levin than are currently mapped.

significance, but considered, as compared with the western options, that those were more readily able to be addressed through design and mitigation.

26.3.2 Transport modelling

Transport modelling of a representative sample of the 10 corridor options was undertaken after IBC MCA Workshop 2 to determine the relative transport performance of the options against the Project Objectives.[12]

The Project Objectives assessment identified that the key regional journeys that needed to be improved by the new offline highway, were:

- SH1 south to SH1 north (Ōtaki to Manawatu River, approximately 4,000 vpd in 2016);
- SH1 south to Levin (Ōtaki to Levin, approximately 7,000 vpd in 2016); and
- SH1 south to SH57 north (Ōtaki to Potts Hill, approximately 5,000 vpd in 2016).

The ability of the different options to cater for these three key journeys was demonstrated through Select Link Analysis (SLA) plots. The following diagrams show trips with an origin south of the Project Area and travelling north. The thickness of the blue line represents the number of vehicles using that route.

Figure 26-6 and Figure 26-7 below show the SLA plots for S1N1 (the shortest of the western options) compared to S6N4 (the shortest of the eastern options).

Figure 26-6 Select link analysis of S1N1

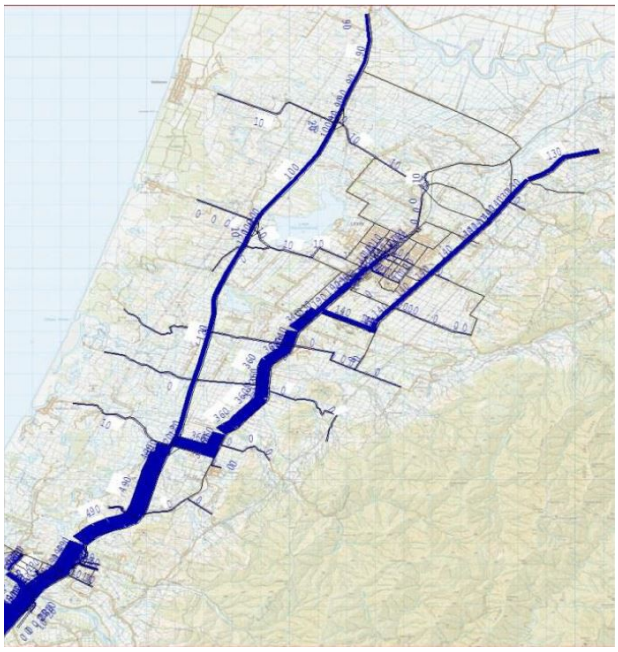
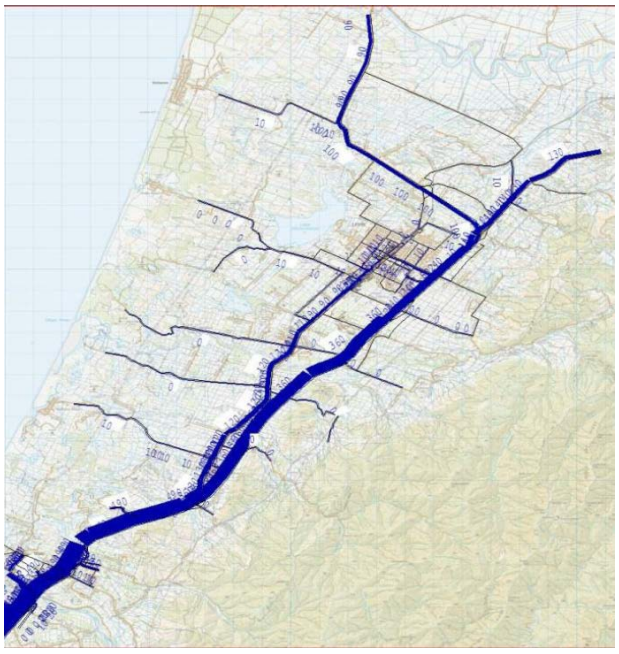


Figure 26-7 Select link analysis of S6N4



The SLA plots demonstrate that the western option (S1N1) attracts only those movements heading north of Levin on SH1 (i.e. only a quarter of trips on the existing SH are attracted onto the new highway route with the remainder staying on the existing network (SH1 heading to Levin and SH57). This is because while the western option provides travel time savings for trips to north of Levin on SH1, for trips to either

[12] At that time, the Project Objectives did not specifically include provision of a north to south walking and cycling link.

Levin or onto SH57 represents a considerably longer journey than is currently available via the existing network (and therefore does not provide any travel time savings).

With the majority of traffic modelled using the existing state highway network, the risk of high severity crashes (and continued deaths and serious injuries) for the western option remained significant. In addition, although the western options would reduce traffic volumes through the Levin Town Centre, they would not provide improved access to existing employment areas or to planned residential (primarily to the east of Levin) and economic growth locations.

In contrast, the eastern options (represented by S6N4) demonstrated:

- travel time savings for all three key journeys;
- less traffic on the existing highway network i.e. a greater transfer of trips onto the new highway; and
- interchange locations available that integrate with the urban areas providing improved access to both economic growth locations and the Levin town centre.

A summary of the travel times for the two options across the three key regional journeys are presented in the Table 26-6 below, for two growth scenarios (as at the time of that analysis)[13].

Table 26-6 Comparison of eastern and western route travel times

Option	Scenario	Key regional journeys		
		Ōtaki to Manawatu river	Ōtaki to Levin town centre	Ōtaki to Potts Hill (SH57)
Western	Low growth	10 minutes saving	1½ minutes longer	1 minute longer
	HDC LTP growth	11½ minutes saving	Half of minute longer	Unchanged
Eastern	Low growth	5½ minutes saving	Up to 1 minute saving	Up to 5 minutes saving
	HDC LTP growth	6½ to 7 minutes saving	1½ minutes saving	Up to 6 minutes saving

In addition to the three key regional journeys, analysis of wider network destinations was also undertaken, and confirmed that the eastern S6N4 option provides the shortest route from Ōtaki to both the Manawatū Gorge (or its replacement Te Ahu a Turanga: Manawatū Tararua Highway Project) and to Palmerston North, with travel time savings of up to 6 minutes via SH57 when compared to the existing network vs savings of 1 minute or less for the western corridor.

Therefore, when considering the project objectives, the eastern corridor options performed better with respect to safety and reducing travel times for the key regional journeys. The eastern options also

[13] Future year models were prepared for two growth scenarios; one representing 'low' growth assumptions reflecting growth in external State Highway trips only and the growth assumptions reflecting possible population and employment growth in response to the Wellington Northern Corridor (WNC) Roads of National Significance (RoNS) projects. The low growth scenario assumed no overall long-term growth in population and employment within the Horowhenua District, with model growth 'driven' by external growth only, based on Statistics NZ medium term population growth and long-term trends in recorded State Highway counts. The HDC LTP growth scenario represented the growth forecast by HDC as predicted through research undertaken by NZIER and Sense Partners and reflected in their Long Term Plan.

provided improved access into the Levin Town Centre and better supported the economic growth objectives of the HDC.

Further investigation was also undertaken into the N8 route to the far east of Levin. The N8 route is significantly longer than the other northern routes and, therefore, modelling was undertaken to determine if the N8 alignment had a significant impact on overall network traffic flows. The outputs from this are shown in the figures below.

Figure 26-8 Select link analysis of S7N4

Figure 26-9 Select link analysis of S7N8

The figures above show that by constructing N4, the majority of traffic entering Levin, does so from the new highway. However, if N8 is built, the most attractive route into Levin is not using the new highway and instead traffic continues to use the current state highway.

As with the western options above, this option also resulted in a less safe network compared to the other eastern options and did not materially improve access to Levin.

26.3.3 Constructability of Option S7

With respect to Option S7, it was acknowledged that limited exploration or examination had been undertaken into the valley through which this option traversed.

Accordingly, additional information was collected through LIDAR, site visits and helicopter inspection (as some parts of the route were difficult to get to on foot) to get a better understanding of the constraints and complexities of the route.

In summary, the valley is predominantly rural but does have pockets of rural residential development. The topography is highly variable and quite challenging in some locations. There are many streams which have carved out multiple flow paths throughout the valley areas and there are areas of regenerating natural bush.

No fatal flaws were identified in terms of the constructability of an option through this area. However, a number of deep and wide gullies through which the larger rivers and streams negotiate that would cost substantial amounts to traverse. The largest of these is around 800m long and up to 35m deep. The costs of structures across these features (rivers, streams, gullies) would be in addition to the higher cost

of this route (50% more than S6) due to the ground conditions, terrain and the need for structures as well as the increased length compared to S6.

26.3.4 Analysis of Option S7A

Option S7A was identified as a potential additional southern corridor option at IBC MCA Workshop 2 and discussed on an initial basis. However, it was not subject to more formal assessment and scoring at this workshop.

Corridor option S7A would avoid most of Manakau (like S7) but also avoided some of the areas that caused the significant cost differences between the S7 and S6 options. Accordingly, options that used S7A were considered, and included in the post-Workshop 2 traffic modelling and constructability assessments.

The traffic modelling and constructability analysis of options that use S7A showed that these options would:

- Provide fewer transport benefits that S7 (and S6) based options. This is because these options are 2km longer than options that use S6 and 1km longer than options that use S7.
- Cost 20% more than options that use S6 (at that stage estimated to be $141 - $162M more than S6 options) but cost an estimated $84M-$97M less than S7 options.

Following IBC MCA Workshop 2S7A was considered and scored by the MCA assessors. This scoring is included below in Table 26-7 (for comparison purposes).

Table 26-7 Scoring of option S7A

Criteria	Landscape/Visual Impact	Ecological Impacts	Impact on Heritage	Tāngata Whenua Cultural Values	Productive Land Values	Social/Community/ Recreation Impacts	Impact on Dwellings	District Development	Fit to Project Objectives	Property Degree of Difficulty	Engineering Considerations	Cost
S6	2	2	2	2/2	4	5	5	3	1	4	2	3
S7	3	5	2	3/3	4	2	4	1	3	4	3	4[14]
S7A	4	5	2	3	3[15]	1[16]	5	1	3	4	4	5

Table 26-7 shows that the key differences between Option S7 and Option S7A are, as follows:

- Landscape/Visual – Option 7A is worse than S7 in that the route is only partly confined to the valley and that it would include dog-legs to negotiate both the Waiauti and Kuku Stream valleys.
- Impact on Dwellings – Option S7A is worse than Option S7 due to more dwellings being directly affected
- Engineering Considerations and Cost – Option S7A is worse than Option S7 due to a greater number of lower (tighter) radii curves and also there are significant constructability issues with the route heading back onto route Options S6 from S7 in the Waiauti valley. These difficulties are also reflected in costs.

In addition to the above, it is noted that the Option S7A corridor is some 800m longer than Option S7 and, therefore, would have fewer benefits in transport terms when compared to Option S7. However, Option S7A was retained for further consideration as it offers benefits over S6 in that it avoids a significant part of the Manakau lifestyle area.

26.3.5 Stage 4 – Confirmation of Corridor Shortlist for Further Consideration

Following the MCA process (and in particular IBC MCA Workshop 2), and the post-Workshop 2 additional analysis, the following routes were removed from further consideration:

- S1N1 – Noting in particular the effects on Tāngata Whenua areas of significance and not meeting the project objectives in terms of safety and travel time for key routes
- S8N6 - Noting in particular the effects on Tāngata Whenua areas of significance and not meeting the project objectives in terms of safety and travel time for key routes
- N8 – Noting in particular that it would not meet the project objectives in terms of safety and travel time for key routes

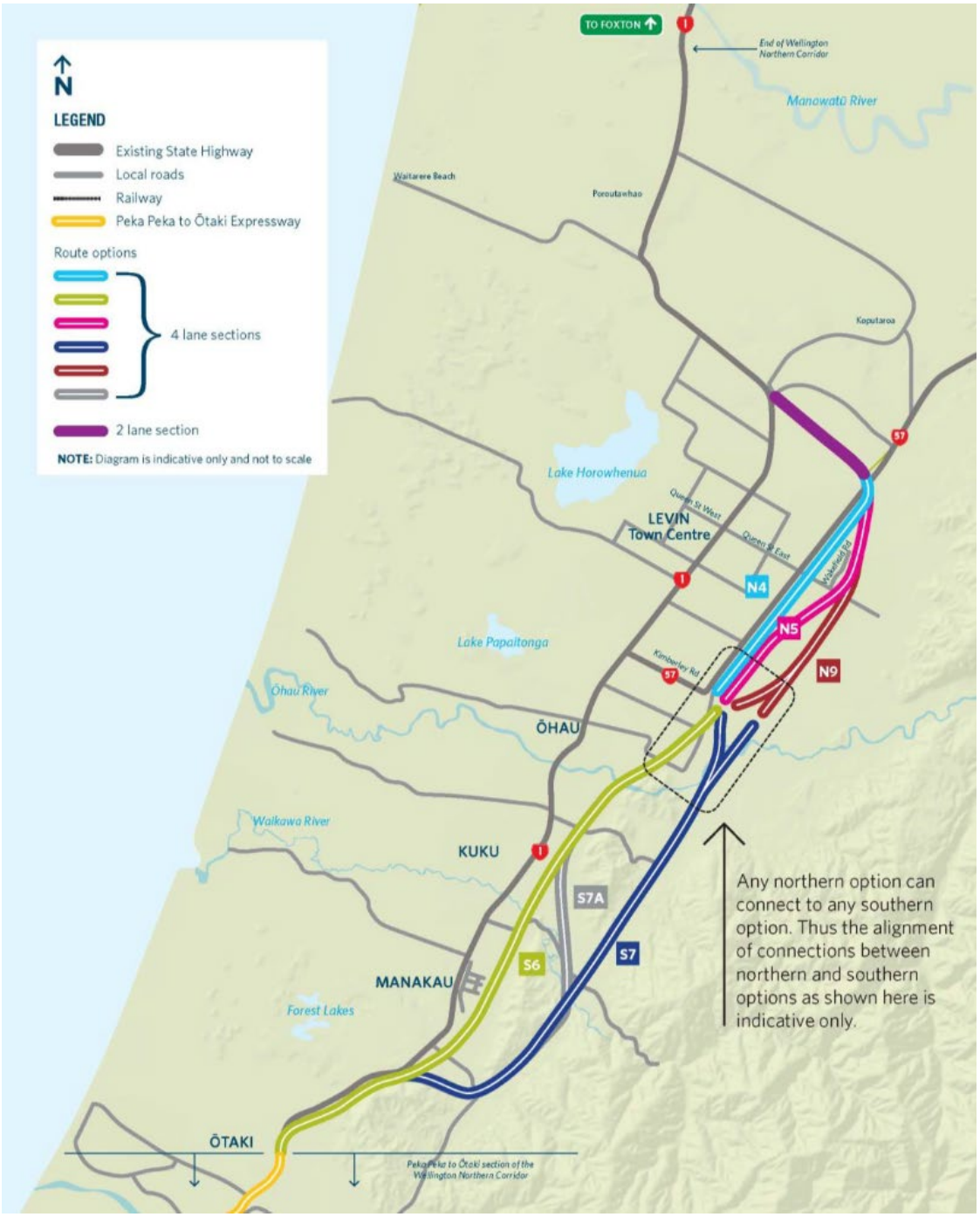
[14] S7 was initially allocated a Cost score of 4. When it was later assessed with further detail on terrain and in comparison to S7A, both of these options (S7 and S7A) were deemed sufficiently costly to both be scored a 5.

[15] Note that the specialist indicated this could be scored either 3 or 4, as could Option S7 which the workshop had accorded a 4 as shown. The current score provides a more favourable basis for this option.

[16] The specialist for this criterion had also proposed Option 7 as a 1, but the workshop participants considered this to be a 2. In the specialist's opinion there is little difference between Option 7 and 7A. As with the Productive Land criterion score, this score provides a more favourable basis for the analysis of this route.

As a result, the following options were taken forward as the shortlist of corridor options for more detailed investigation as set out in Figure 26-10 below.

Figure 26-10 Short listed corridor options



At this point, an independent peer review of the process to assess the corridor options was prepared by Mitchell Daysh consultants and confirmed the process was valid and valuable.

26.4 Consultation on the short list

The short list corridor options and their attributes was shared with key stakeholders and the community for their feedback in early 2018 (see Part F of this report). The key attributes of the shortlisted corridor options (as at that point in time) are summarised in Table 26-8 below:

Table 26-8 Shortlisted corridor options summary

Criteria	Southern Options			Northern Options		
	S6	S7	S7A	N4	N5	N9
Length (km)	14.7	15.7	16.7	9.5	9.8	9.5
Number of Dwellings located in corridor option	39	29	26	76	76	73
Amount of Productive Land located in corridor option (ha)	230	315	290	40	95	130
Cost Estimate ($M) (IBE) 4L = 4 lane / 2L = 2 Lane	4L ~$450 2L ~$360	4L ~$690 2L ~$550	4L ~$600 2L ~$480	4L ~$300 2L ~$240	4L ~$300 2L ~$240	4L ~$300 2L ~$240
Transport BCR (excl. Wider Economic Benefits) (4L)	0.33 – 0.37	0.22 – 0.24	0.22 – 0.25	0.24 – 0.37	0.22 – 0.33	0.22 – 0.33
Traffic removed off current SH1	75% (with N4)	66% (with N4)	64% (with N4)	75% (with S6)	68% (with S6)	<68% (with S6)
Other Key Environmental Effects	Severance & Amenity around Manakau	Resilience, Ecology	Landscape, Ecology	Ecology, Heritage Buildings	Social Impact	Social Impact
Alignment with key project objectives	✓✓✓✓✓	✓✓✓	✓✓✓	✓✓✓✓✓	✓✓✓✓✓	✓✓✓✓✓
MCA performance (best to worst by section relative to one another)[103]	1st	2nd	3rd	2nd	1st	3rd

The engagement process for the short-listed corridor options focused on asking people to identify key features about each option that they liked or did not like. Potentially affected landowners were also formally advised, and their feedback sought.

26.4.1 Public Feedback on the Southern Route Options

For the Southern Route, Option S6 was favoured by most due to its safety benefits, journey time savings, resilience, and cost effectiveness, but its potential (negative) impacts on Manakau were noted. Southern

Route Option S7 was favoured by some due to its reduced impacts on Manakau, but concerns around its resilience, landscape, and ecology impacts were noted.

Some people considered Option S7A was a good compromise between Option S6 and Option S7. However, there was limited overall support for this option as it was longer, less direct and did not meet the project objectives to the same extent as Option S6 or Option S7 (it was longer option and so would not attract as many vehicles from existing state highway onto it, as compared to other shorter route options).

26.4.2 Public Feedback on the Northern Route Options

In the north, Northern Route Option N4 was favoured by many submitters. They considered that this option would best meet the project objectives and that it was located near existing developments. However, a number of concerns were raised about this option's effects on ecology, productive land, heritage and on existing dwellings. Option N9 was favoured by some submitters for a connection to S7 and due to it affecting the least number of dwellings. Option N5 received limited comments from submitters.

26.5 MCA update

Between March and June 2018, each of the MCA assessors reviewed their original evaluations and scores based on the feedback received from the public engagement undertaken from January-March 2018 and the technical assessments outlined above.

In addition, further technical information was gathered on potential noise, heritage and ecology effects of the short-listed options in response to the community feedback and to help differentiate the options. An assessment of the relative social impacts of the short listed options was also undertaken. The outputs from these additional investigations is discussed below.

26.6 Short list to the recommended southern and northern corridor options

26.6.1 Southern Section

To identify the recommended southern corridor option a comparison assessment of the short list was undertaken.

In summary, and as set out in Table 26-9 [17], this comparison assessment process focused on the criteria for which there was differentiation i.e. the criteria that had more than a 1 point difference between the highest and lowest scoring shortlisted options [18]. The assessment also focused on the key findings from the further technical analysis undertaken and key consultation themes.

[17] The table is also colour coded as follows:

Very positive	Positive	Neutral	Negative	Very negative

[18] For avoidance of doubt, there were five assessment criteria that had no material scoring difference, therefore these weren't used any further in the comparison assessment, and therefore are not represented in the table.

Table 26-9 Southern section corridor MCA scoring

	S6	S7	S7A*
MCA Differentiators			
Landscape / visual	MCA score: 2 Good fit with the landscape, requires less earthworks and would be located within a more modified landscape	MCA score: 3 Moderate fit with the landscape. Potential impacts on Kimberley Bush and Waikawa Stream area. Significant landform modification needed	MCA score: 4 Poor to moderate fit with landscape due to dog-legs in alignment, it affecting both valley and plains and still has landscape modification
Ecology	MCA score: 2 Able to avoid the few constraints nearby.	MCA score: 5 Many areas of significance and some are unable to be avoided e.g. Waikawa Stream Picnic area.	MCA score: 5 Many areas of significance and some are unable to be avoided e.g. Waikawa Stream Picnic area.
Social/ community/ recreation	MCA Score: 5 Severance and Amenity concerns, particularly around Manakau. Also affects the highest number of dwellings	MCA Score: 2 Low impacts, apart from recreational.	MCA Score: 1 Similar to S7
District development	MCA Score: 3 NB: MCA score was on the basis of impacts on a growth area which is now no longer proposed.	MCA Score: 1 Impacts on rural land only	MCA Score: 1 Impacts on rural land only
Project objectives	MCA Score: 1 Best performing option as shortest and attracts the most traffic	MCA Score: 3 Longer option that traverses fault line	MCA Score: 3 Longer option that traverses fault line in part
Engineering considerations	MCA Score: 2 Fewer tight curves, fewer structures and generally stable geology	MCA Score: 3 Large structures, significant earthworks	MCA Score: 4 Large structures, significant earthworks, more lower radii curves and difficulties in linking back to Waiauti valley
Cost	MCA Score: 3 Shortest and easiest route	MCA Score: 4 Long route with very large structures. Shown as red as subsequent work has shown that costs would be much higher	MCA Score: 5 Longest route with some large structures
Community comments / further information			
Traffic modelling	Shortest most direct route that takes the most traffic off SH1	Mid-length route	Longest route, takes least traffic from SH1

	S6	S7	S7A*
Social impact assessment	Comparatively performs best in Ōhau and Kuku but worst through Manakau	Comparatively performs worst for Ōhau and Kuku, but best through Manakau.	Performs comparatively average in both key locations.
BCR excl. WEBS (with best performing northern option)	0.37	0.24	0.25
Impact on dwellings (including noise)	14 within 50m of CL 64 within 150m 116 within 250m 13-14 PPFs in Cat B/C without mitigation	7 within 50m of CL 41 within 150m 68 within 250m 12-13 PPFs in Cat B/C without mitigation	10 within 50m of CL 51 within 150m 89 within 250m 11-13 PPFs in Cat B/C without mitigation

The comparison assessment in Table 26-9 identified that all of the shortlisted southern corridor options have their relative strengths and weaknesses. While it fared worse than the other options on the social impacts criterion (and the related impacts on dwellings), Option S6 was the strongest performing option on the important landscape / visual and ecology criteria. Option S6 was also the strongest performing option from a Project objectives perspective. It is also the most direct route, and hence minimised the loss of productive land to the Project (approximately 230ha) when compared to S7 (approximately 315ha) and S7A (approximately 290ha).

Accordingly, Option S6 was recommended in the IBC as the preferred corridor option for the **southern section** of the **Taylors Road to North of Levin New Offline Highway.**

26.6.2 Northern Section

A comparison assessment process was also undertaken for the short-listed northern corridor options. For the purposes of the assessment, it was assumed that the northern options would connect into S6 (as a starting point for understanding the performance of the northern options).

In summary, and as set out in Table 26-10[19], this comparison assessment process focused on the assessment criteria for which there was differentiation (i.e. these were the criteria that had more than a 1 point difference between the highest and lowest scoring shortlisted corridor options). [20] These criteria were Ecology and Heritage. The assessment also focused on the key findings of the further technical analysis undertaken and key consultation themes to help provide further differentiation (i.e. traffic modelling, productive lands, district development, social impacts, noise and stage-ability and fit with S6) plus updated benefit cost ratios.

[19] Table 7-10 uses the same colour coding as was used for the Southern Corridor Option Assessment (Table 7-9)

[20] For avoidance of doubt, there were 10 assessment criteria that had no material scoring difference, therefore these weren't used any further in the comparison assessment, and therefore are not represented in Table 7-10.

Table 26-10 Northern section MCA scoring

	N4	N5	N9
MCA Differentiators			
Ecology	MCA Score: 4/5 Score based on avoidance/impact of Prouse and Arapaepae bush. Considered that these effects can be mitigated by additional planting and protection to adjacent areas.	MCA Score: 1 Can avoid Koputaroa Stream	MCA Score: 5* *MCA score was due to the option encroaching on the ecological sites at the Ōhau River and Kimberley Scenic Reserve, but this only applies if the route connects into S7, hence this is now shown as green
Heritage	MCA Score: 4 Key constraint identified in the Prouse Homestead	MCA Score: 2 No specific constraints identified. Adkin house is outside the corridor	MCA Score: 2 No specific constraints identified. Adkin house is outside the corridor
Community Comments / Further Information.			
Traffic modelling	Shortest most direct route that takes the most traffic of SH1	More indirect route that attracts up to 1,000 fewer trips per day from the old SH1 due to its additional length	Not modelled but likely to be worse than N5 as a connection to Levin at either Kimberley Road or Tararua Road is further away from Levin.
BCR excl. WEBs (with S6)	0.37	0.33	0.33
Productive land	Corridor contains up to 40 ha of productive land.	Corridor contains up to 95 ha of productive land.	Corridor contains up to 130 ha of productive land.
District development	Good in terms of existing structure plan but provides urban design challenges to expansion.	Less favourable than Option 9 with respect to future urban expansion but better than N4.	Best fit with potential future urban expansion.
Social impact assessment	Corridor located in an area with an existing highway impacts. But most number of people adjacent to corridor (many of them on urban side of SH57 therefore N4 benefits as it takes traffic further away). Performs best in regard to community cohesion. 76* dwellings within corridor	Fewer people affected but the impacts are greater as they are in a more rural setting. Performs poorly in regard to community cohesion 76* dwellings within corridor	Similar to N5 but has recreational impacts in being close to Kimberley Reserve. Performs poorly in regard to community cohesion 73* dwellings within corridor
Noise	18 PPFs in Cat B/C without mitigation	22 PPFs in Cat B/C without mitigation	21 PPFs in Cat B/C without mitigation
Stage-ability and fit with S6	Very good as both corridors are close to SH57. SH57 can be used as an interim alignment.	Very good as both corridors are close to SH57. SH57 can be used as an interim alignment.	Less logical route as corridor moves from east to west, south of Levin and staging is more difficult as further away from SH57.

* Dwellings count includes connection component of option to S6

As set out in Table 26-10, the performance and impacts of the northern options were more finely balanced than the southern options.

In respect of Project Objectives, as shown by the traffic modelling criterion in the table above, Option N4 performed the strongest, as it offers the shortest journey, is closest to Levin Town Centre and is therefore predicted to divert (and accommodate) 75% of traffic from the current network onto the new State Highway. As discussed above, diverting traffic from the current network is central to the safety gains that the Project is intended to deliver. This is also reflected in the benefit to cost ratio calculation carried out at the time which shows N4 performing the highest (though not by a significant margin).

Option N5 was assessed as having lower ecological and heritage effects as compared with Option N4. However, additional (post MCA workshop) field survey of the ecological and heritage areas affected suggested that the ecological and heritage effects of option N4 could be minimised or appropriately managed.[21]

The additional, more detailed, social and noise studies concluded that Option N4 performed better as compared with the other options (in these respects). A key differentiator is that the N4 option is aligned close to and parallel to SH57. This means that a number of the properties that N4 would affect (from a noise and thus amenity perspective) are already currently affected by state highway traffic, which would be diverted onto N4 once that is constructed.[22] Community feedback tended to favour the N4 option ahead of N5 and N9 and this may be reflective of the alignment of N4 adjacent and close to SH57.

It was acknowledged that N4 was not desirable in respect of the planned urban growth (now known as Tara-Ika) but such effects could be addressed through the design of the future growth area. These are potential effects on dwellings yet to be built and were therefore considered to be less determinative than effects on dwellings and urban environments that currently exist.

N4 also minimised the loss of productive land to the Project (approximately 40ha) when compared to N5 (approximately 90ha) and N9 (approximately 130ha).

Accordingly, **Option N4** was recommended in the IBC as the preferred corridor option for the **northern section** of the **Taylors Road to North of Levin New Offline Highway.**

It was noted that care would need to be taken during subsequent investigations to consider how potential effects of N4 on the ecological and heritage sites could be avoided, mitigated or otherwise addressed. That work is reflected in the route refinement process that followed, and ultimately in the technical assessments that are being lodged with the RMA applications for the Project.[23]

26.6.3 Summary: Taylors Road to North of Levin New Offline Highway

A summary of the combined southern and northern preferred corridor options for the **Taylors Road to North of Levin New Offline Highway** is set out in Figure 26-11 below.

[21] This is in turn reflected in the technical assessments carried out in support of the RMA applications for the Project.
[22] This is discussed in more detail in the noise technical assessment.
[23] It is noted that in 2021, Waka Kotahi elected to undertake a re-check of the evaluations / scores for the short-listed northern corridor options N4, N5 and N9 on the basis that the Tara-Ika Plan Change 4 would be fully operative prior to it lodging the relevant Resource Management Act authorisations for the Ō2NL Project. The overall outcome of the re-check process was that there would be no material evaluation / scoring changes needed. That is, the IBC's recommended preference for Option N4 would remain (and possibly be enhanced due to improved Landscape / Visual and Social / Community / Recreation evaluations / scores). It is noted that the recheck process recommended no further corridor option evaluation processes be undertaken as a result of the (then) proposed Plan Change 4.

Figure 26-11 Summary of the combined southern and northern preferred corridor options for the Taylors road to north of Levin new offline highway

26.7 2018 re-evaluation

Prior to approval of the IBC, an independent project re-evaluation of the Ō2NL Project was undertaken in 2018 to check if the findings aligned with the then new priorities and strategic direction set out in the Government Policy Statement on Land Transport (2018).

The evaluation assessed all stages of the investigation, checking to ensure that the problem had been correctly identified, that the selected project objectives were appropriate, and that the approach to solving the problem was correct.

The outcome of this investigation was that a programme approach to improvement was recommended, entailing immediate safety improvements to the current state highway network between Ōtaki and Levin, while detailed business case investigations to identify a preferred highway route option were undertaken.

Following completion of the IBC and the Project re-evaluation[24] the preferred 300m corridor for the Taylors Road to North of Levin New Offline Highway was formally endorsed by the Waka Kotahi Board in December 2018.[25]

27 Refinement of the Project within the preferred corridor

In October 2019 Waka Kotahi announced it would undertake a DBC for the Taylors Road to North of Levin New Offline Highway and pursue the relevant RMA authorisations following approval of the DBC.

In the early phases of the DBC's development, Waka Kotahi re-checked the do-nothing option for the Ō2NL Project. This re-check identified the following:

- Death and serious injuries would continue to increase because of higher traffic volumes, creating more potential conflicts, on a corridor which already has significant safety deficiencies.
- High risk structures will continue to age until end-of-life replacements and, coupled with climate change, will result in increased frequency and severity of flooding and other natural hazard events.
- Levin will become a less 'liveable' town and affect social wellbeing for locals as the number of vehicles passing through Levin will continue to increase, along with the corresponding effects such as noise, safety, emissions, community severance and reduced active mode attractiveness.
- Regional growth is likely to be stifled, and/or growth will occur in a manner that results in the inefficient use of land, causing undesirable land-use integration/ town planning outcomes and worsening of future transport issues.
- There will still be a lack of mode choice, with limited opportunity to easily improve as road-based modes will continue competing for space on busy existing highways. There would be no north-south walking and cycling spine to develop a cycle network around, and bus services would be hampered by the poor and deteriorating traffic performance on the road network.

Following this re-check, the principal focus of the DBC's MCA processes was on the option and development processes to help inform Waka Kotahi's decision-making on the new highway route within the 300m corridor, interchange forms and locations and key local roads. In addition to this principal focus, and as the project design evolved during development of the DBC, further MCAs were undertaken to help inform Waka Kotahi's decision-making processes as follows:

[24] See - Ōtaki to north of Levin independent re-evaluation report (nzta.govt.nz)Waka Kotahi: Ō2NL IBC Appendix M
[25] See Board Meeting minutes from Friday 14 December 2018 (Resolution 2): https://www.nzta.govt.nz/assets/About-us-2/docs/board-meeting-minutes-2017/minutes-20181214.pdf

- **Additional 'spot' MCAs** – the MCAs further considered connectivity options at the Taylors Road locality (to the immediate north of Ōtaki), Tararua to Kimberley local road alignment and SH1 / Tararua Road intersection.
- **East of Levin MCA** – A MCA was undertaken on the Queen Street and Tararua intersection options as well as the 'height' of the midblock section between these two intersections.

All MCAs undertaken for the DBC used consistent assessment criteria and scoring methodologies. Where possible, and to ensure consistency, the same MCA assessors were used to inform each MCA.

All DBC MCA processes undertaken have been documented in the following reports (available online at https://www.nzta.govt.nz/otaki-to-north-of-levin/consent-applications):

- Ōtaki to North of Levin Highway Project: Consideration of Alternatives Multi Criteria Analysis Summary Report (Detailed Business Case Phase) – October 2022;
- Ōtaki to North Levin Detailed Business Case: East of Levin Multi Criteria Analysis (MCA) Report – October 2022.

In simple terms, through the MCA processes Waka Kotahi sought, where practicable, to minimise adverse effects while maximising the potential benefits of the Project.

27.1 New highway route refinement, interchange locations / form and local road re-connections

In summary, the DBC option development processes undertaken to inform Waka Kotahi decision-making processes for the new highway route (within the 300m corridor), interchange forms and locations and key local roads were undertaken as follows:

- Stage 1 – Long to short list assessment processes to identify a short list of alignment and interchange location / form preferences for detailed MCA evaluation.
- Stage 2 – initial short list of alignments and interchange MCAs, including MCA Workshops 1 (Alignment) and 2 (Interchanges and Local Roads).
- Stage 3A – Iwi engagement on the draft preferred highway alignment and interchange options and iwi MCA scoring on the options.
- Stage 3B – Public engagement on the draft preferred alignment, interchange and local road options.
- Stage 4 –Updates to new highways alignment, interchange and long road evaluations (MCA Workshop 3).

The above stages were undertaken over the course of 2020.

27.1.1 Stage 1: Identifying short listed options

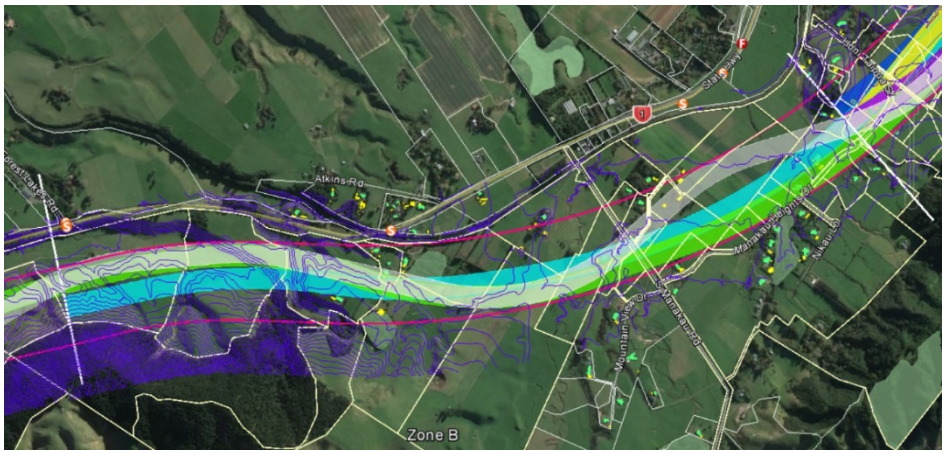
The first step in the evaluation process was to identify long and short list options for the new highway routes within the 300m corridor, interchange locations and forms and key local road options as set out below.

27.1.1.1 New highway route alignments

To develop the initial long list of route alignment options, the preferred 300m wide corridor was broken into 10 Highway Zones (referenced A-L), ranging from 1.5 to 4.5 km in length, to enable area focused evaluations. The location and length of each zone was based on engineering and environmental considerations. Coarse 80m wide highway route alignment options were developed for each zone, with each option meeting horizontal geometry standards and taking into consideration property information and topographical information. Each option also took into consideration the constraints and opportunities identified as part of the IBC investigations.

A screening workshop was held in March 2020 to determine whether any of the long list of route alignment options for each zone could be removed or further optimised based on high level design principles. At the completion of this work, there were typically two to three 80m alignments identified for each highway zone for further consideration in Stage 2 of the process. The route alignments were colour coded to allow for easier recording of scores. An example of the colour coding – in this case for 'Zone B' – is provided in Figure 27-1 below.

Figure 27-1 Example of colour coding of route alignments for highway alignment MCA workshop



27.1.1.2 Interchange options

For the interchange locations and forms, a long list was first identified by the Project Team, and subsequently evaluated against high level interchange principles and design requirements. This process enabled a short list of interchange options to be identified and taken forward for further evaluation in Stage 2 of the process.

27.1.1.3 Local road options

For the key local roads, a long list was identified for each local road zone by the Project Team and assessed against local road design principles. This process resulted in a long list of local road options to be taken forward for further assessment in Stage 2 of the process.

27.1.2 Stage 2 – Initial option evaluations and refinement

27.1.2.1 New highway route alignments

DBC MCA Workshop 1 was held on 25 May 2020 to evaluate the short-listed new highway alignment options for each highway zone. The workshop was attended by the MCA assessors, key members of the Project Team, observers from Waka Kotahi as well as representatives from HDC, KCDC, Ngāti Raukawa and Muaūpoko Tribal Authority.

Each highway alignment for each highway zone was assessed against the assessment criteria set out below:

- fit with Project Objectives
- iwi cultural values (Ngāti Raukawa ki te Tonga)
- iwi cultural values (Muaūpoko)
- landscape / Visual
- terrestrial ecology
- freshwater / wetland ecology
- heritage
- archaeology
- noise / vibration
- productive land values
- social / community / recreation
- Horowhenua district development
- Kāpiti Coast district development
- fit with local road system
- engineering degree of difficulty
- property degree of difficulty

For DBC MCA Workshop 1, each MCA assessor provided an "initial" unweighted score for their assigned criteria[26] (based on the six point scoring scale) for each of the short listed highway alignment options in each zone. These scores were considered initial as they were to be reviewed at DBC MCA Workshop 3 following completion of public engagement (that was to be undertaken in August / September 2020).

Following DBC MCA workshop 1, the scores were subject to a similar weighting scenario assessment that was undertaken for the IBC options.

27.1.2.2 Interchange and local road options

Grade separated, and at-grade interchange forms were considered for the following four broad potential interchange locations:

- Manakau / Kuku
- Kimberley Road / Tararua Road
- "SH1/SH57 Split"
- North Levin

DBC MCA Workshop 2 was held on 3 June 2020 to evaluate the short-listed interchange options. For efficiency purposes, this workshop also included evaluating the key local road options. The workshop was attended by the MCA assessors, members of the Project Team and observers from Waka Kotahi, HDC, KCDC, Ngāti Ruakawa ki te Tonga and Muaūpoko Tribal Authority.

With the exception of the Kāpiti Coast District Development, the same assessment criteria set out above, was applied to the evaluation of the short-listed interchange locations and forms using the six point scoring scale in order to identify initial unweighted scores.

Following, DBC MCA Workshop 2, an initial weighting scenario process was undertaken to test the sensitivities of the unweighted scores against matters that might be considered to be more important.

[26] For avoidance of doubt, the unweighted (raw) scores were equally weighted

The same weighting scenarios as used for the new highway alignment options were used for the weighted scenario testing process.

27.1.2.3 Local road long list options

Different connection options were evaluated for each local road that would potentially be severed by the new highway. Options were considered not just in isolation but alongside adjacent connections. These options were considered at DBC MCA Workshop 2 where the MCA assessors recorded "traffic light signals" for each option. This evaluation system enabled the assessors to identify green if they had minor concerns, orange if they had moderate concerns and red if they had significant negative concerns.

27.1.2.4 Further refinement of the options following workshops 1 and 2

Following completion of the DBC MCA Workshops 1 and 2, the Project Team further refined the highway alignment, interchange and local road options in response to the information shared at the workshops.

For the new highway alignments, this process enabled the Project Team to respond to key issues highlighted by the MCA assessors at the workshops (such as avoiding terrestrial ecological effects or complex property acquisitions) as well as ensuring the alignments integrated appropriately with the emerging interchange option preferences. The refinement process also included responding to the need to "stitch" together the initial highway preferences per zone into an overall coherent and workable new highway for public engagement in Stage 3.

For the interchanges, a new half interchange option was identified at Tararua Road based on feedback from the MCA assessors for further design consideration. The Project Team also identified a preference for only an at-grade roundabout form option at the SH1 / SH57 location to be taken forward to public engagement in Stage 3.

For the local road long list, and based on the traffic signal evaluations, further engagement with HDC, KCDC and technical specialists from Waka Kotahi was undertaken. Ultimately, through this process, a short list of local road options was identified for further consideration in Stages 3 and 4.

The key outcome of the overall refinement process, enabled Waka Kotahi to identify an emerging new highway alignment, interchange and local road option preferences for public engagement in Stage 3.

27.1.3 Stages 3A and 3B - Iwi and Public engagement

During August and September 2020, Waka Kotahi undertook public engagement on the emerging new highway alignment route, interchange locations and forms and local road options. Feedback from this engagement process is summarised in Part F of this report. In short, people commented on the interchange locations and forms, on the new highway alignments, motorised connectivity across the new highway, walking / cycling across the new highway, and providing feedback on the remaining options for local road connectivity.

Both Ngāti Raukawa ki te Tonga and the Muaūpoko Tribal Authority established project teams to engage directly with their respective hapū on the emerging new highway route that was identified in the public engagement programme. The outcomes of this engagement informed each Iwi's option evaluations / scores for a "public engagement option" at DBC MCA Workshop 3. Both Iwi did not engage on the interchange options or the local road options.

In addition, informal community reference groups were established by Waka Kotahi at Manakau, Ohau, Levin and north Levin to provide an additional forum for community discussion on the Ō2NL Project.

27.1.4 Stage 4 – DBC MCA Workshop 3 for identifying a recommended preferred alignment and interchange and local road options

Following public and Iwi engagement on the new highway route, interchange and local road options, DBC MCA Workshop 3 was held on 18 November 2020. In addition to re-checking their original evaluations and scores taking into account public and Iwi feedback, the MCA assessors were also asked to:

- Evaluate new highway alignment options for some of the Highway Zones as a consequence of post-MCA refinement processes and community engagement;
- Evaluate a new half grade separated interchange option at Tararua Road; and

- Undertake a new traffic light signal evaluation for the short-listed local road options.

The workshop was attended by the MCA assessors, representatives from HDC, KCDC, Ngāti Raukawa ki te Tonga and Muaūpoko Tribal Authority, key members of the Project Design Team and Waka Kotahi staff. At this workshop, the MCA assessors presented their updated evaluations / scores for the new highway alignment for each highway zone and interchange form and locations. They also presented their scores for the new highway alignment options, and new options that had been generated through public engagement feedback and / or Post MCA assessment processes, being the half interchange at Tararua Road as well as for the short listed local roads.

At the workshop Ngāti Raukawa ki te Tonga and Muaūpoko Tribal Authority presented scores for the "public engagement option" only. That is, both elected to provide one overall score for the emerging highway alignment presented in Waka Kotahi's August / September 2020 public engagement programme rather than to evaluate / score the short-listed highway options per highway zone.

As with previous processes, the updated scores were subject to weighted scenario testing.

27.1.4.1 New highway alignment

Following the MCA process, alignment preferences were identified for each zone, and these were combined into a single overall alignment for further development in the Ō2NL Project DBC.

27.1.4.2 Interchange form and locations

Following the MCA process, the following interchange options were identified as better performing under both the unweighted and weighted scenario processes:

- Manakau/Kuku – No connection, but if a connection is to be provided in the future, then there is a preference for an interchange to be located at Kuku (north of the river; form to be decided)
- Kimberley/Tararua – A full grade separated (compact diamond) interchange at Tararua
- SH1/SH57 split – roundabout
- North Levin – roundabout

27.1.4.3 Local road preferences

At DBC MCA Workshop 3, the MCA assessors submitted traffic light signal evaluations for the short-listed local road options. For some of the local road zones, only one feasible local road option existed, but in other locations, alternative local road options were identified for public engagement and evaluation.

At South Manakau, an active mode only and full modal connectivity option were proposed for reconnecting Honi Taipua Street at Manakau. Ultimately, the full modal connectivity option presented fewer difficulties and was therefore recommended to be progressed as part of the Ō2NL DBC.

Two road options were proposed for ensuring Kimberly Road connectivity at Tararua. Ultimately, the north south parallel road option presented fewer difficulties and was therefore recommended to be progressed as part of the Ō2NL Project DBC. It was however recommended that more specific optioneering be undertaken to help identify the preferred location for the local road alignment. This assessment was subsequently undertaken as one of the "additional spot MCAs" as set out below.

Two options were proposed for reconnecting Waihou and McDonald Roads (located to the north / west of Levin). Ultimately, a new connection to the north presented fewer difficulties and was therefore recommended to be progressed as part of the Ō2NL DBC.

Table 27-1 sets out the local road options identified for further development in the Ō2NL Project DBC.

Table 27-1 Recommended local road options

Local road zones	Recommended local road options
Taylors road	Utilise new Taylors Road connection currently being built as part of the Peka Peka to Otaki expressway (and reconfigure existing SH1) to access Taylors Road traffic only. Reconnect existing SH1 with a localised realignment and new grade-separated connection across expressway
South Manakau	Provide full multi- modal connectivity between Honi Taipua Street and Manakau Heights Drive
North Manakau	Connection at Manakau North Road
Kuku	Connection at Kuku East Road
Muhunoa East to Tararua Road	Provide connections at Muhunoa East Road and Tararua Road (no Kimberley Road connection but parallel local roads)
Liverpool street	No option provided as part of the new highway
Queen Street	Connection at Queen Street
Waihou and McDonald Road	Provide a new connection between Waihou Road and McDonald Road and connection on to SH57
North Levin	Provide supporting local connections for the proposed north Levin roundabout

28 Additional "spot" MCAs in 2021

In March 2021, and as a consequence of further design investigations, Waka Kotahi identified that additional MCAs were required to assist its decision making on key design elements as follows (each design element was evaluated by the same MCA assessors using the same assessment criteria and unweighted and weighted scoring systems at DBC MCA Workshop 4):

28.1 Taylors Road half interchange

Following identification of a preferred local road connection for Local Road Zone A (Taylors Road re-connection) in 2020, further design to identify improved local access to the new highway resulted in a half interchange concept being identified (providing a northbound off ramp, and a southbound on ramp only). Accordingly, a need to evaluate the half interchange option (Option 2) with the Taylors Road reconnection option (Option 1) was identified.

At DBC MCA Workshop 4, Option 1 (Taylors Road reconnection) was preferred under the unweighted scoring, and under all of the weighting scenarios with the exception of the economic weighting scenario. Following this workshop, Waka Kotahi undertook further consultation with HDC and KCDC, which resulted in a half interchange being preferred by Waka Kotahi. This preference was because it would provide greater connectivity to the new highway and was likely to reduce inter-regional traffic movements through Ōtaki town centre (noting that further work would be required to reduce the noise and visual impacts of this option through detailed design).

28.2 Tararua to Kimberley Option A local road options

As noted above, a key recommendation for the local road connection at this location was to undertake further optioneering in order to identify a preference for the location of the local road on the eastern side of the new highway between Tararua and Kimberley Roads. Two east-west local road locations were

identified: Option A1 would be within the 300m corridor and Option A2 would be located outside of the corridor.

At DBC MCA Workshop 4, a one point preference was identified for Option A2. Ultimately, Waka Kotahi identified a preference for keeping the east-west local road connection within the 300m corridor (and therefore Option A1 was preferred for the Ō2NL Project DBC).

28.3 SH1 / Tararua Road intersection

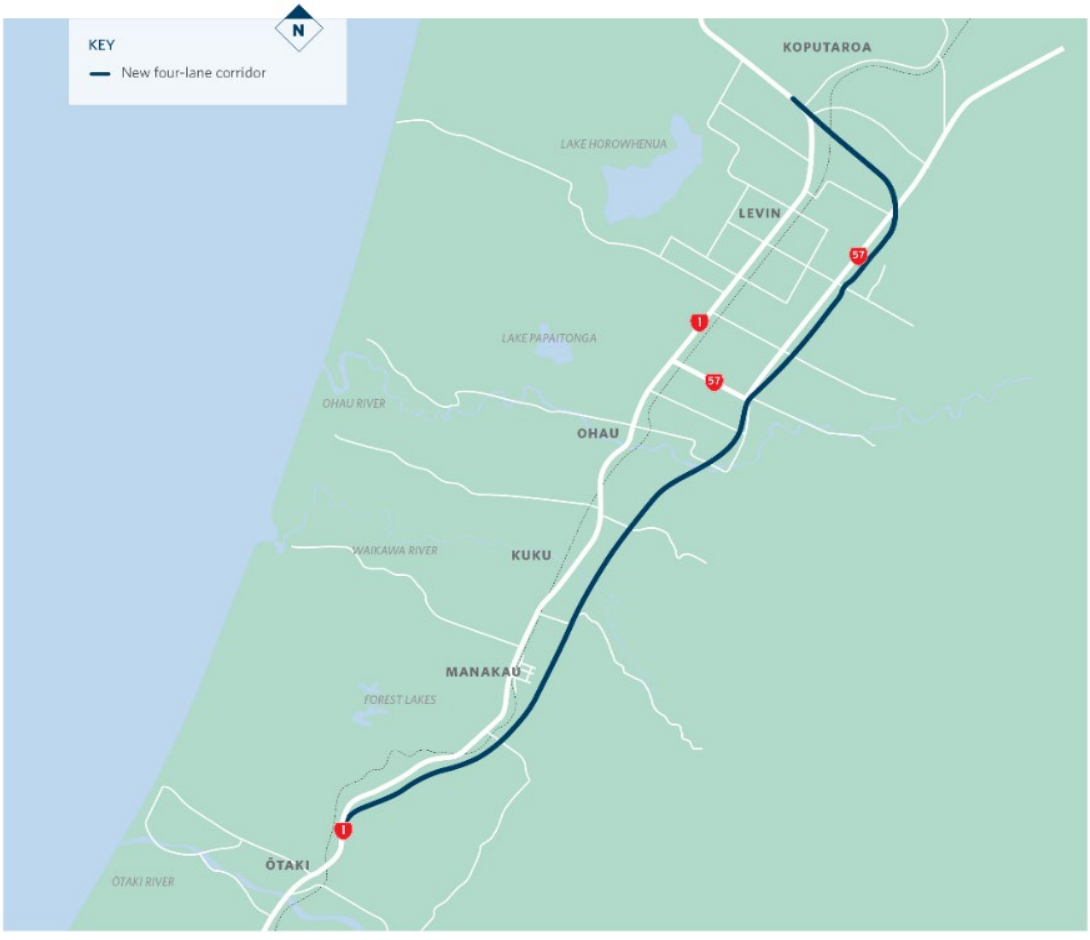
Using the traffic light evaluation approach, seven at-grade and grade separated intersection options were considered for the existing SH1 and Tararua Road intersection. A key consideration for each of the options was the long-term safety treatment of the North Island Main Truck line.

At DBC MCA Workshop 4, a general preference was identified for the at-grade options (but did not identify a preference for a particular at-grade option). Following further engagement with KiwiRail and HDC, Waka Kotahi identified a preference for the at grade full signalisation intersection option.

28.4 East of Levin MCA

During late 2021, Waka Kotahi investigations identified the need to undertake option assessment work for the design options for the section of the new Ō2NL Project to be located between Tararua Road and Queen Street East i.e. in the general locality of the red circle in Figure 28-1 below.

Figure 28-1 General locality of east of Levin and Tararua road MCA



The initial design thinking for this section of the new highway was for it to be a 'in cut' (i.e. below ground to minimise urban effects and gain material for reuse). However, further localised site investigations identified a high groundwater table, which could potentially make construction and operation of the new

highway difficult and could impact on groundwater flows. In addition, cultural concerns were identified by Muaūpoko Tribal Authority regarding potential impacts on the historic 'Horowhenua' landslip and on local groundwater and the flow on impacts to Punahua / Lake Horowhenua.

The Project Team identified and developed a long list of intersection and 'mid-block' (i.e. for the 'height' of the new highway between the intersections) options for this section of the new highway alignment. Next, and working with hapū of Ngāti Raukawa ki te Tonga, Muaūpoko Tribal Authority and HDC officers, Waka Kotahi identified a short list of options. The short-listed intersection options included at grade, below grade and above ground options. The mid-block options included at-grade and below grade options.

DBC MCA Workshop 5 was held on 13 October 2021 to evaluate the short-listed intersection and mid-block options. The workshop was attended by the MCA assessors, representatives from HDC, KCDC, Muaūpoko Tribal Authority, key members of the Project Team and Waka Kotahi staff.

At this workshop, the MCA assessors presented their evaluations / scores for the intersection and mid-block options. It is noted that the same MCA processes from the previous MCAs were applied to the East of Levin MCA. That is, the same MCA assessors (where available), assessment criteria and unweighted and weighted scenario scoring processes were used for the evaluation of the short-listed options.

The overall outcomes of MCA were as follows:

- **Queen Street** - Option Q5 (State highway at grade and Queen Street diverted north) was the preferred option in the MCA process. Option Q5 enabled future development of East-West connections between Tara-Ika and Levin. It also means that Tara-Ika is served by the combination of Queen Street (diverted) and Tararua Road as well as the potential new East-West central spine connector (described in the Tara-Ika plan change). The precise alignment of the Queen Street diversion component of Q5 can be designed to align with and serve the planned road network of the Tara-Ika Growth Area. This option fits with the Tara-Ika Growth Area master plan and in particular the East-West Central spine road identified in that master plan.
- **Tararua Road** - Option T7 (Tararua Road over the state highway) was considered the best performing option in the MCA process. This was due to this option having the best alignment with Project objectives, and good relative performance in terms of environmental effects.
- **Mid-Block –** The 'at grade' option was preferred over the 'below ground level' option. That reflected the overall outcomes of all MCA weighting systems, except for the economic weighting (as Option 2, the below ground option, would be preferrable as a source of material that would help to address fill deficit across the Project).

28.4.1 Queen Street interchange re-check in 2022

Following completion of the 2021 East of Levin MCA processes, Waka Kotahi undertook additional engagement with HDC and Muaūpoko Tribal Authority on the short-listed options for the Queen Street intersection in early 2022. It also undertook additional design refinements to Q5 (Queen Street diverted north) and Q7 (Queen Street over new highway).[27] As a consequence of these processes, and in particular the design changes to Q5 and Q7, Waka Kotahi asked the MCA assessors to re-check their original evaluations / scores for each short-listed Queen Street intersection option and to update these if deemed appropriate.

[27] The key design changes to Q5 and Q7 are as follows:
- Q5 – updated horizontal and vertical geometric design that seeks to better relate to property boundary lines and existing and possible future road network layout (including the Tara-Ika Masterplan). Additional work was also undertaken on the pedestrian and cycle bridge on the existing Queen Street alignment
- Q7 – minor changes to the alignment and the location of the bridge crossing, which is offset northwards from the existing Queen Street alignment

The re-check process was undertaken in accordance with the original East of Levin MCA instructions and the previous (individual) assessment methodologies. This ensured that the re-consideration process was undertaken in a manner consistent with the original evaluation.

Following the re-check process the Landscape / Visual / Urban Design, Archaeology, and Horowhenua District Development MCA assessors updated their original unweighted scores. The scores for all of the other MCA assessors were unchanged. As a result of the re-check process there was no material change in the unweighted or weighting scenario option rankings i.e. ultimately the overall scoring changes had a neutral impact on the unweighted and weighting scenario scores / rankings. Consequently, there was no change to the original recommendations for the short-listed intersection options for Queen Street (i.e. Q5 - State highway at grade and Queen Street diverted north).

Following receipt of the re-check process recommendations, Waka Kotahi decided to undertake additional transport network, transport safety investigations and project costings for both Options Q5 and Q7. Both options were also subject to a public consultation process in May 2022. Workshops with Muaūpoko Tribal Authority and HDC were convened to consider outcomes that were desirable at this location. The outcomes of these investigations are provided in the Table 28-1 below.

Table 28-1 Q5 and Q7 additional considerations outcomes

Topic/Area	Options Q5	Options Q7
MCA recheck outcome	Best performing	Fourth best performing
Transport network	Worst performing	Best performing
Safety	Meets design guides Provides more opportunities for improved traffic safety outcomes	Meets design guides
Active mode	Meets design guides	Meets design guides
Cost	Most expensive	Cheapest
Community feedback	Similar numbers supported / opposed both options with concerns about amenity, landscape and visual type effects and also transport network performance.	
Cultural	Through design both options can help deliver aspiration to develop and celebrate the spiritual pathway and water (Wai Mārie), including preserve views up and down Queen Street East, help develop the green /ecology corridor between Tararua Range and Punahau / Lake Horowhenua, and potentially incorporate tree-fort concepts.	
HDC	Concerned about urban design effects	Best fit with growth plans

Following Waka Kotahi's additional technical work and engagement processes, it ultimately decided to proceed with Option Q7. This is because it provides a better fit with the transport network, and with growth plans of HDC. It can be designed to provide positive legacy outcomes (by celebrating Wai Marie in particular) and otherwise protects views along Queen Street between Punahau / Lake Horowhenua and the Tararua Range. This option also represents an efficient use of resources.

29 Discharges

Pursuant to Clause 6(1)(d) of the Fourth Schedule and section 105(1)(c) of the RMA, where consent is sought for the discharge of contaminants to the environment, any possible alternative methods of discharge, including discharge into any other receiving environment must be assessed.

The Ō2NL Project is seeking resource consents for discharges relating to the following activities:

- For the discharge of clean fill (spoil sites [28]);
- For discharges to air during the construction phase of the Project; and
- For the discharge of water or contaminants into water or onto or into land within 'rare habitat' or threatened habitat in accordance with Schedule F of the One Plan.

As discussed above, the alternatives for the general location/route of the Project (and therefore construction and operational discharges) have been carefully considered.

The sections below set out a more specific discussion of alternative options considered for the relevant discharges associated with the Project.

29.1 Discharges to land and water

29.1.1 Construction discharges

During construction of the Project, discharges to land and water will occur associated with the discharge of silt and sediment runoff from earthworks and general construction activities including at the crossing points of the various streams and waterways within the project area.

These discharges are a necessary part of the construction process and cannot be practicably diverted to an alternative receiving environment due to the geographic location of the Project. A range of methods for erosion and sediment control were considered and assessed in the Erosion and Sediment Control Technical Report (Volume II, Appendix A4.3 to this report). A draft ESCP and three example SSESCPs have been prepared and accompany this application and will form part of the overall Construction Environmental Management Plan for the Project.

Industry best-practice construction and erosion and sediment control techniques are proposed and with the implementation of these, as required by the proposed conditions of consent, the effects of these discharges on water quality have been assessed in the Water Quality - Technical Assessment H to be minor. The report acknowledges that the bulk earthworks will, during construction, increase sediment loss. The effects will be particularly apparent during high flow events, however, the effects downstream can be minimised through the proposed SSESCPs 'control' and 'treatment' methods as discussed in Part G of this report.

29.1.2 Operational discharges

The permanent works and operation of the Project will generate new discharge points and discharge of contaminants from the road surface. Again, there are no practicable alternative environments to which the discharges can be made. These contaminants will be picked up in stormwater which will then be treated (to the Transport Agency's Stormwater Treatment Standard for State Highway Infrastructure 2010 guidelines) prior to discharging into relevant waterbodies. This approach effectively and efficiently manages stormwater discharges from the proposed operational transport corridor as set out into the Stormwater Management Design report (attached as Appendix 4.2 to the Design and Construct Report provided as Appendix Four).

29.1.3 Discharges to air

Discharges to air associated with earthworks activities will occur throughout the construction phase of the Project. Given the nature of the project and the source of the discharge, there are no alternative methods of discharge or alternative receiving environments. The construction phase air discharges from the

[28] The Material Supply and Spoil Sites selection reports (attached as Appendices 4.4 and 4.5 to the Design and Construction Report (Appendix Four to Volume II) should be referred to for more detail on the alternatives and site selection process undertaken for those sites that are within the boundaries of the proposed NoR.

project will be effectively managed through the implementation of dust avoidance and management processes and procedures as set out in the Air Quality- Technical Assessment C.

30 Summary of consideration of alternatives

Waka Kotahi has carried out a systematic, thorough, detailed, replicable, transparent and fit for purpose assessment of alternative sites, routes and methods for the Ō2NL Project which has resulted in the Project form as described in Part C of the AEE (Project Description).

The Project's option assessment and refinement processes have involved comprehensive information gathering and analysis undertaken by broad multi-disciplinary teams and informed by ongoing discussions with iwi, key stakeholders and wider public consultation.

A broad range of corridor options between north of Ōtaki and north of Levin were subject to detailed analysis, including long list and short list MCA processes, additional technical analysis and consultation, and refinement and rechecking. The end result was the selection of corridor S6-N4, to the east of the existing SH1 (and Levin).

The design of the Ō2NL Project within the preferred S6-N4 corridor subsequently considered the alignment, the location and form of interchanges that connect the new state highway to the local road network, and local road connections that retain and provide for the existing local road network.

The process undertaken by Waka Kotahi for considering alternative options was comprehensive, and 'adequate' in terms of section 171(1)(b) of the RMA.

PART F: CONSULTATION AND ENGAGEMENT

31 Overview

This chapter provides an overview of partner, key stakeholder, affected landowner and community engagement for the Ō2NL Project. Engagement has been designed to support the Project's strategic objectives, assist progression of the Project's investigation and design, ensure better-informed decisions and help ensure the delivery of a state highway network that meets the needs of communities and the wider public. Engagement has focused on collaboration with partners and key stakeholders and open and responsive discussions with affected landowners and the wider community.

This chapter sets out a summary of:

- the statutory framework and engagement guidelines that have shaped the engagement strategy;
- the engagement objectives and principles;
- engagement methods and techniques;
- partnership with tangata whenua;
- engagement with key stakeholders and landowners and the community;
- the phases of engagement, including during the consideration of alternatives process; and
- on-going and future planned engagement.

Detailed descriptions of the above matters are included in the Ō2NL Engagement Report September 2022 and associated appendices[1].

- the design context and standards;
- the anticipated physical works necessary to construct the Ō2NL Project.

[1] Ōtaki to north of Levin engagement report - September 2022

I. Ōtaki to North Levin project consultation report: Consultation stages 1-3
II. Ōtaki to North Levin project consultation report: Consultation stage 4
III. Ōtaki to North Levin project consultation report: Consultation stage 4 (part two) April 2014–November 2015
IV. June 2017 engagement – summary of key points – Feb 2018
V. Project update on shortlist for consultation – Feb 2018
VI. Shortlisted corridor options engagement summary report Jan-Mar 2018 – December 2018
VII. Interim engagement summary – December 2020
VIII. Engagement summary report Aug-Sept 2020 – March 2021
IX. Collateral and promotion April-May 2022 engagement
X. Feedback and team responses April-May 2022 engagement

32 Engagement strategy and approach

32.1 Statutory framework

There are no specific statutory requirements for consultation under the RMA for either NoR or resource consent applications. Form 18 of the RMA requires a NOR for a designation to include a description of any engagement (or consultation) that has been undertaken with parties that are likely to be affected, and clause 6(1)(f) of Schedule 4 requires an assessment of an activity's effects on the environment to include information on the identification of persons affected by the activity, any engagement or consultation undertaken, and any response to the views of any person consulted.

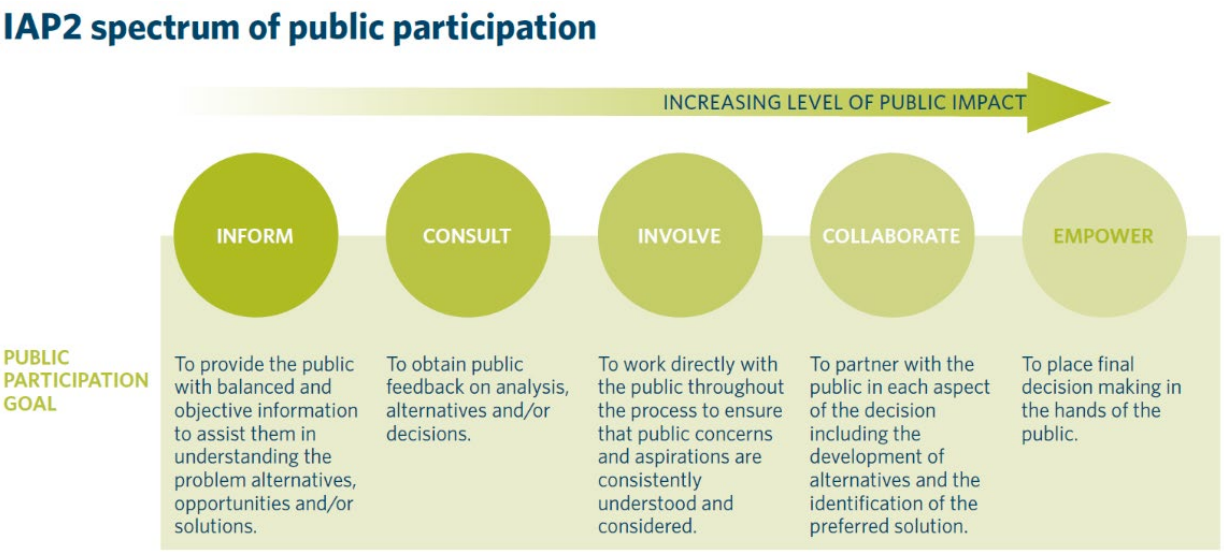
Section 96(1) of the LTMA requires Waka Kotahi to exhibit a sense of 'social and environmental responsibility' in meeting its objectives and undertaking its functions.

Waka Kotahi places a strong emphasis on pre-application engagement, in line with its focus on exhibiting a sense of social and environmental responsibility (including considering the views of potentially affected communities). Partnering with tangata whenua is also important in light of the Crown's Treaty of Waitangi obligations (including in respect of section 8 of the RMA).

32.2 International Association of Public Participation (IAP2)

Waka Kotahi engagement for the Ō2NL Project has been informed by the International Association of Public Participation (IAP2) principles and public participation spectrum. The IAP2 participation spectrum is shown in Figure 32-1 below.

Figure 32-1 – IAP2 spectrum of public participation



For each phase of the Project, the level of partner, public and stakeholder participation has been guided by the IAP2 participation spectrum approach. This approach specifically seeks that engagement transparently identifies the goals or outcome of the engagement process and determines how this outcome can be effectively delivered through a spectrum of engagement processes.

32.3 Waka Kotahi public engagement guidelines 2016

Engagement on the Ō2NL Project has also been informed by the *NZ Transport Agency Public Engagement Guidelines (2016)*[2]. This sets out the Waka Kotahi engagement guidance for developing a fit for purpose engagement strategy to understand issues and effects, provide opportunity for input, inform decisions, and disseminate relevant Project information as appropriate. The guidance encourages the use of the IAP2 public participation spectrum as a framework for engagement.

The guidelines include the following principles:

- we know why we are engaging and we communicate this clearly
- we know who to engage
- we know the history and background
- we begin early
- we are genuine
- we support and encourage best practice.

32.4 Te Ara Kotahi - our Māori Strategy 2020

Te Ara Kotahi provides strategic direction to Waka Kotahi on how the Agency works with and responds to Māori.

The strategy outlines five strategic pou (pillars) that support te whakakitenga (the vision):

- **Partnership** – We recognise and respect Te Triti o Waitangi and will promote a partnering approach in our work with Māori.
- **Leadership and culture** – We are respected by Māori and value Te Ao Māori views in the work we do to enhance the delivery of the land transport system.
- **Engagement** – We will engage effectively with Māori to build strong, meaningful and enduring relationships to achieve mutually beneficial outcomes.
- **Empowered** organisation – We support our people to have the capability, capacity and confidence to partner and engage successfully with Māori.
- **Strong and vibrant Māori communities** – We support the development of strong and vibrant Māori communities and will work with Māori to identify opportunities to enhance Māori social, cultural, environmental and economic wellbeing in the work we do.

32.5 Engagement principles

Informed by the above framework and direction, thorough and ongoing engagement has been carried out for the Ō2NL Project in the context of considering:

- the provision of sufficient information for the issues to be understood and time for relevant issues to be considered;
- the effects on the environment (including people and communities) of the Ō2NL Project;
- suitable and appropriate approaches to avoiding, remedying or mitigating adverse effects;
- refinements to the proposed alignment of the new road, in order to minimise adverse effects while delivering on Waka Kotahi objectives;
- developing the Ō2NL Project alongside tangata whenua as Project Partners; and
- the views, concerns and matters of importance to landowners, stakeholders and the community.

[2] NZ Transport Agency Public Engagement Guidelines

The Ō2NL Project has sought to collaborate and build consensus with the Project's Iwi Partners and key stakeholders. Project engagements with iwi partners are underpinned by the following principles that Waka Kotahi and tangata whenua will:

- acknowledge the relationships that upholds the rangatiratanga of the te taiao, and the relationship that partners have to each other within Horowhenua;
- acknowledge where we agree on values, effects and mitigation and seek workable solutions where we don't;
- consistently behave with respect, integrity and courtesy; and
- communicate openly, with respect, with direction and focus.

Other Ō2NL Project engagement principles are as follows:

- **Whole-of-programme communications** - to help avoid engagement fatigue and confusion, communications are always supported by whole of Project context and include information about other work that Waka Kotahi is undertaking in the region. This recognises that the same community and stakeholders can be affected by multiple projects – including safety improvements and speed reviews on the existing highways in the area, as well as the new Ō2NL highway.
- **Proactive and regular communication** - regular updates to the community and seek opportunities for dialogue and information-sharing, including face-to-face. Proactively share information by publishing key documents and provide answers to likely questions on the Project web pages. Through newsletters and events, proactively provide information on known areas of interest.
- **Transparent** - transparent about programme and process so that key stakeholders and the community can come to the same conclusions about the work programme as the Project Team. This includes sharing timeframes for key milestones and updates on progress, replying promptly and thoroughly to queries and creating opportunities for face-to-face conversations with the Project Team.
- **Take a long-term view of relationships** - the proposed new highway has a long history with the region's stakeholders and the community and so it is important to recognise past engagement and confirm that feedback has been considered. Taking a long term view to relationships will provide direct and regular engagement with key stakeholders and the community to help provide visibility of concerns.
- **Be approachable and available** – to engage with the audience, communications are straightforward, well-structured, concise and use plain English. The Project Team is contactable via a freephone number and Project email address. Responses are timely, sympathetic, helpful, frank and detailed.
- **Think regionally and nationally as well as locally** - support the bigger picture story about progress with transport infrastructure in the region to provide context.

33 Engagement methods

A wide range of engagement tools and channels have been utilised. An integrated approach to communications and engagement planning saw a mix of channels used to provide multiple touchpoints and engagement and feedback options. From March 2020 to September 2022, engagement method options reflected the Covid 19 Alert Levels / Protection Framework as well as the community response to the pandemic; with additional reliance on online options, in particular Zoom meetings.

- **Iwi engagement –** The Ō2NL Project Team began engaging with iwi partners in 2012. Initially, conversations were with iwi as key stakeholders albeit with considerable levels of input during the IBC investigation phase as reported in the Part E Consideration of Alternatives. In 2019 Waka Kotahi, Muaūpoko Tribal Authority and Ngāti Raukawa ki te Tonga began discussions about a partnership

approach to the ensuing investigation and construction phases of the Project. From October 2019 investigations to be undertaken in partnership with increasing involvement in the DBC investigations. Notably this entailed the commencement of the development of a Cultural and Environmental Design Framework and formation of investigation and design principles, as well as principles around working together.

The partnership approach has matured and developed over time. Key interfaces to allow iwi to participate, engage, inform and shape ongoing investigations now include governance, management and operational activities.

- **Project Reference Group and Ō2NL Community Groups -** A Project Reference Group (PRG) was formed in May 2017, which comprised of key stakeholders, iwi and community members[3]. The PRG met regularly with the Project Team and were involved in the MCA process for shortlisting corridor and alignment options.

  In June 2020, to better support the ongoing investigations of the Project, the PRG was expanded into four different Ō2NL Community Groups, representing the communities of Manakau, Ohau, Levin and north Levin. This allowed more detailed discussions about specific locations and their requirements to occur and to inform ongoing alignment investigations.

  Since July 2020, these Ō2NL Community Groups have continued to meet on (approximately) a bi-monthly cycle and are provided with information about ongoing environmental investigations as well as an opportunity to provide input into specific design aspects of the Project, such as the location and connections of the SUP. Community Group insights contribute to the AEE and RMA process and to community relations with the Project. The invite list for these meetings is more than 90 people and typically 40-60 people attend each round of Community Group meetings. It is open to anyone to attend Community Group meetings, which are advertised via the Ō2NL Project (email) newsletter and occasionally other promotion.
- **Stakeholder meetings** – Meetings with key stakeholders provide an opportunity for the Project Team to present audience specific information to key stakeholder groups and to work collaboratively to develop solutions. These include face to face and online meetings (when appropriate) with stakeholders to discuss specific matters such as river management, water quality monitoring, and plans to improve local roads and infrastructure, as well as multi-disciplinary workshops to discuss the Project, shared use path, intersection and local road improvements, the design framework, ecology and noise.
- **Dedicated phone** - A free phone number (0508 625 4636) is available to receive calls and answer queries from the public. This line received up to 50 calls per month in 2021/2022.
- **Email** - O2NL@nzta.govt.nz. This email is often the first point of contact for public and stakeholders to reach out to the Project. It is also used for follow up on queries and liaise with landowners. Members of the public and stakeholders contact it significantly more during periods of engagement or following a project newsletter than when we have not recently shared an update. However, the inbox is closely monitored to respond to all queries as they come in.
- **Ō2NL Project website –** The website provides up to date and accurate information and is a key portal for people to have access to day-to-day information relating the Project. Waka Kotahi aims to proactively make as much information and documentation as possible available on the Project website: www.nzta.govt.nz/Ō2NL
- **Ō2NL Project email newsletter** – This newsletter is emailed to a subscriber mailing list. Updates are provided for the community every four to six weeks and the newsletter is also made available on the website. People can subscribe to Project updates via a sign-up form on the website or request

[3] It is recognised that these groups are not representative of the entire community but they provide useful insights

newsletters using Project inbound channels. As of October 2022 the newsletter has more than 1,900 subscribers.

- **Letters / email newsletters to property owners** - Major announcements are sent in personalised letters/emails to all property owners identified as potentially affected by the new highway. Since 2018, that has been those inside the 300m wide preferred corridor. For those owners who have supplied email addresses, email updates were used during COVID alert level 4, when it wasn't possible to deliver letters to property owners.
- **Landowner meetings** - The Project Team meets with and exchanges correspondence with property owners/ tenants both proactively and reactively when owners have particular concerns. This is to inform property owners, listen to any concerns and issues they have, understand their access requirements during construction and operation of the new state highway, and to facilitate land access and future land purchases. During property owner engagement periods, owners are invited to schedule meetings with the Project Team to discuss the Project and process any queries related to their property.
- **Social media channels –** Queries on the Waka Kotahi Facebook and Twitter pages are forwarded to the Project Team and responded to on the platform or via email. Waka Kotahi social media channels are used throughout engagement periods to inform the public about the drop-in sessions and how to give feedback. The Waka Kotahi Wellington Facebook page has the largest reach of the social media channels with 52,000 followers.
- **Social Pinpoint** – This online tool is used during periods of public engagement for the community to learn more about proposed changes and leave feedback on the interactive map. Following use of a physical map at earlier engagement events, the interactive Social Pinpoint map was used during the August 2020 draft preferred alignment engagement to provide an online option. Members of the public can view feedback provided by other users and it is made available to view on the Project website. During the 2020 engagement, there were more than 1,300 unique users to the Social Pinpoint and 269 comments were provided as feedback. This feedback was consolidated with emails, conversations, survey responses and phone calls also received during engagement.
- **Survey Monkey –** This online tool is used for online surveys during periods of public engagement. Paper-based versions of online surveys are also available.
- **Local Project Office presence in Levin** - In December 2020, an Ō2NL Project Office was established in Levin, providing a local base for the team to work and meet with stakeholders. The office has a display area to view plans that has been open to the public during engagement phases and for occasional open day since July 2021 (subject to COVID restrictions) and allows members of the public to come and speak to the Project Team.
- **Public information events** - Numerous public information events and open days (details are outlined in the Ō2NL Engagement Report September 2022) have been held during key engagement phases to enable the public to view plans and designs, ask questions and discuss the Project with team members directly and to provide input and feedback. These events are advertised on the Project website, local newspapers, radio ads and billboards. Engagement events for the new highway have been held at venues in Ōtaki, Manakau, Ohau, Levin and Koputaroa. For example, 10 face to face events were held during the four-week engagement phase for the draft preferred alignment in 2020.
- **Advertising –** Public information events are promoted using external advertising channels. During periods of engagement, print, radio, outdoor and social media advertising are booked to inform the general public that there is Project update and feedback is open. All advertising is local to the Horowhenua and Kāpiti regions.
- **Engagement collateral –** Engagement collateral is written and designed for all engagement periods to inform the public of the latest Project updates in an easy-to-understand manner. Collateral will differ between different engagement periods, however, usually includes display boards (printed boards for

events and also published on the Project website), brochures, flyers, roll-out maps and feedback forms.

- **Media release** - Media releases are issued on the first day of an engagement period to announce drop-in sessions and the feedback window opening. Media releases are also issued outside an engagement period if there is an important Project update like a funding decision.
- **Communications and Engagement Database** - All communications and engagement activities with key stakeholders and the public are recorded for internal use.

34 Partners, stakeholders and landowners

There are numerous partners, key stakeholders and groups involved in the Ō2NL Project. Participants include those with interests in land, asset owners, landowners, people with interests in the Ō2NL Project's design and development, and others with broader ecological, tourism and economic interests.

34.1 Partnership with tangata whenua

The Ō2NL Project is being developed by Waka Kotahi, Muaūpoko Tribal Authority (Muaūpoko) and the following hapū of Ngāti Raukawa ki te Tonga: Ngā Hapū o Ōtaki (on behalf of Ngāti Kapumanawawhiti), Ngāti Hikitanga, Ngāti Huia ki Poroutawhao, Ngāti Huia ki Mātau, Ngāti Kikopiri, Ngāti Ngarongo, Ngāti Pareraukawa, Ngāti Takihiku, Ngāti Tukorehe and Ngāti Wehi Wehi (Ngāti Raukawa ki te Tonga). Waka Kotahi has worked in partnership with Muaūpoko and Ngāti Raukawa as Iwi Project Partners since early 2020 when work on the Detailed Business Case (DBC) investigations programme commenced. Through this partnership, core principles for the Project have been established and applied across Project development processes. Details regarding the Project Partnership including the partnership principles, working relationship, and governance, are described in Part A of this report.

Hapū and iwi partners of Muaūpoko and Ngāti Raukawa ki te Tonga have led the Project Team's efforts to incorporate identified cultural values with the overall outcomes and local values, and is acknowledged and reflected in the development of the Cultural and Environmental Design Framework (CEDF) that has assisted to finalise the alignment and concept design of the Ō2NL Project.

Cultural Impact Assessments (CIA) have also been prepared for the Project and are provided in Volume V and has allowed specific and detailed cultural issues to be identified and resolved.

34.2 Involvement of iwi / hapū

Tangata whenua have been involved as Project Partners in considering corridor options, route alignment assessment processes, and assessment of effects. Key cultural interests include how the Project interacts with wai (including groundwater), maunga, spiritual pathways, what the impacts are on the environment (wetlands, rivers, stands of vegetation and terrestrial invertebrates, such as snails and lizards, birds and other fauna) and how the Ō2NL Project will contribute positively to the environment and community.

Iwi Project Partners have been working alongside the Project Team during investigations, and have been involved in Project Team meetings and RMA Planning Team hui. Key touchpoints for recent iwi involvement since 2019 include:

- Co-creation of a draft CEDF – commenced in October 2020 and entailed numerous workshops to develop a preliminary draft CEDF that was reviewed by whānau review in December 2021. Development of the draft CEDF continued in response to emerging design issues (such as noise mitigation investigations, material supply sites and construction methodologies). The draft CEDF has been used to inform the concept design of the Ō2NL Project and associated infrastructure.
- Weekly/fortnightly workshops convened since May 2021 where detailed matters are presented and worked through, including geometric, bridge and stormwater design, groundwater, ecology, air and

water quality, construction methodology (including erosion and sediment control), spoil sites and material supply sites. The CEDF has continued to be developed at these workshops, and development has included two CEDF design review audits (the latest iteration is attached to the CEDF). Proposed RMA conditions (attached as Appendix Five) have also been shared and discussed at the workshops.

- Input into various MCA processes to select the final corridor, East of Levin options, material supply and spoil site locations, and Queen Street East connections (refer to Part E Alternatives for more detail). Iwi partners contributed scores for tangata whenua cultural values for various options in all of these processes.
- Access to and review of all Project resources including draft technical reports and advice, draft plans/designs and drawings, as well as the ability to discuss matters with expert/specialist advisors, Project designers, the planning team and support, and support for discussions with whānau and hapū members; and
- Representation on the Project Steering Committee (PSC) since February 2022.

Key themes for both Muaūpoko and Ngāti Raukawa included consideration of impacts on cultural values associated with the Ō2NL Project, including:

- past and present associations;
- key areas of settlement (marae and papakianga);
- wāhi tapu (if known) and other cultural values;
- areas of use (e.g. food gathering, harvesting, bathing, hunting);
- current ownership;
- important elements of the natural environment such as waterways and wetlands;
- Enabling training, employment, and social innovation opportunities for Māori to contribute to the Ō2NL Project, while leaving a positive and sustainable legacy for the region and supporting its future workforce.

The proposed designation avoids a wide range of cultural sites, features and landscapes, and is otherwise respectful of mātauranga Māori cultural values, for example the concept design alignment avoids Pukehou, planting concept design layouts that respond to and respect the principles of *ki uta ki tai,* avoiding cutting into the Horowhenua Block (located to the east of Levin), and the concept design approach for the Queen Street East reconnection. Ongoing cultural effects will be managed through careful selection of construction methods and ongoing iwi involvement in design development. Notably opportunities have been provided for mana whenua to be involved in: (i) stream diversion and culvert design, (ii) ecology offset and compensation sites identification and establishment, landscape and natural character plant design including implementation and of material supply sites, (iii) shared use path and public interface design aspects (roundabouts, gateways), including a mahi toi (Māori artwork) strategy.

Cultural effects and how they are proposed to be avoided, remedied or mitigated are outlined in Part G and H of this AEE.

While not part of the consenting process, a Legacy Outcomes Framework to help identify how the Project''s detailed design, and construction can achieve outcomes for hapū and iwi partners, Māori and the region generally is currently being prepared. As the Project proceeds through design and procurement stages, consideration will be given to how it can help achieve the Broader Outcomes Framework outcomes, whether through direct investment, technical assistance and capacity building, or catalysing other relationships and investment.

34.3 Local government

The Ō2NL Project sits across four local and regional council boundaries to include:

- HDC
- Horizons
- KCDC
- GWRC

All four councils have been involved in the scoping and methodologies of the technical aspects and the environmental assessment of the Ō2NL Project. They have been invited on, and attended, site visits and reviewed relevant draft reports and conditions prior to submission of the RMA documentation and have had the opportunity to provide feedback and meet with the Project Team and relevant specialists to discuss any key issues.

Monthly meetings with HDC, KCDC, Horizons and GWRC commenced in 2012. A Project Steering Group was established in 2015 comprising representatives and staff from Waka Kotahi and the relevant councils (including elected representatives and staff). This group has evolved over time, initially into the Technical Steering Group. More recently it has become the RMA Officers' Group, which operates alongside the governance-level Project Steering Committee, formed in late 2019. Local government engagement is summarised in Table 34-1.

Table 34-1 Summary of council engagement

Council	Purpose	What, When and How
Kāpiti Coast and HDC senior staff and elected members	To share information with elected representatives and senior staff about the Project and to share in particular milestones in the programme leading up to construction and road opening.	Periodic updates to senior staff and elected members since 2012. Note also quarterly meetings via Regional Transport Committee, described below. Meet periodically as information becomes available through all phases of investigations, with weekly or more catchups with HDC managerial staff since 2020. Milestone briefings for elected members. Since mid-2020, monthly HDC briefings
Technical officers' meetings (KCDC and HDC, Horizons and GWRC)	To share information about the ongoing investigations relevant to the Project. This included, for example, to enable participation in the evaluation and refinement of options.	2012 – 2015 involvement in initial investigations, leading to consideration of online improvement between Ōtaki and the Manawatū River. 2016 – 2018 involvement in IBC investigations including attendance at MCA workshops. 2019 – 2022 involvement in DBC investigations including attendance at MCA Workshops 1 (May 2020), 2 (June 2020), 3 (November 2020), 4 (March 2021), 5 (October 2021)
RMA officers meeting (KCDC and HDC, Horizons and GWRC officers and planning representatives)	To discuss administrative and mechanical aspects of consenting pre-lodgement and post-lodgement phases. To provide information about the Project and to align scope and	Group established in 2021, with monthly meetings since February 2021 Project briefing (May 2021) Supply of ecological, culvert, hydrology, offsetting assessment methodologies for comment Project site visits (May 2021, August 2021 and August 2022)

Council	Purpose	What, When and How
	purpose of effects assessments with RMA purposes	Regular e-mail updates on programme Electronic distribution of two rounds of draft technical reports, design drawings and supporting information and follow-up meetings of experts Attendance at numerous workshops on RMA conditions, noise, ecology, shared use path and CEDF development (2020 – 2022).
KCDC and HDC Road Controlling Authority	To share information about the project and in particular to discuss design and Project interfaces with local road networks. To discuss and agree assumed condition of the existing state highway network once the new highway is open, including revocation options and principles.	HDC and KCDC as Road controlling authority were engaged via the Technical Officers meetings described above. These discussions included transport modelling assumptions discussions, around planned road improvements, sharing survey data and growth assumptions, the design specification of proposed improvements to the local road network including reconnections, shared use path facilities and intersection improvements Level crossing improvement investigations hui, and site visit (June 2021 – February 2022).
Horizons & Wellington Regional Transport Committee	To discuss transport effects of the Project and implications for regionally and nationally significant road networks.	Quarterly meetings

34.4 Government organisations

The Ō2NL Project Team has also engaged with relevant government organisations, including the Department of Conservation, Heritage New Zealand and the Ministry of Transport. A summary of engagement activities undertaken is shown in Table 34-2 below.

These government organisations have been involved in the scoping and methodologies of the technical aspects and the environmental assessment of the Ō2NL Project. They have reviewed relevant draft reports prior to submission of the RMA documentation and have had the opportunity to provide feedback and meet with the Project Team and relevant specialists to discuss any key issues.

Table 34-2 Summary of government organisation engagement

Stakeholder	Purpose	What, When and How
Department of Conservation	To provide information about the Project and to align scope and purpose of effects assessments with RMA purposes. To check consistent understanding of the values of ecology systems and the effects on them are understood and to agree an approach to responding to those effects.	Monthly progress catchups Project site visit August 2021 Supply of ecological and offsetting assessment methodologies for comment Electronic distribution of two rounds of draft technical reports, design drawings and supporting information and follow-up meetings of experts Supply and review of technical workings to establish mitigation and offsetting requirements (Biodiversity Offset Accounting Model and Stream Ecological Value assessments)

Stakeholder	Purpose	What, When and How
		Attendance at RMA conditions, ecology and CEDF development workshops (2020 – 2022).
Heritage New Zealand Pouhere Taonga	To provide information about the project and to align scope and purpose of effects assessments with RMA purposes. To check consistent understanding of the values of heritage and the effects on them are understood and to agree an approach to responding to those effects.	Quarterly updates since early 2021 Project workshops – attendance at project briefing for stakeholders (mid 2021) Invitation to attend a project site walk-over/bus rode (mid 2021) Electronic distribution of draft technical reports, design drawings and supporting information Sharing of the technical reports relating to archaeology and heritage effects for which HNZ feedback was provided Attendance at condition workshops Sharing of the draft AEE and draft technical reports for feedback at the same time as Council (2020 – 2022)
KiwiRail	To share information about the Project and in particular to discuss design and Project interfaces with North Island Main Trunk Line. To discuss and agree design responses where improvements to rail crossings are required at Tararua Road and also at northern extent of Project at Heatherlea East Road, and potential construction access at Ohau and Bishops Road.	Project discussions (from 2020). Ad-hoc but frequent meetings to discuss level crossing at Tararua Road (from June 2021) Regular fortnightly meetings to discuss processes to manage project interfaces (from May 2020) Attendance at condition workshops

34.5 Other key stakeholders

Table 34-3 below summarises key stakeholder groups that have an interest and/or are affected by the Ō2NL Project and with whom specific engagement that has occurred. A number of key stakeholders have been involved in relevant technical aspects and environmental assessments. Some groups (such as Forest and Bird and the noise groups) have also been involved in the scoping and methodologies of the technical aspects of the Project and had the opportunity to provide feedback and meet with the Project Team and relevant specialists to discuss any key issues.

Table 34-3 Summary of other key stakeholder engagement

Stakeholder/Partner	Purpose	What, When and How
Commercial and emergency services, Road users groups - Police, Fire, Ambulance, Automobile Association, NZ Road Transport Association,	To discuss the Project's design specification, connections and interchanges and seek understanding of and respond to areas of concern.	Approximately quarterly on-line / hui briefings / discussion in respect of the status of the design and investigations.

Stakeholder/Partner	Purpose	What, When and How
Road Transport Forum NZ, Heavy Haulage.		
Forest and Bird	To provide information about the Project and to align scope and purpose of effects assessments with RMA purposes. To check consistent understanding of the values of ecology systems and the effects on them are understood and to agree an approach to responding to those effects.	Ecology workshops Project site visits Electronic distribution of draft technical reports, design drawings and supporting information Attendance at ecology, shared use path, RMA conditions and CEDF development workshops (2020 – 2022).
Ō2NL noise mitigation group and Manakau noise group	To share information about the Project and to discuss and agree approaches to managing the effects of noise on existing and planned dwellings	Meet periodically as information becomes available through investigations.
Ō2NL Community group meetings for Manakau, Ohau, Levin and north of Levin	To share information about the Project's design and effects assessments processes. To seek local views and to seek understanding of and respond to areas of concern.	Bi-monthly meetings (from March 2020)
Service providers: Electra (Power), Vocus (telecoms), Chorus (telecoms), Spark (telecoms), PowerCo (Gas)	To identify all utilities and liaise with utility companies to develop construction methodology and phasing in order to relocate any services during the construction phase of the Project.	Liaison with service providers as required Involvement in detailed design and during construction

34.6 Landowners

'Landowners' refers to those with property within the preferred alignment and proposed designation area, as well as those who were previously located within an alignment or corridor (prior to the selection of the preferred corridor.

34.6.1 Pre-2018

- In 2013, landowners who were identified to be directly affected by the Project at the time were contacted and a total of 85 meetings were held between April and July. A further 25 meetings were held with landowners in November and December 2013;
- Further letters were sent out to landowners between April 2014 and November 2015 relating to the proposed SH1/SH57 connection;
- Additional property owner updates includes letters in June 2016 and May 2017.

34.6.2 From 2018 - 2022

On 19 January 2018, letters were sent to 490 landowners that were identified as owning a property affected or potentially affected by one or more of the short-listed corridor options.

From January to March 2018, the Project Team held more than 300 meetings with approximately 400 landowners. A property owner information sheet was also provided to further explain the process should their property be affected by the Project. Details of this engagement with landowners can be found in the Ōtaki to north of Levin IBC, December 2018 (Appendix L).

The feedback from the engagement, including additional investigations / studies commissioned in response to concerns, informed the selection of a preferred corridor option which is reported in the IBC. The process for selecting the preferred option is described in Part E of this report.

In December 2018 a preferred corridor was announced. Letters were sent to landowners to confirm the preferred corridor and investigations began to identify a preferred alignment within the 300m wide preferred corridor.

In October 2019, letters were sent to landowners within the preferred corridor with an update on delays to the Project and to inform them that work on the DBC was getting underway.

In January 2020, a letter was sent to landowners within the preferred corridor to announce the NZUP's commitment to fund the four-lane highway and firm up on the Project's timeline.

In August 2020, Waka Kotahi announced the draft preferred alignment. All landowners within the preferred corridor were informed whether they were in or out of the draft preferred alignment through letters including individual maps. Landowners were informed that while this announcement provided increased certainty about the location of the Project, the was still a chance land within the preferred corridor would be affected. Follow-up phone calls were made to further check in with landowners and arrange meetings.

In August/September 2020, the Project Team held more than 110 meetings with landowners. Discussions were largely focussed on individual property impacts. Further details on engagement with landowners during this stage can be found in the Ōtaki to north of Levin MCA published in July/August 2020.

In March 2021, the refined draft preferred alignment was announced and letters were sent to all landowners within the preferred corridor. The properties where the extent of which they were in the alignment changed were told why the change had taken place, for example earthworks, local road connections or water courses. Landowners were invited to get in touch if they had further questions at this stage and 12 meetings took place between March and June 2021.

In October-November 2021, landowners were contacted to discuss details of the Ō2NL Project and ensure that properties that are likely to be only partially acquired can continue to be used during construction and operation of the new state highway. These discussions focussed on access, water supply and any other utility or service infrastructure requirements. Some properties were identified as being needed to be purchased in entirety – generally because the whole or large part of the property was in the draft alignment. These landowners were invited to start talking with property consultants about purchasing. There were 25 landowner meetings in November 2021.

In December 2021, the preferred alignment was announced, providing further certainty for landowners ahead of consenting. Letters were sent to all landowners within the preferred corridor, and they were informed that at this stage the preferred corridor would be removed from plans and only those within the preferred alignment would receive landowner communications from this stage. Letters were accompanied by a property owner information sheet, which is also available on the website.

Information was also posted to property owners within the previous 300m corridor who were not within the preferred alignment to share information about the Project's design and effects assessments processes. A near neighbours' information sheet was also included and is available on the website.

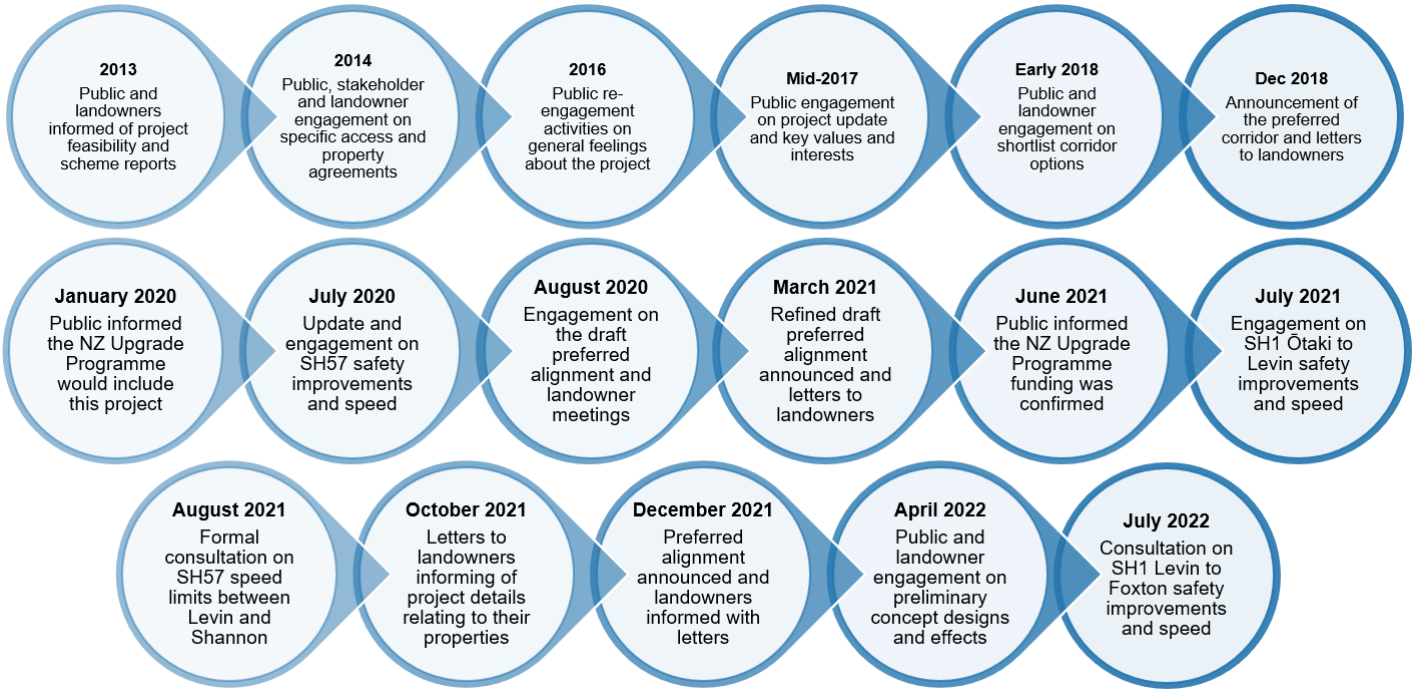
In April-May 2022 in addition to wider community drop-in sessions, neighbourhood meetings were set up on request to provide an opportunity to talk on topics of interest with members of the Project Team and technical specialists about what the Ō2NL Project will mean for them in their area. Noise and landscape / visual were key topics. The offer of neighbourhood meetings was also extended via the Ō2NL Project newsletter. To date, hui have been held with various residents from Waihou Road, Kimberley Road, Redwood Grove, Manakau and Manakau Heights Drive. Additional areas were identified where coverage of the Project could be boosted, and opportunities to attend events or find out more.

Ongoing 2022, liaising with landowners transitioned from the Project team's responsibility to each landowner being assigned an individual property consultant. These property consultants work closely with landowners to work through issues and concerns and address the needs of each individual property owner.

35 Phases of engagement and feedback

Work on the Ō2NL Project commenced in 2011 as part of the Roads of National Significance (RoNS) programme. Key stakeholder and public engagement commenced in 2013 as the selection of the final alignment and design of the proposed highway progressed. The timeline of engagement with the community is shown in the Figure 35-1 below.

Figure 35-1 Timeline of engagement



With respect to engagement activities, the Ō2NL Project can be divided into three phases – Phase 1: Option investigations; Phase 2: Preferred corridor identification; and Phase 3: Preferred alignment identification and refinement.

35.1 Phase one – assessment of corridor options 2011 to 2017

In March 2011, a Consultation Plan was prepared by Waka Kotahi with the aim of engaging with iwi to meet the requirements of tikanga Māori, stakeholders and the wider community of the scope and programme for the proposed Ō2NL Project. From 2011 to 2013, engagement was undertaken with key stakeholders on the area and potential corridors followed by public and community input towards route options and the preferred route.

In August 2013, Waka Kotahi published a Consultation Report[4] that described and reported on the engagement undertaken between April 2011 and July 2013.

It is important to note that during this time the scope of the Ō2NL Project was modified from a standalone state highway to targeting safety and efficiency improvements on the existing highways, while retaining a long-term four-laning option between Ōtaki and Levin[5]. Therefore, engagement with iwi, key stakeholders and the community focussed on a series of specific improvements relating to locations along SH1 and SH57.

In 2014, ongoing public engagement and discussions related to safety and efficiency improvements on the existing state highways, but primarily to any specific access and property agreements and exploration of and any agreements of mitigations. This stage of engagement involved provision of information (via newsletters; Project Updates; letters to affected landowners), individual meetings with those likely to be affected by a new option for the connection between SH1 and SH57, open days and displays in the Levin Library.

In 2016, the scope of the Project was modified to create a combination of 2+1 and 4 lane sections with intersection and safety improvements. Engagement focussed on the route alignment; SH1/SH57 connection; and Manukau and Ohau safety improvements. Engagement was through newsletters, Project Updates, letters to affected landowners, ongoing engagement with iwi, and meetings with individual organisations and small group meetings as requested.

In mid-2016, further investigations were undertaken on how to improve the corridor from Ōtaki to north of Levin. Re-engagement exercises in mid-2016 asked people to provide their likes and dislikes; issues; opportunities and ideas about transport within the Project Area, rather than different routes.

Key outcomes were:

- There are a number of features unique to the Horowhenua District: highly productive soils, village character, marae, rural lifestyle, spiritual connection between Lake Horowhenua and the Tararua Range, heritage buildings.
- Positive comments about the recent safety improvements in Ohau and Manakau, but many more comments highlighting other concerns, like the narrow bridges and lack of safe passing opportunities;
- There was strong support for the need to bypass Levin and other townships/villages.
- There was some concern about removing passing traffic and potential trade from Levin, but the majority recognising the need to reduce congestion and to have heavy vehicles out of the town centre.
- Some people talked about routes to the east of Levin, and generally communities located to the east of SH1 / SH57 considered a route to the west of Levin should be developed. It was considered important to find a route that minimises the impact on residential and agricultural land. Some commented on the need to continue the project further north.

In August 2017, Waka Kotahi published an Engagement Summary Report[6] which recorded the engagement undertaken from May to July 2017 (which confirmed and identified additional constraints and

[4] August 2013 Consultation Report includes all of the collaboration workshop notes and presentation; iwi hui notes; newsletters; Project Updates; media releases, sample Landowner Letters; Display Boards for Open Days; Open Day notes; copy of Feedback Form

[5] Ōtaki to North of Levin; SH1 – SH57 Connection Scoping Report; November 2013

[6] SH1 Ōtaki to north of Levin: Engagement summary report (nzta.govt.nz)

opportunities in the Project Area to assist potential corridor options), updated the community on progress since the 2015 engagement, clarified the scope of the Ō2NL Project and updated key messages.

Key stakeholders and the community were engaged to seek their perspectives in relation to community values and interests, including cultural environmental, business and social issues. A series of seven public open-days, drop in events and five community events were convened and supported by information boards, an interactive map and social pin point.

Key feedback points from the engagement included:

- The eastern corridor has significant challenges, given high quality soils, rural lifestyle homes and proximity to Manakau and Levin.
- The western corridor is a shorter route, but ground conditions will be challenging and significant historical and cultural issues.
- An integrated cycleway and native planting areas would be a huge benefit to local communities and local biodiversity, which would help offset effects of construction.
- Bypass of Levin and other townships / villages would reduce congestion and improve amenity especially in Levin town centre.
- Concerns that bypassing Levin could have economic effect on town centre businesses.
- Concern about safety on current state highway, notably narrow bridges, safe passing, intersections.
- Unique features of Horowhenua need to be recognised including village character, productive soils, marae, rural lifestyle, Tararua Ranges, Punahau / Lake Horowhenua and heritage buildings.

In September 2017, Waka Kotahi published the 'Ō2NL Community Multi Criteria Analysis Report' that explained the process of identifying and then assessing a long list of corridor options (which considered feedback from key stakeholders and the community gathered in 2017) and identified a short list of options for engagement. Part E of this report explains that process and its outcomes in more detail.

35.2 Phase two –preferred corridor identification 2017 - 2018

Between January and March 2018, the Ōtaki to north of Levin community and key stakeholders were engaged to provide feedback on the short-listed options. The engagement focussed on asking people to identify key features about each option that they liked or did not like. A series of eight community led events, meetings and huis were held and eight information sessions, newsletters were distributed.

Key feedback points from the engagement in relation to each of the short-listed options are summarised in Part E of this report.

35.3 Phase three – preferred alignment identification and refinement 2019 onwards

This Phase of the Project provides a more detailed description of the engagement process including key engagement activities undertaken with key stakeholders, landowners, near neighbours and communities and the public.

During Phase Three, the following key milestones are noted:

- October 2019: DBC to identify a preferred alignment, interchange forms and locations and key local roads commences
- August 2020: Draft preferred alignment announced
- March 2021: Refined draft preferred alignment announced
- December 2021: Preferred alignment announced

- April 2022: Preliminary concept designs of Ō2NL Project within preferred alignment released

During Phase Three there were two formal public engagement periods:

- August – September 2020: following the announcement of the draft preferred alignment
- April – May 2022: following release of preliminary concept designs

It is noted that by September 2020, a formal partnership was established with Muaūpoko and Ngāti Raukawa as Iwi Project Partners.

35.3.1 August – September 2020 community engagement

Engagement with the community on the draft preferred 300m wide alignment was undertaken in August and September 2020. Feedback was sought on how people would use the new highway and connections.

Communications and engagement activities included a media release, project newsletters, four community group meetings, 10 drop-in events across Manakau and Ohau, Levin and Koputaroa and emails to previous submitters.

Feedback was sought on current travel patterns and how these might be altered by the new highway and connections and considerations for a shared walking and cycling path. Concepts were shared with the community that included options for the Kimberley Road area and around Waihou and McDonald Roads.

Specific feedback was invited in two areas where alternative local road concepts were shared.

Key statistics from these events are:

- 800 stakeholder attendees at drop-in sessions
- 1,304 visitors to the Social Pinpoint online map
- 269 Social Pinpoint comments
- 26 survey responses
- 68 email feedback

Key themes from the feedback received from the engagement activities and how the Project responded to this feedback is summarised in Table 35-1.

Table 35-1 Community engagement and Waka Kotahi response

Community comments	Waka Kotahi response
The design of interchanges and connection points and whether these can cope with large traffic volumes	The benefits of all interchanges were considered with respect to safety and traffic volumes in the Traffic Assessment (Technical Assessment A, Volume IV). The final form of the interchange will be determined through the current business case process.
The number of interchanges proposed and whether there are enough to cope with forecasted population growth	According to the Traffic Assessment (Technical Assessment A, Volume IV), forecast traffic demand does not currently support further interchanges. However, through the current business case process, options for additional interchanges will not be precluded in the future.
In response to options in the Kimberley Road area - a new local road to the east of Ō2NL, that joins the south of Arapaepae Road (where it is cut by the Ō2NL Project) to Tararua Road would give	Following the assessment of options, including taking into consideration feedback from HDC, key stakeholders and the community, the preferred option (Option A) was recommended to be progressed as it can be delivered within the proposed

Community comments	Waka Kotahi response
quicker and easier access to both Levin and Ō2NL for travel north and south.	designation thereby reducing property impacts, costs and time risks.
A shared path could be multi-use and connected to a local café, main river reserves and other paths alongside the river. Parking areas could be provided at various points along the path.	Based on community feedback, the shared path will be routed and aligned to provide a community facility that is appropriate for short commuting and longer recreational use and is easily and conveniently accessible by adjacent communities. The details of the shared path, including its further connections will be further considered at the detailed design phase.

35.3.2 April – May 2022 community engagement

Waka Kotahi undertook further engagement with the community regarding the preliminary concept designs of the Ō2NL Project in April and May 2022. Topics presented for discussion included noise mitigation, stormwater ponds; native landscape planting of earthworks; landscape planting - grassed areas, natural character planting, ecological planting, visual planting; spoil sites; material supply sites and construction compounds. Two options for reconnecting Queen Street East were also shared, and feedback invited.

Communications activities included media releases, local newspaper and radio ads, digital billboard, collateral delivery to 15,900 local residences, social media updates (Waka Kotahi Wellington Facebook page and full-length preliminary concept design video on the Waka Kotahi YouTube channel), project newsletters and emails to previous submitters. Engagement and feedback opportunities included 10 drop-in events, an online zoom meeting and an online and print survey.

Overall the feedback was positive with people generally pleased that the Project intends to make travel from Ōtaki to north of Levin safer and more resilient, with increased transport choices for the area's growing population. From the engagement undertaken and themes arising from the feedback, issues raised through the comments were addressed in Frequently Asked Questions (FAQs) posted to the Project website[7] and responses made to the individuals.

Key themes from the feedback received from the engagement activities and how the Project has responded to this feedback is summarised in Table 35-2.

Table 35-2 Community engagement and Waka Kotahi response

Community comments	Waka Kotahi response
Overall support for the shared use path with comments around access and connections as well as the opportunity to use the path as a bridle path.	The shared use path will be generally provided on the western side of the highway to better serve the more populous areas directly. In this sense, the shared use path will also deviate markedly from the alignment of the highway in some locations. The Ō2NL Project provides for a number of connections with HDC developed shared paths. While a bridle path is not within the Project scope, Waka Kotahi is engaging with local equestrian organisations along with many other groups.
Noise and vibration mitigation has not been adequately addressed and noise modelling will be higher than what was presented in the public material.	Traffic and noise modelling has considered all potential noise and vibration effects from the Project. The design of the road will include noise mitigation features that predominantly meet or exceed the New Zealand Standard 6806. Such features include use of low-noise open graded porous asphalt (OGPA), extra depth OGPA in some sections and road side barriers (which will provide noise mitigation). Planted dirt bunds will be considered through the detailed design process, subject to land requirement and material being available.

[7] Frequently asked questions | Waka Kotahi (nzta.govt.nz)

Community comments	Waka Kotahi response
	These mitigation methods and measures will be embedded through designation conditions, which also requires the preparation and implementation of a Construction Noise and Vibration Management Plan.
Comments and preferences relating to the two Queen Street East Options presented. Option A: Generally considered to have fewer effects on historic heritage, the future Tara-Ika development and views to Tararua Range and coast. Option B: Questions about steeper gradient, noise generation, light pollution and impact on waterways.	Following engagement with key stakeholders and the community, additional transport and engineering investigations were undertaken to assess in more detail how traffic would move, road gradients and curves, and construction costs. A design workshop was also convened to identify desirable outcomes and how they could be delivered, taking into consideration the matters identified during consultation, which included potential noise, light, visual and cultural matters. The outcome of this process is to continue investigating Option B as the preferred option, on the basis that it provides a better fit with the transport network and with growth plans of HDC. This option can also be designed in a way that protects views along Queen Street East between Punahau / Lake Horowhenua and the Tararua Range. The option can be designed to cater for both requirements of current and future housing development, provide a new walking and cycling facility that complements and enhances current and planned networks, and links ecological planting proposed by the Ō2NL Project with Queen Street East.

36 Ongoing and future engagement

Waka Kotahi, in partnership with its Iwi Project Partners, is committed to ongoing engagement with all stakeholders, landowners and the community through the consenting phase of the Project. The approach includes sharing Project information Sand providing updates via the Project newsletter, website, local media and social media. Working closely with key stakeholders will also be an integral part of the detailed design process of the proposed designation (and subsequent processes) as well as the mitigation of potential effects through NoR and resource consent conditions.

Waka Kotahi and the contractor/consortium engaged to construct the final alignment will implement a comprehensive communication plan prior to and for the duration of construction works. The types of communication will be outlined in the Construction Environment Management Plan.

PART G: ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

37 Overview

Part G provides a summary of the actual and potential effects of the construction, operation and maintenance of the Ō2NL Project, including the value of the matters affected, whether these effects are positive or adverse and the scale, duration and locality of effects.

The most significant positive effects of the Project are transport related, specifically in respect of road user safety, connectivity (including travel time), resilience and active mode provision.

During construction there will be temporary adverse effects, including loss of habitat, impacts on waterways, dust, noise and traffic from construction activities. Some of those effects will result in community disruption.

The Project will have some permanent effects including the loss of habitat, visual impacts and changes to the existing noise environment.

Avoiding and minimising adverse effects has been a key driver for the identification of the Project corridor and the subsequent shaping and refinement of the Project, including the location of the proposed designations.

Given the scale of the Project, avoidance of adverse effects has not been possible and measures to remedy, mitigate, offset or compensate for adverse effects have been proposed. With the implementation of these measures, overall the positive effects of the Project will be significant, while the adverse effects will be minimised and acceptable.

38 Project shaping and assessment methodology

Under the RMA an assessment of the actual and potential effects on the environment of the Ō2NL Project is required. It is also part of Waka Kotahi's environmental policy ("Z19 State highway environmental and social responsibility standard" and the "Environmental and Social Responsibility Policy") and its operating principles under section 96(1)(a) of the LTMA to:

> *"exhibit a sense of social and environmental responsibility"*

The requirements of the RMA and the LTMA formed the basis for the assessment of effects undertaken for the Project.

38.1 Project shaping

As set out in Part E, avoiding adverse effects has been a key driver for the identification of the preferred corridor and the subsequent shaping and refinement of the corridor (to ultimately determine the location and extent of the Project). A summary of adverse effects (but not an exhaustive list) that are avoided or minimised through project shaping are set out in Table 38-1.

Table 38-1 – Adverse effects avoided or minimised through project shaping

Potential Adverse Effect	Effects Avoided or Minimised Through Project Shaping
Cultural	• The selected Project corridor avoids all recorded/registered wāhi tapu. • Impacts on significant cultural values and sites located to the west of SH1 are avoided, including potential effects on Punahau/Lake Horowhenua, Waiwiri/Lake Papaitonga, the coastal / dune landscape and the wetland at Forest Lakes/Pukehou.
Transport	• Travel time benefits have been maximised by limiting the extent to which the route deviates from the current route of SH1. • Impacts on community connectivity are limited by reinstating connections for eight of the 14 roads that are intersected, and by connecting the remaining six into the existing network. • The redesign and improvements at the Tararua Road level crossing minimise safety impacts associated with increased use of this crossing.
Noise and vibration	• The selected Project corridor results in a reduction of road-traffic noise impacts on a large number of PPFs near existing SH1 due to reduced traffic. • The selected Project corridor avoids Manakau and Ohau to minimise effects on these urban areas. • Using an existing transport corridor to the east of Levin reduces the number of properties that would be newly affected by road-traffic noise.
Air quality	• The selected Project corridor reduces road-traffic air quality impacts on a large number of homes near existing SH1 due to reduced traffic. • The selected Project corridor avoids Manakau and Ohau to minimise effects on these urban areas • Using an existing transport corridor to the east of Levin reduces the number of properties that would be newly affected by air quality effects associated road traffic.
Landscape and visual	• The selection of the Project corridor avoids significant landscape and visual features, including cultural landscape focused on Punahau/Lake Horowhenua and Waiwiri/Lake Papaitonga and the sensitive sand dune country. • Urban settlements around the existing state highway have been avoided in the central part of the study area, particularly the smaller settlements of Manakau, Kuku and Ohau as well as the impacts of passing through Levin. • The Project avoids steeper hill faces of Pukehou and avoids the toe of the Tararua Range so that these features remain as prominent landmark/features. • The selected Project corridor avoids, and is well separated from, frequented public places, such as scenic reserves, scenic lookouts, public historic places, cemeteries, marae, schools and public buildings.
Natural character	• The selection of a corridor east of SH1 avoids areas with higher natural character values, such as Punahau/Lake Horowhenua, Waiwiri /Lake Papaitonga and the coastal environment.
Social	• The provision of local reconnections and the SUP minimises social impacts by allowing communities continued access to community resources.

Potential Adverse Effect	Effects Avoided or Minimised Through Project Shaping
Hydrology and Hydrogeology	• Water body crossing structures specifications avoid or minimise the footprint within the active bed and maintain flows. • The selection of an eastern corridor and at-grade alignment generally avoids any intersection with groundwater and hydrological and water quality impacts associated with a below-grade alignment, including impacts on Punahau/Lake Horowhenua.
Terrestrial ecology	• The Project avoids all mature indigenous forest and high-value tawa-tītoki treeland. • The selected Project corridor avoids Te Waiaruhe Swamp, the largest wetland in the vicinity of the Project. • The material supply sites, laydown areas and spoil sites avoid terrestrial and wetland habitats. • The construction buffer has been narrowed to avoid potential snail habitat at the northern side of the Waikawa Stream, wetlands located off Kuku East Road, and forest remnants at Pukehou and on Arapaepae Road. • The impacts of artificial lighting on fauna are minimised by lighting specifications for light spill and by only being installed at highway entry and exit points.
Freshwater ecology and water quality	• Bridge crossings of the Ohau River, Kuku Stream, Waikawa Stream, Manakau Stream and Waiauti Stream minimise effects on those water bodies and minimise effects on the passage of fish and adult aquatic insects. • The impacts of artificial lighting on fauna are minimised by lighting specifications for light spill and by only being installed at highway entry and exit points. • Culverts have been located to reduce stream length lost. • Earthworks have been shaped to reduce stream loss and to allow diversions to incorporate a natural meander. • Stormwater treatment avoids effects on water quality.
Archaeology	• Significant adverse effects to numerous archaeological sites have been avoided by the selection of an east Project corridor (through the avoidance of numerous pa and kainga, hunting and cultivation grounds, colonial homesteads, battle sites, urupā and midden located west of the existing SH1).
Built heritage	• The Project avoids direct adverse effects on pre-1900 structures and statutorily recognised built heritage (including 'Ashleigh').
Productive land	• The selection of the Project corridor (at the ‘short-list’ stage) minimises the loss of productive land.
Economic	• Potential adverse effects associated with bypassing the Levin town centre are minimised through the provision of reconnections and various access points to and from the Ō2NL Project, as well as signs and landscaping to highlight the identity of Levin.

38.2 Assessment methodology

The actual and potential effects of the Ō2NL Project corridor have been assessed by technical experts. This assessment includes further shaping and refinement of the Ō2NL Project. The approach to, and outcomes of, these expert assessments are detailed in the Technical Assessments in Volume IV. More generally, the assessment has been:

- collaborative, with the Project designers, the Project Iwi Partners, the technical specialists and key stakeholders contributing to an integrated consideration of potential effects and the possible measures to avoid, remedy or mitigate any adverse effects; and
- iterative, through the refinement of the proposed designations, and constraints on works within the proposed designations, to respond to potential adverse effects.

The effects of the Ō2NL Project have been assessed, understood and managed:

- with reference to the existing environment that is described in Part B;
- on the basis of a technically feasible road alignment that may be accommodated generally within the area subject to the proposed designations, as described in Part C.
- within a range of standards and performance targets that confirm the parameters (or maximum adverse effect) for how the Project must be designed, constructed and operated; and
- with reference to management approaches (embedded in management plans) that set out how the standards or performance targets are to be achieved during the design and construction of the Project.

38.3 Structure of the assessment

The remainder of Part G describes the assessment of effects that has been undertaken and is arranged by key topic areas. Each topic area includes a description of the actual and potential effects (both positive and adverse) resulting from the Ō2NL Project (with reference to the existing environment as described in Part B) and a description of measures that have been undertaken, or are proposed, to avoid, remedy or mitigate potential adverse effects, including any measures to offset or compensate for any residual adverse effects. Details of these measures are included in Part H and reflected in conditions proposed to be imposed on the resource consents and designations (attached as Appendix Five).

Table 38-2 sets out the technical assessments that inform Part G:

Table 38-2 Technical assessments that inform the assessment of effects

Topic	Technical Assessment
Cultural	P - Muaūpoko Tribal Authority Cultural Impact Assessment Q - Ngā Hapū o Ōtaki (Ngāti Kapumanawawhiti) Cultural Impact Assessment R - Ngā Hapū o Kereru Koputoroa Stream Cultural Impact Assessment S - Ngāti Huia Collective Cultural Impact Appreciation T - Te Iwi ō Ngāti Tukorehe Cultural Impact Assessment U - Te Kotahitanga o Te Iwi o Ngati Wehi Wehi Cultural Impact Assessment
Transport	A –Transport Effects
Noise and Vibration	B – Noise and Vibration Effects
Air Quality	C – Effects on Air Quality
Landscape and Visual	D –Landscape and Visual and Natural Character Effects
Natural Character	D – Landscape and Visual and Natural Character Effects
Social	E – Social Impact Assessment
Hydrology and Hydrogeology	F – Effects on Hydrology and Flooding G – Effects on Hydrogeology and Groundwater
Surface Water Quality	H – Effects on Surface Water Quality
Contaminated Land	I – Contaminated Land
Terrestrial Ecology	J – Effects on Terrestrial Ecology
Freshwater Ecology	K – Effects on Freshwater Ecology
Archaeology	L – Effects on Archaeology

Built Heritage	M – Effects on Built Heritage
Productive Land	N – Effects on Productive Land
Economic	O – Economic and Town Centre Impacts

39 Summary of effects on the environment

The overall 'rating' of potential effects of the construction, operation and maintenance of the Ō2NL Project, incorporating measures that are taken to avoid, remedy, mitigate, offset or compensate for adverse effects, are set out in Table 39-1.

Table 39-1- Summary of effects on the environment

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
Cultural					
Effects on awa	✓	✓	✓	✓	Offsetting and compensation will result in a net indigenous biological diversity gain
Effects on native forests/bush and animals and insects	✓	✓	✓	✓	Offsetting and compensation will result in a net indigenous biological diversity gain
Archaeological finds, including kōiwi and animals	✓			✓	Minor adverse
Effects on tikanga Māori, spiritual pathways	✓	✓	✓	✓	Moderate negative and positive
Transport					
Effects on current transport network safety (including the NIMT level crossing on Tararua Road).		✓	✓		Significant positive
Effects on State Highway and local road network resilience.		✓	✓		Significant positive
Effects on State highway and local road network efficiency.		✓	✓		Significant positive
Effects on State highway and local road network community connectivity.		✓	✓		Positive

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
Effects on property access and connectivity.		✓	✓	✓	Less than minor adverse
Effects on public transport, parking and pedestrian and cyclist users		✓	✓		Positive
Impacts of construction traffic on the safety and efficiency of the existing transport network	✓			✓	Negligible on SH1 and SH57 Minor adverse on local roads
Noise and vibration					
Vibration effects of operation of new highway on Protected Premises and Facilities (PPFs)		✓		✓	Negligible
Noise effects of operation of the new highway on PPFs and human health		✓		✓	Moderate to significant adverse
Temporary effect of initial chipseal surface prior to the low-noise road surface being laid	✓			✓	Minor adverse over a limited duration (one year)
Construction noise and vibration effects	✓			✓	Potential minor adverse
Effects of operational road traffic noise from the existing SH1 and SH57 on PPFs and on human health		✓	✓		Minor to moderate positive
Effects of operational road traffic noise on the Levin town centre		✓	✓		Moderate to significant positive
Effects of operational road-traffic vibration from the existing SH1 and SH57 on PPFs		✓	✓		Minor positive

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
Air quality					
Effects of operational vehicle emissions on sensitive receptors adjacent to the Project		✓	✓		Minor positive
Effects of air quality in areas adjacent to the existing road network		✓	✓		Moderate positive
Construction air quality effects (dust)	✓			✓	Less than minor
Landscape and visual effects					
Impact on landscape and visual amenity values		✓		✓	Less than minor
Visual effects on public viewpoints		✓		✓	Less than minor
Visual effects for individual properties		✓		✓	Less than minor
Construction visual effects	✓			✓	Less than minor
Natural character					
Impact on existing perceived naturalness of rivers, streams and wetlands		✓			Current natural character will be maintained in all catchments.
Social					
Impact of the operation of the Project at a regional level on' way of life'.		✓		✓	Moderate positive
Impact of the operation of the Project at a regional level on 'community cohesion'.		✓		✓	Low positive

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
Impact of the operation of the Project at a regional level on 'health and wellbeing'.		✓		✓	High positive
Impact of the operation of the Project on 'way of life' at a local and sub-local level.		✓	✓	✓	Negligible at a local level Very low negative to moderate positive across sub-local levels
Impact of the operation of the Project on 'community cohesion' at a local and sub-local level		✓	✓	✓	Moderate to high positive Negligible to very low negative at a local level (negligible in Levin) Very low negative at a sub-local level
Impact of the operation of the Project on 'health and wellbeing' at a local and sub-local level.		✓	✓	✓	High positive across all local and sub-local areas No negative at a local level Very low negative to negligible at a sub-local level (reducing over time)
Impact of the operation of the Project on 'quality of living environment' at a local and sub-local level.		✓	✓	✓	High positive at a local level in Levin. Low to moderate positive otherwise Nil to negligible negative impacts at a local level. Very low to moderate negative at a sub-local level
Construction impacts on 'way of life' at a local and sub-local level.	✓		✓	✓	Low to moderate positive Low negative
Construction impacts on 'community cohesion' at a local and sub-local level.	✓			✓	Very low negative
Construction impacts on 'health and wellbeing' at a local and sub-local level	✓			✓	Very low negative impacts
Construction impacts on 'quality of living environment' at a local and sub-local level.	✓			✓	Low negative impacts

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
Hydrology and groundwater					
Impact on groundwater quality		✓	✓		Minor positive effect
Impact on soil moisture		✓	✓		Minor positive effect
Impact on groundwater recharging		✓	✓		Minor positive effect
Impact of increased water levels		✓		✓	Less than minor
Impact of localised increased velocity		✓		✓	Less than minor
Impact of bridge structures on hydrology and flooding		✓		✓	No more than minor
Impact on groundwater mounding		✓		✓	Less than minor
Flood hazard risk and resilience of the state highway network		✓	✓		Significant positive effect
Construction impacts on hydrology and flooding	✓			✓	Less than minor
Impacts on groundwater and groundwater dependent ecosystems during construction	✓			✓	Less than minor
Surface water quality					
Impacts of operational stormwater on hydrology and temperature		✓		✓	Negligible or Low (after treatment)
Impacts of operational stormwater on water quality		✓	✓		Positive effect
Impacts on sedimentation in streams during construction	✓			✓	Less than minor
Impacts of vegetation clearance during construction	✓			✓	Negligible

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
Impacts of concrete and other hazardous chemicals during construction	✓			✓	Less than minor
Contaminated land					
Impacts on human health and the environment as a result of the disturbance of contaminated land	✓			✓	Medium-high risk sites are the subject of a future DSI and subsequent management (as necessary) under the NES-CS
Terrestrial ecology					
Impacts on indigenous forest, treeland and scrub habitats	✓	✓	✓	✓	Very Low Offsetting will result in a net indigenous biological diversity gain
Impacts on indigenous-exotic forest and scrubland	✓	✓	✓	✓	Low to High Offsetting will result in a net indigenous biological diversity gain
Impacts on exotic terrestrial vegetation	✓	✓	✓	✓	Very Low, Low and Moderate Offsetting will result in a net indigenous biological diversity gain
Impacts on wetland habitats	✓	✓	✓	✓	Low, Moderate and High Offsetting will result in a net indigenous biological diversity gain
Impacts on birds	✓	✓	✓	✓	Very Low to Moderate Offsetting will result in a net indigenous biological diversity gain
Impacts on terrestrial invertebrates	✓	✓	✓	✓	Negligible to Moderate Offsetting will result in a net indigenous biological diversity gain
Impacts on lizards	✓	✓	✓	✓	Negligible to Moderate Offsetting and compensation will result in a net indigenous biological diversity gain
Freshwater ecology					
Effects of culverts on the passage of fish and adult aquatic insects.		✓	✓	✓	'Very Low' (and a 'Net Gain' in the case of Stream 2, Stream 20 and Stream 23)

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
Effects of operational stormwater discharges (quality and quantity) on freshwater ecosystems.		✓	✓	✓	Positive effects (or 'Net Gain') 'Low' adverse for the Kuku Stream 'Very Low' adverse in all other cases.
Effects of the permanent loss, and modification, of freshwater habitat.		✓	✓	✓	'No Net Loss' or 'Net Gain'
Effects of artificial lighting on indigenous aquatic fauna.		✓		✓	No effect for the majority of streams and 'Very Low' and 'Low' in the case of three streams (Stream 39, Stream 39.1, Stream 1, and Stream 3)
Effects of construction work in streams on freshwater habitat.	✓			✓	'Very Low' and 'Low'.
Effect of the temporary diversion of watercourse on fish migration.	✓			✓	'Low' in the situation where an existing culvert (#2) under SH1 is replaced and 'Very Low' in the case of other waterways
Impact of release and subsequent deposition of fine sediments during construction	✓			✓	'Moderate' for two streams and 'Low' or 'Very Low' for the remaining waterways.
Effects of other potential contaminants in watercourses as a result of construction activities on aquatic ecosystems.	✓			✓	'Very Low' to 'Low'
Archaeology					
Damage or disturbance of potential or unknown archaeological sites	✓		✓	✓	Negligible or less than minor adverse Minor positive
Built heritage					
Impacts (visual, dust and noise) on heritage values of 'Ashleigh'	✓	✓		✓	Less than minor
Productive land					
Loss of the ability to use the land for production, potentially including		✓		✓	Minor adverse

Actual or potential effects on the environment	Temporary effect	Permanent or ongoing effect	Positive effect	Adverse effect	Scale of effect with mitigation
through fragmentation of land parcels.					
Economic					
Economic impact of construction as a result of Project expenditure.	✓		✓		More than minor positive
Economic impact or consequences of population and household growth stimulated by the Project		✓	✓		Significant positive
Economic effects on Levin town centre (operational phase)		✓		✓	Less than minor adverse
'Wider Economic Benefits' to the regional and sub-regional scale.		✓	✓		More than minor positive
Economic impact on the use of productive land (construction and operational phases)	✓	✓		✓	Less than minor adverse

40 Cultural

40.1 Introduction

Iwi have been involved in a multi-layered engagement and collaboration in respect of the Ō2NL Project in order to identify, respect and reflect cultural values. Through this engagement, iwi have been invited to be, and now are, Project Iwi Partners alongside Waka Kotahi.

The Project Iwi Partners and Waka Kotahi have identified and adopted kaupapa tumu/core principles for the Project, as described in Part A of this volume. These principles underpin the concept design of the Project and inform the proposed approach to construction activities and methodologies for avoiding, minimising and otherwise managing adverse effects of the Project.

The Project Iwi Partners have also each prepared a Cultural Impact Assessment (CIA). The following CIAs are provided in Volume V:

- Muaūpoko Tribal Authority Cultural Impact Assessment;
- Ngā Hapū o Ōtaki (Ngāti Kapumanawawhiti) Cultural Impact Assessment;
- Ngā Hapū o Kereru Koputoroa Stream Cultural Impact Assessment;
- Ngāti Huia Collective Cultural Impact Appreciation;

- Te Iwi ō Ngāti Tukorehe Cultural Impact Assessment; and
- Te Kotahitanga o Te Iwi o Ngati Wehi Wehi Cultural Impact Assessment.

Waka Kotahi respects that these assessments contain distinct and diverse historical narratives which reflect the perspectives and experience of each Project Iwi Partner. They also reflect and relate the distinct values of each Project Iwi Partner.

The CIAs have been informed by the engagement and collaboration to date and represent a point in time. They reflect progress made to avoid and mitigate cultural effects and identify areas where further work is still needed to manage remaining residual adverse effects.

The sub-sections below summarise the:

- values and effects that are described in the CIA reports; and
- measures and processes that have been agreed/ discussed with the Project Iwi Partners to address effects.

Waka Kotahi appreciates and is grateful for the considerable efforts of the Project Iwi Partners in connection with the Project to date. Waka Kotahi also acknowledges that the Project Iwi Partners will provide an update on their respective positions as the Project develops and as more design information is made available.

40.2 Muaūpoko Tribal Authority

The Muaūpoko CIA (provided in Volume V) has been approved by the Muaūpoko Tribal Authority (MTA) Board of Trustees, representatives of the seven Muaūpoko hapū, and the Lake Horowhenua Trust Board of Trustees who own the bed of Lake Horowhenua and surrounding margins including the Hokio Stream.

Muaūpoko descend directly from Tara-Ika (also known as Tara) and are also known as Ngai Tara ki Mua Ūpoko o te Ika a Maui.

The MTA is the mandated organisation for the Muaūpoko Iwi. The MTA represents Muaūpoko for the purposes of the Resource Management Act 1991. The key purpose of the Lake Horowhenua Trust is to look after the mauri of water, land and fisheries around Lake Horowhenua and the Hokio Stream.

40.2.1 Cultural effects and management

40.2.1.1 Connections / pathways – ki uta ki tai

The connections between Muaūpoko maunga and moana are very pronounced in the landscape as the maunga and moana are geographically close together. Muaūpoko people traditionally and today connect with the environment (ki uta ki tai).

The maunga is connected to the moana through waterways and ancestral and spiritual pathways. The waterways are connected to the whenua, ngāhere, wāhi tapu (sacred sites) and taonga (highly prized natural resource), in particular Punahau / Lake Horowhenua. Ngārara are considered to be the kaitiaki over departed spirits that travel one of these pathways on their way from the lake, marae to the ranges and up into the heavens. The construction of a new state highway can disrupt ki uta ki tai and the way the landscape is traditionally experienced.

40.2.1.2 Effects on spiritual sites and values

Wāhi tapu, wāhi taonga and wāhi tupuna (places where Muaūpoko ancestors are connected) manifest a link between the past and present, Muaūpoko ancestors and the surrounding environment. Disturbing resting places of ancestors has the potential irreversible effect of uncovering and disturbing the burial place of ancestors.

Muaūpoko considers that there is a risk of the Project overlooking, rewriting or belittling the traditional narrative of the Muaūpoko landscape as road users pass through or move about the rohe (region). Consequently, Muaūpoko wishes to record and monitor the changes for future generations and ensure the mauri of te taiao (life force of the environment) is maintained.

40.2.1.3 Wai

Wai (water) is considered to be the lifeblood of Muaūpoko. Muaūpoko recognises the interconnectedness of groundwater, surface water and wetlands and their connection through the sea, and the need to manage and protect these as a whole. Muaūpoko aspire to return Punahau /Lake Horowhenua and freshwater to health and restore their mauri (life force) so they can again culturally, spiritually and physically sustain the Muaūpoko people and ensure that there is abundant mahinga kai that is physically and culturally safe to gather and eat.

Muaūpoko are concerned that sedimentation from earthworks associated with the construction of the Project may cause deposition of soil in the waterways and groundwater and which could then be transported to Punahau/ Lake Horowhenua, and other waterbodies. This in turn could have adverse effects on taonga species and the mauri of these places. Muaūpoko are also concerned about the long-term effectiveness of the proposed stormwater treatment systems.

40.2.1.4 Landscape and ecology

Muaūpoko are concerned that the Ō2NL Project will cause a visual and spiritual interruption to the landscape. There is also potential for the Project to permanently degrade terrestrial and freshwater ecological systems. Earthworks activities associated with the material supply sites and the spoil sites change the nature of the landscape and can also have potential adverse effects.

The Ō2NL Project includes a significant ecological and natural character effects management package. There is a risk these packages could create large areas of novel ecosystems that do not develop signatures of natural/local plant community types or do not trend along the appropriate trajectory, including functions such as recruitment and mahinga kai values. Weed and pest issues could develop that risk the long-term viability of the planned restoration outcomes.

40.2.1.5 Muaūpoko iwi

Muaūpoko CIA states that the mana of their people extended across the entire Ō2NL landscape prior to 1820s, and therefore Muaūpoko considers itself to hold kaitiaki responsibilities across its whole traditional rohe.

Muaūpoko considers that there is a risk that their people are unable to participate authentically in the ongoing management of the Project and protect its rights and interests because it is under-resourced. This risk is further enhanced if it is unable to participate fully in the construction phase where others may attempt to override its tikanga and kawa when managing accidental finds, including koiwi and taonga from pre-1820s.

40.2.1.6 Positive effects

Muaūpoko consider that the Ō2NL Project can help celebrate the values of Muaūpoko and reverse the loss of values from the landscape through ecological restoration and mahi toi. These include:

- the Project respects Muaūpoko mātauranga through environmental construction management, through place-based values and practices, and by sharing Muaūpoko approaches with the community;
- the proposed walking/cycling bridge over the proposed state highway acknowledges Muaūpoko values associated with Arapaepae, spiritual values, ancestor(s) who first laid the track, and connections ki uta ki tai. The proposed offline lookout provided at the top of the walking/cycling bridge that is physically safe and designed in a culturally appropriate way for people to connect ki uta ki tai;
- ecological offset planting includes canopy forming species, which will allow a forest tier structure to be provided that is favourable habitats and regenerative abilities for native species; and
- Wai is also proposed to be planted with appropriate vegetation that is accessible for harvesting and other cultural activities, namely from the SUP.

40.2.2 Mitigation / recommendations

The table below describes the residual effects and the measures and processes that have been agreed with Iwi Partners to address residual effects.

Table 40-1 Muaūpoko Tribal Authority residual effects management

Residual Effects Management	Management
Connections / pathways – ki uta ki tai values	
• Planting awa upstream and downstream of the proposed designation to promote ki uta ki tai connections and minimise the dominance of the highway	• Waka Kotahi is committed to the ongoing involvement of iwi partners in the implementation, delivery and opening of the Project. This will include opportunity to be involved in the design of rehabilitation planting including ecology and natural character planting, to promote ki uta ki tai, and to integrate the state highway into the landscape.
• Minimise planting on cuts and fills in favour of planting along awa to minimise the horizontal nature of the Project and to promote moana and maunga landscape features	• Muaūpoko will be provided opportunity to be involved in the ongoing design development of the project which will landscaping and rehabilitation of cut and fill slopes, and planting along awa. This work will be consistent with the CEDF which inter alia promotes moana and maunga features; ki uta ki tai.
• Maintain fish passage at all times during construction and beyond and ensure that all culverts meet the NZ Fish Passage Guidelines or the most up to date best practice and consider the direct and cumulative impacts on Punahau	• Conditions are proposed to manage fish passage during construction, which in general is intended to be provided at all times. Conditions require design of culverts to provide fish passage and this is anticipated to be generally consistent with the Fish Passage Guidelines, noting that fish passage is not always required / appropriate.
• Provide for ngārara specific mitigation measures, and for residual adverse effects, a comprehensive offsetting and compensation package	• The proposed conditions include measures to protect ngārara species, and require provision of a terrestrial and freshwater ecological offsetting and compensation package. Iwi partners will be provided opportunity to be involved in the development and implementation of this package.
Spiritual sites and values	
• A mahi toi plan that identifies the Muaūpoko narrative and cultural connections and includes 'markers' that welcome people onto the state highway at each entrance through planting, carving or other forms of cultural expression.	• The CEDF provides for the development of a mahi toi strategy. This will be developed in the next phase of the Project.
• The creation of a cultural health monitoring assessment framework.	• A Muaūpoko Management Plan is proposed to be developed (through the proposed conditions provided in Appendix Five) and this is to include development of a cultural health monitoring framework.
• Maintain soils sustained by Muaūpoko ancestors within the local area and reuse soils of Haumietiketike (guardian of the fern root) in local landscaping.	• Muaūpoko will be provided opportunity to be involved in the ongoing design development of the project which will consider earthworks and will seek to minimise the need to move soil. Any top soil and vegetation materials collected is intended to be re-used for landscaping purposes.
Wai	
• A puna (springs of water) investigation is undertaken before construction starts and this information is provided to Muaūpoko.	• All known puna have been avoided through the current design. Should additional puna be identified then the design will seek to avoid or otherwise minimise and manage effects on these puna. Information collected will be made available to iwi Partners.

Residual Effects Management	Management
• Site specific erosion and sediment control plans are prepared and provided to Muaūpoko for assessment and feedback. • Permanent flow meters are established to understand the frequency of overflow events and appropriate wet weather monitoring undertaken. • Haul roads are designed to maximise distance from the awa and minimise dust and noise effects on the mauri of the awa during construction.	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. This process will include development and design of the sediment control plans, the identification of locations for flow metres, and weather monitoring stations and the design and location of haul roads. Where haul roads need to cross streams / rivers this will be via temporary bridges or culvert crossings, or if in alignment, where practicable on final Project design crossings.
• Appropriate treatment of stormwater through a treatment train of sediment drop out pits, swales and wetlands. • All site specific wetland designs are provided to Muaūpoko for comment.	• Waka Kotahi is committed to the ongoing involvement of iwi partners in the implementation, delivery and opening of the Project. This will include opportunity to be involved in the stormwater design process.
• Signage recognising the tikanga of the area is installed, particularly near awa. • Public access to the awa is maintained, particularly to spiritual places, bathing and kai collecting areas.	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. This will include opportunity to be involved in the identification of opportunities to provide access to the awa, and where provided, the design of those accesses.
Landscape and ecology	
• Rehabilitation planting, integrated with ecology and natural character mitigation and offsetting, reintroduction of site-specific wetland taonga species and enhancement of existing lowland forest areas and contribution to river corridor habitats • Muaūpoko to participate in and lead ecology and water quality surveys, and an ecological offset monitoring plan	• Waka Kotahi is committed to the ongoing involvement of iwi partners in the implementation, delivery and opening of the Project. This will include opportunity to be involved in the design of rehabilitation planting including ecology and natural character planting, and with implementation aspects. • Conditions proposed include involvement in the development of management plans.
• Implementation of a tāniko (decorative weaving mat) or similar kaupapa Māori design on the noise wall that connects to and integrates with the landscape	• The CEDF includes for the development of a mahi toi strategy. This will be developed in the next phase of the Project.
• Waka Kotahi works with Muaūpoko to provide adequate capacity to authentically partner, participate and project its values as Te Tiriti partners • Waka Kotahi to ensure that Muaūpoko mana and mātauranga is recognised in Project inductions, conditions and management plans.	• Waka Kotahi is committed to the ongoing involvement of iwi partners in the implementation, delivery and opening of the Project. • The CEDF and the proposed process of its ongoing design development, plus the involvement of iwi in the development and implementation of management plans (notably the Ecology Management Plan) allows mana and mātarauranga to be recognised. • An Muaūpoko Management Plan is proposed (through the conditions provided in Appendix Five) that amongst other things includes development of cultural inductions.

The Muaūpoko CIA explains that they have participated in the shaping of the Ō2NL Project route selection process. Through this process, effects on the most sensitive Muaūpoko sites of significance and eco-systems have been avoided. Muaūpoko have played a leading role in the corridor refinement process to secure avoidance of a landscape scale cutting through the Horowhenua gravels (east of Levin) and through the avoidance of significant peaks. Muaūpoko have been involved in material supply and spoil site selection and also in the design of local road connections over the proposed state highway, with

specific consideration given to spiritual pathways (particularly Wai Mārie), kaitiaki ngārara, ngata and tree forts.

Muaūpoko are concerned about the cumulative effects of the Project on the current poor state of wai and taonga species. Muaūpoko advise that management measures throughout construction and during operation are critical to ensure protection of their te taiao values. Specifically, Muaūpoko seek ongoing monitoring and adaptive management measures to ensure the ability to effectively manage stormwater and the ecological mitigation and offsetting package that protects and supports taonga.

Muaūpoko advise that they continue to work alongside Waka Kotahi to ensure that they deliver the best outcomes for their people, te taiao and also the Project in a way that is responsive to their worldview and whakapapa. Waka Kotahi respect and acknowledge that a tailored approach to involvement of Muaūpoko in the Project is required. This will include a Muaūpoko focused management plan to address matters specific to Muaūpoko.

40.3 Ngā hapū o Kererū

Ngā hapū o Kererū is made up of two hapū, Ngāti Ngārongo and Ngāti Takihiku. Kererū Marae hapū descend from Ngāti Raukawa ki te Tonga. Ngā hapū o Kererū have occupied and held mana whenua at Te Kōpū o te Tōroa (also spelt Kōpūtōroa or Koputaroa) since the 1830s. Ngā hapū o Kererū have prepared a Cultural Impact Assessment that assesses the cultural effect of the Project.

40.3.1 Cultural effects and management

The focus of the Ngā hapū o Kererū CIA is the Koputaroa. Ngā hapū o Kererū consider that mauri binds the physical and spiritual worlds and is the life-force of all living things, and that every living particle has its own mauri. There is mauri within bodies of water, rākau (timber/weapons), maunga (mountains) and of the whenua.

40.3.1.1 Wai

The Koputaroa crosses a floodplain about 7 kilometres north-east of Levin and joins the Manawatū River. Kererū Marae is situated about 200m away on Kōpūtōroa Road. Hapū members identify strongly with the stream as a mahinga kai. The stream and river have traditionally been important sources of Tuna (eels), Inanga (whitebait), Kōkopu (freshwater fish) and Kākahi (freshwater mussels). Hauhau (mudfish) and Pūpūrangi (giant carnivorous snails) have also been present in the stream and wetlands but are now rarely seen.

The Koputaroa has been affected by farm run-off, market-gardens and other commercial practices which have degraded its natural values and water quality. This stream and the Waoku Stream have also been subject to extensive straightening improvements to improve farm drainage which has significantly affected habitats, leading to reduced fish populations.

Ngā hapū o Kererū are concerned about the potential effects of the Ō2NL Project on streams and their catchments, as well as the potential effects of the Project on subterranean lakes that bubble in puna (springs) and feed the dune lakes. This includes the big lakes (Lake Waiwiri, Papaitonga and Punahau) and other lakes, including Te Hakari, Pekapeka and Waiorongomai and Huritini. The concern relates to the potential for further pollution of waterways, which leads to deterioration of personal health and a further decline in economic independence. The continued degradation of the mauri of waterways undermines article two of Te Tiriti o Waitangi.

Ngā hapū o Kererū note that a number of these lakes are being restored by hapū groups, and this includes ongoing wetland restoration plans at Te Ripo o Hinemata, near the Kererū marae.

40.3.1.2 Waipuke

Ngā hapū o Kererū are concerned about the potential effects that the Ō2NL Project could have on flooding, which is already an existing issue for the area, and in particular, for the Koputaroa. Huarere taurangi (weather changes or climate-change) is important to address in the design of the Project.

40.3.1.3 Cultural practices

Ngā hapū o Kererū have, and/or continue, to undertake the following cultural practices in the Project area:

- Harakeke – the harakeke that is used for traditional weaving is best grown on the margins of wetlands.
- Kākaho - toetoe flower stalks are used to line the interior walls and/or ceiling of wharenui. They are placed vertically between the poupou (wall slabs), with horizontal kaho (wooden laths) lashed in front. On this framework, thin strips of pīngao, kiekie or harakeke are laced around both the kākaho and the kaho to form patterns. Completed wall panels are called tukutuku.
- Traditional methods for catching birds (such as Kākā and Kererū) with mutu (foot snares) were used in this area.
- Peha/pepeha - are the ultimate statement of connection of Ngā hapū o Kererū with their surroundings. Pepeha are frequently practised and used as educational tools to support the retention of mātauranga Māori and whakapapa. The peha used in the CIA acknowledges the locations which the iwi, hapū and whanaū hold in high regard, with an ancestral connection.
- Poi making - using raupō.
- Whakapapa - is the recording of connections across, up and down through generations. Importance is placed on the accurate recollection of such critical mātauranga.

40.3.2 Cultural effects management

When considering how to manage effects, Ngā hapū o Kererū provide the following context. The atua are responsible for looking after future generations from the perspective of health and wellbeing now and in the future, including the consideration of climate change. This whole approach, way of thinking and acting is referred to as raupapa – to put things in order – connecting the environment, planning and future generations.

Table 40-2 describes the residual effects and the measures and processes that have been agreed with Ngā hapū o Kererū, to address those residual effects.

Table 40-2 - Ngā hapū o Kererū residual effects management

Residual Effects Recommendations	Management Approach
• Ngā hapū o Kererū consider it critical to have baseline and ongoing monitoring for the Project, using a mātauranga Māori approach, recognising wairua, mauri and the atua.	• Conditions are proposed that provide for the development of a cultural health monitoring framework.
• To enable Ngā hapū o Kererū to carry out the role of tīkanga and kawa.	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. • Conditions are proposed that require karakia to precede work. • The CEDF and the proposed process of its ongoing design development, plus the involvement of iwi in the development and implementation of management plans (notably the Ecology Management Plan) allows iwi to be involved in processes that enable tīkanga and kawa to be practiced on the whenua.
• The design of the Project has addressed concerns in respect of actual and potential pollution and flooding effects on awa, however it is important that the detail of these design elements is monitored and developed properly to ensure outcomes.	• The CEDF and the proposed process of its ongoing design development, plus the involvement of iwi in the development and implementation of management plans (notably the Ecology Management Plan) allows iwi to be involved in processes that enable tīkanga and kawa to be practiced on the whenua.

Residual Effects Recommendations	Management Approach
• Ngā hapū o Kererū welcome any opportunity to have Mahi Toi (artwork) incorporated in the Project.	• The CEDF provides for the development of a mahi toi strategy in the next phase of the Project.
• To enable traditional cultural practices to continue including through the restoration of Te Ripo o Hinemata, near Kererū Marae.	• The Project will continue to investigate its preferred restoration of Te Ripo o Hinemata with Ngā hapū o Kererū. This proposal is currently a preferred wetland offsetting site. The design of the proposed improvements, including how it is implemented, is subject to ongoing discussions, and it is hoped that this will allow for continuation of cultural practices.

40.4 Ngā Hapū-o-Ōtaki

40.4.1 Introduction

Ngā Hapū-o-Ōtaki ("Ngā Hapū") comprises five hapū including Ngāti Huia ki Katihiku, Ngāti Pare, Ngāti Koroki, Ngāti Maiotaki and Ngāti Kapu. Ngā Hapū have prepared a CIA that documents the cultural significance of the areas within which the Ō2NL Project is proposed, including the specific cultural values that may be affected. The CIA also identifies appropriate measures, where practicable, to avoid, remedy or mitigate, any adverse effects of the Project on cultural values. The CIA only focuses on the area traversed by the Ō2NL Project.

Ngā Hapū have been involved in the Ō2NL Project since 2011. Since 2021, whanaū/hapū/iwi have been collaborating with Waka Kotahi in respect of the ongoing Project design investigations. This process has informed the design development of the Project.

40.4.2 Cultural effects and management

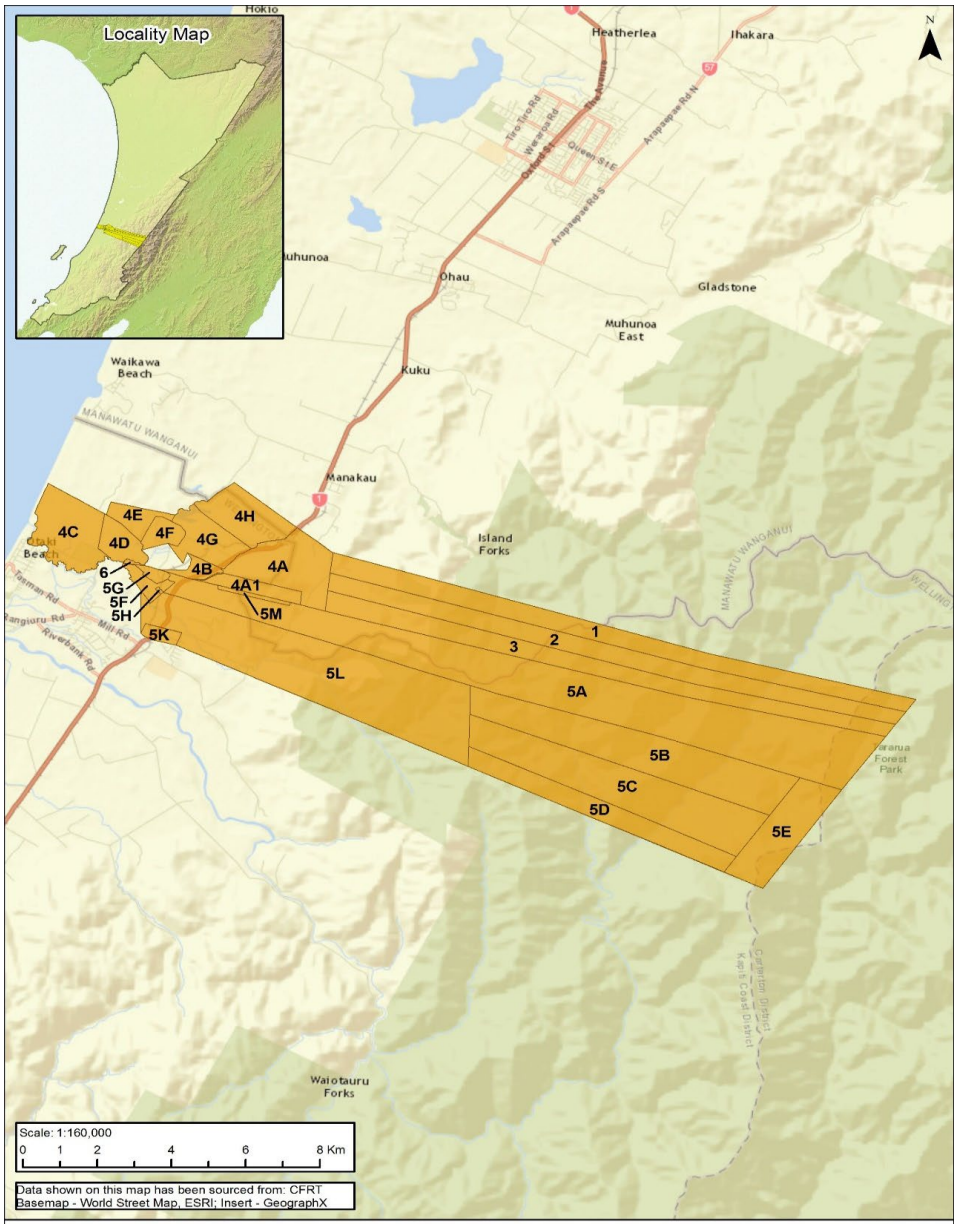
40.4.2.1 Māori land ownership

Ngā Hapū has inalienable rights to and connection with the whanaū/hapū/iwi resources traversed by the Ō2NL Project in keeping with the notions of Kaitiakitanga. Figure 40-1 shows Māori owned land blocks relative to the Ō2NL Project. These land areas traversed by the Project are as follows:

- Pukehou 5K Block;
- Pukehou 5L Block;
- Pukehou 5A:
- Pukehou 4A:
- Pukehou 4A1B.

Where Waka Kotahi need to acquire the land, this is addressed under the PWA.

Figure 40-1 – Māori owned land



40.4.2.2 Kaitiakitanga and Rangatiratanga

The Project, through all of its elements, including earthworks, stream diversions and works, removal of vegetation, damages wāhi tapu, wai, mahinga kai and wildlife. The Project severs cultural links to land blocks that are traversed and in some instances these losses are permanent. This physical and spiritual change to the environment has an immeasurable impact on Ngā Hapū cultural values.

This alienation of Ngā Hapū from their lands affects their ability to exercise:

- rangatiratanga - the ability of Iwi, hapū and whanaū to maintain their history, identify, traditions and/or culture; and
- kaitiakitanga - the role of iwi, hapū and whanaū to guard and protect taonga tuku iho - applying to both the physical and spiritual world.

The Project also precludes access to ancestral lands and areas of significance. Access to these significant areas will be forever changed, and in some instances, will be lost completely to iwi, hapū and whanaū.

For Ngā Hapū, the Project will mean loss of the ability to determine the appropriate use of the land according to tīkanga.

40.4.2.3 Wāhi Tapu

There is a high risk of damage to wāhi tapu sites between Taylors Road and south of Aitkin Road, Manakau. The existence of wāhi tapu in the area is unlikely to be confirmed until construction earthworks occur. The disturbance of wāhi tapu can potentially erode Ngā Hapū rangatiratanga.

40.4.3 Mitigation recommendations

Table 40-3 describes the effects and the measures and processes that have been agreed with Ngā Hapū, to address those effects.

Table 40-3 - Ngā Hapū-o-Ōtaki mitigation recommendations

Residual Effects Recommendations	Management Approach
Wāhi Tapu	
• Mana Whenua to be responsible for all decision making regarding wāhi tapu. • Ensure that Mana Whenua are able to exercise rangatiratanga and kaitiakitanga in all aspects relating to wāhi tapu and sites of significance. • Project to be guided by tīkanga as determined by Mana Whenua when dealing with all issues pertaining to wāhi tapu and sites of significance. • Waka Kotahi, in partnership with Mana Whenua, to co-design any and all management plans and accidental discovery protocols in relation to wāhi tapu and sites of significance. • These documents will offer the highest degree of protection practicable for these areas, both known prior to the Project or discovered throughout the Project. This will also apply to any taonga of cultural significance that are uncovered during the Project.	• All known wāhi tapu have been avoided by the proposed designation and Project work. • Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. This will include opportunities to refine the design to avoid any wāhi tapu sites found, and to otherwise minimise footprint through the area to minimise chances of finding wāhi tapu sites as much as practicable. • Proposed conditions include developing and implementing an archaeological discovery protocol that will establish the protocol should wāhi tapu sites be found during investigations or construction. Archaeological authorities will be sought (under the Heritage New Zealand Pouhere Taonga Act 2014) in future, and will include the protocol agreed through this process.
Te Taiao	

• Mana Whenua to co-design any and all resource consents and management plans where it affects Te Taiao. This will include, but is not limited to:
  ◦ Water, underground springs and aquifers
  ◦ Vegetation
  ◦ Fauna and flora
  ◦ Earthworks
  ◦ Urban and landscaping design
• Ensure Mana Whenua are able to exercise rangatiratanga and kaitiakitanga in all aspects relating to Te Taiao.
• The Project will be guided by tīkanga as determined by Mana Whenua when dealing with issues of cultural significance in regard to Te Taiao.
	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. This involves ongoing development of the design of the Project, including in relation to awa, vegetation, ecological and landscape planting locations and landscape design.
	• Conditions proposed include involvement in the erosion and sediment control management, ecology management and construction management. Conditions also require the development of a Ngāti Raukawa Management Plan that will establish and define cultural practices on site that enable mana whenua to, as appropriate, exercise rangatiratanga and kaitiakitanga, and establish appropriate tīkanga when dealing with issues of cultural significance in regards to Te Taiao.

Residual Effects Recommendations	Management Approach
Rangatiratanga and Kaitiakitanga	

• Waka Kotahi to ensure a Mana Whenua representative is included in strategic level decision making by creating a dedicated role within the Waka Kotahi Project structure as agreed between Waka Kotahi and Mana Whenua.
• Waka Kotahi in partnership with Mana Whenua to codesign any and all resource consents and management plans that are of cultural significance within the Project, that have not already been referred to above. This will include, but is not limited to:
  • Consultation & Engagement;
  • Health and Safety;
  • Cultural Ceremonies;
  • Broader Outcomes Strategy;
  • Procurement;
  • Mahi Toi / Cultural Symbolism;
  • Education and Training;
  • Commissioning and Decommissioning of the Project; in particular;
  o Revocation,
  o Disposal of surplus assets,
  o Disposal of surplus lands.
	• Waka Kotahi is committed to the ongoing involvement of the Project Iwi Partners in the implementation, delivery and opening of the Project. This is intended to include dedicated roles in the Project structure and allows co-design of management plans including procurement, health and safety and consultation and engagement.
	• The CEDF and the proposed process of its ongoing design development, plus the involvement of the Project Iwi Partners in the development and implementation of management plans and allows iwi to be involved in processes that enable tīkanga and kawa to be practiced on the whenua.
	• The CEDF provides for the development of a mahi toi strategy in the next phase of the Project.

40.5 Ngāti Huia Collective

The Ngāti Huia Collective (Ngāti Huia) comprises hapū of Ngāti Pareraukawa, Ngāti Kikopiri, Ngāti Hikitanga, Ngāti Huia ki Matau and Ngāti Huia ki Poroutawhao. Ngāti Huia have prepared a Cultural Impact Appreciation report ("Huia Report") that describes the values held by Ngāti Huia and provides an approach for recognising and providing for these cultural values, cultures and traditions, ancestral lands, waters sacred sites and taonga (highly prized natural resources).

40.5.1 Cultural effects management

As partners to the Project, Ngāti Huia has participated in the Ō2NL Project by providing cultural feedback and guidance for all design aspects, including participation in the development of the CEDF and also attended design, topic and conditions workshops.

Ngāti Huia consider that cultural impacts and effects will change over time as the Project develops through its design, construction and operational stages. A cultural impact assessment represents a snapshot in time, whereas impacts extend beyond this point in time. Therefore, Ngāti Huia are proposing to use Te Whare Tapa Whā model as part of an adaptive and responsive process for hapū to participate in the Ō2NL Project as it progresses.

The following step process/ framework allows for the acknowledgement and protection of cultural values, and for management of the cultural impacts of the Ō2NL Project. This is structured as follows:

- **Step 1** – Review of relevant Project material.
- **Step 2** – Assessment of impact on cultural values using the Te Whare Tapa Whā framework and Ngāti Huia tīkanga.

- **Step 3** – Muru:[1] Re-establishing cultural wellbeing and balance by identifying mitigation required to do so.
- **Step 4** – Hapū korero: where mandated hapū representatives will act as interfaces between specific hapū and the Project, providing feedback and direction to support informed decision making.
- **Step 5** – Reporting back to Waka Kotahi on Ngāti Huia's conclusions.

Te Whare Tapa Whā model provides a systematic and transparent process for identifying how the Ō2NL Project could impact on the wellbeing balance of Ngāti Huia. Using the model, each Project 'element' or activity is able to be listed, and the potential impact on cultural values and 'Te Whare Tapa Whā imbalance' then identified. The following components of Te Whare Tapa Whā are relevant:

- te taha wairua (spiritual wellbeing)
- te taha hinengaro (mental wellbeing)
- te taha tinana (physical wellbeing)
- te taha whānau (family wellbeing)

The Huia Report provides an example assessment of impact on cultural values using Te Whare Tapa Whā model, and this is provided in Table 40-4. Ngāti Huia are proposing that this method is used to inform the development of the design of the Project in the ensuing phases of the Project, through to construction and then to operation.

Table 40-4 – Examples of potential impacts on wellbeing balance of Ngāti Huia

Project Element	Potential Impact on Cultural Values	Te Whare Tapa Whā Imbalance
Earthworks	• Papatūānuku (mother earth), connection with, and impact on, whenua, ancestral lands, sites of cultural significance, wāhi tapu (sacred place) and with taonga. • Kaitiaki (guardian) responsibilities for Ngāti Huia whenua. • Disturbance of kōiwi (human skeletal remains).	Impact on *Te Taha Tinana, Taha Wairua, Taha Hinengaro, Te Taiao*
Culverts, stream diversions, stream works, bridges	• Awa of cultural and spiritual significance. • Mauri (life force) of awa. • Instream habitats, biota, biodiversity – Ngāti Huia taonga. • Kaitiaki responsibilities for awa. • Mahinga kai values. • Mātauranga (Māori knowledge) and intergenerational dissemination.	Impact on *Te Taha Tinana, Taha Wairua, Taha Hinengaro, Taha Whānau, Te Taiao*
Clearance of vegetation	• Ngahere (forest), biota, biodiversity – Ngāti Huia taonga. • Kaitiaki responsibilities for Ngāti Huia ngahere.	Impact on *Te Taha Tinana, Taha Wairua, Taha Hinengaro, Te Taiao*

[1] In this context, 'muru' refers to finding the means to restore balance from past offences (eg degradation of the land and environment).

Project Element	Potential Impact on Cultural Values	Te Whare Tapa Whā Imbalance
Road runoff	• Potential for impact on awa of cultural and spiritual significance. • Potential for impact on mauri of awa. • Potential for impact on instream habitats, biota, biodiversity – Ngāti Huia taonga. • Potential for impact on our kaitiaki responsibilities for awa. • Potential for impact on mahinga kai values. • Potential impact on mātauranga and intergenerational dissemination.	Impact on *Te Taha Tinana, Taha Wairua, Taha Hinengaro, Taha Whānau, Te Taiao*
Highway corridor	• Potential for dislocation or isolation from ancestral lands, Māori land, sites of cultural significance. • Potential for impact on kaitiaki responsibilities for Ngāti Huia whenua.	Impact on *Te Taha Tinana, Taha Wairua, Taha Hinengaro, Taha Whānau, Te Taiao*

40.5.2 Mitigation recommendations

Ngāti Huia have identified the following examples that would underpin, support and restore ongoing cultural wellbeing, and Waka Kotahi's proposed management response is provided, in the table below:

Table 40-5 – Ngāti Hui example of residual effects management

Residual Effects Recommendations	Management Approach
• Environmental restoration of whenua and awa to an improved state following the works, through good project close-out processes and rehabilitation.	• Ecological mitigation, offset and compensation package proposed will restore environment and deliver an overall ecological biodiversity net gain. • Conditions are proposed that allow for the development of a cultural health monitoring framework.
• The incorporation of cultural values into Project designs, as through the CEDF. For example, artwork, water management processes, biodiversity enhancements, signage, naming (of places, locations, highway). • Application of tīkanga and kawa as appropriate. For example, karakia for the commencement of key stages in the construction, at toolbox talks, in reviewing Construction Works Packs, and stand-over monitoring.	• Waka Kotahi is committed to the ongoing involvement of iwi partners in the implementation, delivery and opening of the Project. • Conditions are proposed that require karakia to precede works. • The CEDF and the proposed process of its ongoing design development, plus the involvement of iwi in the development and implementation of management plans (notably the Ecology Management Plan) allows iwi to be involved in processes that enable tīkanga and kawa to be practiced on the whenua. • The CEDF provides for the development of a mahi toi strategy in the next phase of the Project.
• The use of Mātauranga Māori to help inform the Project and outcomes	• The CEDF and the proposed process of its ongoing design development, plus the involvement of iwi in the development and implementation of management plans (notably the Ecology Management Plan) allows iwi to be involved in processes that enable tīkanga and kawa to be practiced on the whenua.

Residual Effects Recommendations	Management Approach
• Appropriately responding to wāhi tapu and taonga that may be affected by the Project.	• Conditions proposed include protocols to protect taonga species, including birds, lizards, snails, fish, native plants and watercourses. A comprehensive suite of ecological mitigation, offsetting and compensation is proposed and iwi partners will be able to be involved in the design and implementation of these measures.
• Treatment and care of any wāhi tapu, archaeological material, taonga or kōiwi discovered during construction.	• In addition to above, an archaeological discovery protocol is proposed to be developed with Project Iwi Partners.

Ngāti Huia propose that takawaenga principles be used to support iwi relationships and to resolve any differences between iwi during the ensuing phases of the Project's development. Waka Kotahi proposes to engage and work with the Project Iwi Partners through the ensuing phases of the Project, and acknowledges that the takawaenga principles provide an approach to understanding overlapping interests and to reaching collective agreement.

Ngāti Huia consider that their ongoing partnership arrangement with Waka Kotahi has provided an effective basis for understanding and then responding to effects of the Project on cultural values. The CEDF development process shows that hapū are informed, feedback is captured, noted and informs design. The CEDF audit process developed provides a living record of the entire engagement process for the design phase to date. The approach to date has allowed issues to be identified and a process to be established to resolve them.

Ngāti Huia have entered a formal Partnership arrangement with Waka Kotahi to ensure the Rangatiratanga of the Ngāti Huia collective is upheld and maintained and that Ngāti Huia's tīkanga and kawa are recognised throughout the Project.

Core values underpinning the Partnership arrangement are set out in the CEDF; and are:

- Te Tiriti (spirit of partnership);
- Rangatiratanga (leadership – professionalism – excellence);
- Ūkaipotanga (care – constructive behaviour towards each other);
- Pūkengatanga (mutual respect, including for knowledge and expertise);
- Manākitanga (generosity – acknowledgement – hospitality);
- Kaitiakitanga (our responsibility and care for our whenua and our people);
- Whanaungatanga (belonging - teamwork);
- Whakapapa (connections).

The adoption of these core values for all aspects of the Project's ongoing design development and construction will enable tīkanga Māori to be integrated throughout the Partnership. The values will also ensure the Rangatiratanga of the Ngāti Huia collective is upheld and maintained and enable each iwi/hapū to participate and engage in all aspects of the Ō2NL Project and at all levels. These core values underpin and define how Ngāti Huia will engage through this Project.

In order to ensure that the CEDF values consistently underpin design development through to, and during, the construction period, the CEDF design audit is proposed to be undertaken frequently, at regular intervals during these phases. This approach also recognises and appreciates that cultural impacts and effects will change over time, as the Ō2NL Project develops through its design, construction and operational stages. This approach provides an adaptive and responsive process for hapū to participate in the Ō2NL Project as it progresses.

Ngāti Huia propose to discharge their core responsibility as Kaitiaki by ensuring that the principles of Te Whare Tapa Whā are maintained, so that te taiao is sustained, and that when Waka Kotahi have completed construction of the Project, Papatūānuku is enhanced.

Waka Kotahi recognises and respects the approach proposed and intends to honour the partnership with Ngāti Huia through the ensuing phases of the Project's design and implementation. The CEDF forms the basis for ongoing design development of the Project involvement of Ngāti Huia in this process presents opportunities to restore balance, address adverse cultural effects and provides a framework within which solutions to future issues can be found. The proposed conditions, which include the design audit, allow for this process.

40.6 Ngāti Tukorehe

Ngāti Tukorehe is an iwi that is affiliated to Tainui Waka. Originally from the Waikato region, sections of Ngāti Tukorehe and its hapū Te Mateawa, Te Rangitāwhia, Ngāti Kapu and Ngāti Manu migrated to Horowhenua and Manawatū regions in the early 1820s.

Te Iwi ō Ngāti Tukorehe Trust have prepared the CIA provided in Volume V which provides an assessment of cultural value impacts and traditional history of Ngāti Tukorehe, and potential effects on its wāhi tapu.

Ngāti Tukorehe have been involved in the Ō2NL Project since 2014, entailing input into corridor options development and assessment phases of Waka Kotahi investigations. More recently Ngāti Tukorehe have been involved in the assessment of route options (including local roads connection and intersection options), material supply and spoil site options. Ngāti Tukorehe have had considerable input into the development of the CEDF (provided as Appendix Three) and the CIA is informed by this document.

40.6.1 Cultural effects and management

40.6.1.1 Ōhau Awa and its tributaries

The Ōhau Awa and its tributaries, in particular the Mākorokio and Kuku Streams are taonga (highly prized natural resource) of significant cultural value. The Ōhau Awa for Ngāti Tukorehe is a source of spriritual sustenance, mahinga kai and swimming and camping. It is also the location of vital cultural, social and environmental importance. For Ngāti Tukorehe, the taniwha are kaitiaki or spiritual guardians of the waterways, and these Kaitiaki are taonga (highly prized object). As held by traditions, there are important taniwha along the lower reaches of the Ohau Awa.

The Ō2NL Project will cross a large number of awa, a number of which are of major cultural and spiritual significance, which raises concerns about the awa and the mauri (life force) of these waterways. Works in the waterways (diversions, bridge piers) have the potential in impact on the mauri of the awa. Stormwater discharges during construction and during highway operation have the potential to affect water quality and instream life. Hapū hold kaitiaki (guardian) responsibilities for these awa. The awa are already subject to significant pressures from land use management activities.

40.6.1.2 Construction water abstraction

Within the Ngāti Tukorehe catchment, point and non-point source discharges impact on the ability of the waterway to undertake its role in supporting the life contained within and around it. Ngāti Tukorehe is concerned that water abstraction could effect aquatic species, the hydrology and ecology of local water bodies, water quality and the mauri of the waters. Ngāti Tukorehe considers that taking water at or below minimum flows will compromise the life carrying capacity of the ecosystem.

40.6.1.3 Stormwater

Treatment of stormwater in the Ngāti Tukorehe catchment is required to enhance the protection of the mauri of the water.

40.6.1.4 Whenua

The whenua is considered as taonga – an ancestral treasure handed down, as a living being related to the people of the place. The whenua also has tapu facets to it, where it could be the site of battle, a burial site, the place of a significant taonga, a place of historical significance.

The Ō2NL Project will result in a cut through the whenua for which iwi and hapū hold kaitiaki responsibilities. This cut will affect the connection that iwi and hapū have with their whenua and with their ancestral lands, sites of cultural significance and taonga.

40.6.1.5 Māori owned land

The alignment crosses land parcels held in Māori ownership. Māori land blocks are considered taonga and are of cultural significance to the whānau members who own them. The Māori land blocks provide for the social and economic well-being of the owners and their whānau. The owners represent the inter-generational connection between the Ngāti Tukorehe ancesteors who migrated here and still reside in the rohe (region) today. They are a link to the past and for the future and are valued.

40.6.1.6 Mātauranga Māori

Mātauranga Māori translates to Māori knowledge established over the centuries of occupation and interaction with the environment: land, mountains, awa and lakes, and living creatures living within these habitats. Mātauranga Māori encompasses not only what is known to iwi – but how it is known – this refers to the way of perceiving and understanding the world, and the values of thought that underpin those perceptions. Mātauranga Māori, therefore, refers not only to Māori knowledge but also to the Māori way of knowing.

Ecosystem vitalisation relies on the local knowledge about a place. When elders retold stories of encounters with local Taniwha, spriutal gaurdians or the protocols observed around special places, a value system was highlighted, which is fundamental for forming principles and guiding philosophies for culturally based sustainable development.

40.6.1.7 Road safety

Ngāti Tukorehe support the proposed safety improvements planned to occur on SH1 south of Levin and also the recent removal of passing lanes and reduction of the speed to 80 kph. However, further improvements are needed including setting the speed limit to 70kph.

40.6.1.8 Positive effects – legacy

Ngāti Tukorehe considers that the Ō2NL Project provides an opportunity to ‘normalise’ Māori values so that they are embedded in all aspects of design, construction and implementation. The social and environmental outcomes that are mutually beneficial for all parties could leave an enduring legacy by:

- Create (whakatū) – opportunities that the Project reflects the social, political and environmental aspirations
- Enhance (whakapaipai) – what is already there to realise the maximum potential of the opportunity to be the best version of itself (i.e. raise the status of the mauri)
- Restore (whakaora) – fix what is broken
- Preserve (tiaki) – enhance if there is an opportunity
- Evaluate (arotake) – ensure there is a process to evaluate lessons learned through the Project

40.6.2 Mitigation / recommendations

The table below describes the residual effects and the measures and processes that have been agreed with Iwi Partners to address those residual effects.

Table 40-6 Ngāti Tukorehe residual effects management

Residual Effects	Management
• Ngāti Tukorehe is concerned about its kaitiaki responsibilities including through input in design development, the incorporation of cultural elements into design, environmental restoration and cultural monitoring. • Ngāti Tukorehe also requests to be included in conversations which include procurement and engage with external agencies, such as Te Rōpū Pakihi, MSD, UCOL, HDC, MBIE, Kainga Ora and any other entities who can provide greater understanding and access to procurement opportunities.	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. This will include opportunities to input into procurement, design development, incorporate cultural elements into the design, environmental restoration and cultural monitoring. • Conditions also proposed to requiring the development of a Ngāti Raukawa ki te Tonga Management Plan that will establish and define cultural practices on site that enable mana whenua to, as appropriate, exercise rangatiratanga and kaitiakitanga, and establish appropriate tikanga when dealing with issues of cultural significance. • The CEDF and the proposed process of its ongoing design development, plus the involvement of iwi in the development and implementation of management plans and allows iwi to be involved in processes that enable tikanga and kawa to be practiced on the whenua. • The CEDF provides for the development of a mahi toi strategy. This will be developed in the next phase of the Project.

• Ngāti Tukorehe is concerned about any effects on water ways including the following:
  • the creation of any barriers to native fish passage, unless approved by Ngāti Tukorehe for conservation or cultural reasons
  • works that could create sediment issues, including sediment starvation or over-supply of fine material
  • any work/digging in any awa, stream or 'drain'
  • any changes to natural flows
• Riparian margins should be managed to assist with protecting the water from erosion, sedimentation and run-off of nutrients, sediment and other contaminants.
	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. This will include opportunities to input into the design of works that interface with water ways, including fish passage design of culverts, erosion and sediment control management and protocols.
	• Conditions proposed include involvement in the erosion and sediment control management, ecology management and construction management.
	• The ecological offset and compensation planting and natural character planting entail planting of riparian margins, which will over time, protect water from erosion, sedimentation, and runoff effects.

• Ngāti Tukorehe is concerned about potential effects on wetlands and considers that they should be protected from drainage and enhanced where possible.	• Wetlands have been avoided wherever practicable. Where they are impacted, then ecological planting is proposed to offset and compensate for those effects on wetlands.
• Ngāti Tukorehe seeks assistance in the relocation of the Saint Stephens Church to Tukorehe Marae.	• Waka Kotahi is committed to working with our Iwi Partners to identify broader outcomes that could be delivered through the Project.
• Ngāti Tukorehe would like to relocate / re-use Project construction buildings (site office compound) as a community facility at Kuku which can be used a meeting place, offices and a regional Civil Defence Headquarters. • Ngāti Tukorehe would ask that any of the houses which have been purchased for the Ō2NL Project	• Waka Kotahi is committed to working with our Iwi Partners to identify broader outcomes that could be delivered through the Project.

Residual Effects	Management
be made available for re-location to whānau land sites for those who have been impacted by land loss from the purchase of their property. It is acknowledged that there is a different process, administered by Land Information New Zealand, of land banking and offer back in respect of land that is acquired and subsequently disposed.	

Ngāti Tukorehe consider that the CEDF reflects the values that underpin Te O Māori. Ngāti Tukorehe advise that there is the opportunity for the Ō2NL Project to be delivered through partnership, co-governance and co-design, and that this collaboration with Iwi can occur in a mana enhancing way.

40.7 Ngāti Wehi Wehi

Te Kotahitanga o Te Iwi o Ngāti Wehi Wehi is made up of five hapū, Ngāti Tamatātai, Ngāti Te Ihīhi, Ngāti Te Rangitawhia, Ngāti Pihaka and Ngāti Pareahotea and is often simply referred to as Ngāti Wehi Wehi.

Ngāti Wehi Wehi place great emphasis on building and maintaining wider community relationships and so have entered into a partnership arrangement with Waka Kotahi, which amongst other things includes the undertaking of a CIA of the Project on the customary interests of Ngāti Wehi Wehi and on their rohe from the summit of Pukehou to the middle of the Ohau River. This CIA is provided in Volume V.

40.7.1 Cultural effects and management

Ngati Wehi Wehi is connected through whakapapa to the physical and metaphysical embodiment of mauri. In this context the following summarises the effects of the proposed construction and operation of the state highway that are detailed in the CIA.

40.7.1.1 Awa

Ngāti Wehi Wehi outline particular concerns in relation to the effects of the Project on water, waterways, lakes and rivers. The CIA explains that water is precious and a gift from Papatūānuku's life sustaining provisions and waterways including lakes and rivers possess a spiritual essence or mauri life force, which invokes a deep rooted respect and desire in Ngāti Wehi Wehi to act responsibly around waterways. It is also noted that the preserve of guardian taniwha, known locally as Mukukai, is the coastal waters and wetlands of Horowhenua/Kāpiti.

The CIA explains that coastal wetlands were once part of a complex wetland eco-system that have been systematically drained to provide for productive farmland. This has resulted in cultural impacts on Ngāti Wehi Wehi who knew and understood that environment well and were reliant on the provisions that the wetlands provided to sustain themselves.

The CIA explains that access to the Waikawa awa is considered a paramount legacy outcome of the Project.

40.7.1.2 Rangi

Ngāti Wehi Wehi are concerned that air pollution from the Ō2NL Project will degrade and lessen the mauri or life force of air (taonga). It could also affect the mauri of other taonga, such as plants and animals and the consequences that this could then have on customary resources (for example native plants that provide food and natural medicines).

There is also concern about the effects that pollutants and lights from cars and light poles on the proposed road will have on the ability to observe the taonga within the domain of Ranginui i.e. the moon, stars and rainbows. The moon and the luna calendar help tell the time of year for sowing and harvesting. The stars also represent the way in which ancestors navigated Te Mōana-nui-a-Kiwa (Pacific Ocean).

40.7.1.3 Ngāti Wehi Wehi marae

The CIA explains that two proposed material supply sites (that could be used to supply bulk earthworks for the construction of the Project) adjoin the Wehi Wehi marae. There is concern that the operation of the two sites could have significant noise, visual intrusion and air pollution effects on Ngāti Wehi Wehi marae and that the proposed operation will displace mauri (life force). One of the proposed material supply sites is within close proximity to a bird snaring area known as Parikawau, and is close to old pā sites Te Kotahitanga and Uewhaki and the Wehi Wehi (Tūrangawaewae) – today being Wehi Wehi Marae.

40.7.1.4 Effects on gentrification and housing crisis

The CIA explains that the development of the Ō2NL Project will increase pressure on housing stock, as homes will become within commuting distance of Wellington or attractive as holiday homes. There is concern that the Project will further cause local iwi to be driven away from their communities in search of not only available but affordable housing, in turn eroding spiritual connections, increasing isolation and a decline in quality of life. The CIA notes that the effect of the current highway has been increasing crime rates, increasing dependability on the health care system and emotional duress due to financial stress. There is also increasing rates of substance abuse and domestic violence, which is forcing families apart and children into state care.

40.7.2 Mitigation/recommendations

The table below describes the residual effects and the measures and processes that have been agreed with Iwi Partners to address those residual effects.

Table 40-7 Ngāti Wehi Wehi residual effects management

Residual Effects	Management
• Ngāti Wehi Wehi need to be able to maintain their own mana tīkanga and kawa on their whenua to complement the future generations of Ngāti Wehi Wehi.	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project. • The CEDF and the proposed process of ongoing design development, plus the involvement of iwi in the development and implementation of management plans (notably the Ecology Management Plan) allows iwi to be involved in processes that enable tīkanga and kawa to be practiced on the whenua.
• Ongoing relationship with Waka Kotahi be maintained. Ngāti Wehi Wehi seek to be consulted in relation to any existing and/or future Waka Kotahi assets that will impact the outlying whenua in which the Ngāti Wehi Wehi preside.	• Waka Kotahi is committed to the ongoing involvement of Iwi Partners in the implementation, delivery and opening of the Project.
• Protocols or tīkanga involving karakia should always precede any work	• Conditions also proposed to requiring the development of a Iwi Management Plan that will establish and define cultural practices on site that enable mana whenua to, as appropriate, exercise rangatiratanga and kaitiakitanga, and establish appropriate tīkanga when dealing with issues of cultural significance. • Conditions are proposed that require karakia to precede work (see Appendix Five).
• Ngāti Wehi Wehi welcome any opportunity to have Wehi Wehi Mahi Toi (artwork) incorporated in the Project	• The CEDF provides for the development of a mahi toi strategy. This will be developed in the next phase of the Project.

Residual Effects	Management

• To address the effects of the material supply sites on:
  • a bird snaring area known as Parikawau,
  • pā sites Te Kotahitanga and Uewhaki and the Wehi Wehi (Tūrangawaewae) - today being Wehi Wehi Marae.
  • Displacement of Mauri
  • Visual intrusion, air pollution and noise effects
• By returning the land to a condition better that it is found today and in manner that provides a positive legacy (Wehi Wehi seeks a return of tipu wairākau (to prosper/grow) to uphold the health of Iwi and an environment providing abundance for the tamariki o Tāne Mahuta.)
	• Conditions are proposed that require the design of the remediation of the material supply sites at Waikawa Stream to be undertaken in consultation with Iwi Partners and for that design to investigate the creation of a native ngāhere reserve which includes:
	  • mahi toi such as carved Pou, signage and planting
	  • rongoā and rākau harvest places and
	  • recreational walking access to the stream.

Ngāti Wehi Wehi are in favour of the proposed new state highway and acknowledge the positive economic and road safety effects that the Project will bring to those who live on or near to the current state highway and the wider community. However, as described above, the new state highway will have negative effects in particular on iwi and Māori.

Ngāti Wehi Wehi state that due to the significant safety hazard of the current road, they have once again have been put in a position where they have to accept these negative effects, further loss of land and compromising what little they have left, including the life sustaining bodies of water.

Ngāti Wehi Wehi will continue to work alongside Waka Kotahi to mitigate effects and to hopefully improve the current state of the environment.

The partnership of Waka Kotahi with Ngāti Wehi Wehi represents an upholding of the values and concepts that make up the TĪriti o Waitangi and provides a robust cultural basis for the completion of the proposed improvements (the Project). The role of Ngāti Wehi Wehi includes providing cultural advice to Waka Kotahi in order to best mitigate the effects of the Project, during all stages, the design phase, during construction, and maintenance of the road following its completion.

40.8 Cultural impacts summary

In order to integrate cultural and spiritual values into the Project, iwi have been invited to be, and are now, Project Partners. Iwi Partners have developed key cultural values for the Project that underpin the ongoing cultural, environmental and wider design, management and implementation aspects.

Through this ongoing partnership arrangement a good understanding of the cultural values and the actual and potential effects of the Project on those values has been achieved. The collaborative and iterative approach to design development has provided an effective basis for understanding and responding to these effects, and has resulted in the avoidance of effects on key values, notably:

To tread lightly, with the whenua

- avoiding effects on groundwater that feeds Punahau/Lake Horowhenua;
- avoiding cutting into maunga;
- avoiding earthwork cuts across spiritual pathways and reconnecting them with overbridges;
- avoiding effects on Ohau, Kuku, Waikawa and Manakau awa, and otherwise providing for fish passage in other awa;
- avoiding effects on native forest remnants wherever possible;
- designing stormwater and drainage so as to avoiding mixing catchments, and to allow current awa patterns of movement to be retained (the same as pre-development);
- designing earthworks to reduce the need to take earth between catchments.

Create an enduring legacy

- designing the proposed restoration planting in accordance with ki uta ki tai; to restitch the landscape together and restoring connections that align with mountains to sea principles;
- designing so as to restore access to awa (at Waikawa Stream) but also potentially the northern bank of the Ohau River;
- planting types that afford rongoa and mahinga kai opportunities; and
- ongoing involvement of Iwi Partners in the design (through the CEDF Design Audit process, management plans) and then construction (through karakia and site observation) of the Project.

The process of working with Iwi Partners has, therefore, allowed cultural and spiritual values to be integrated into the development of the design of the Project, and the design of processes for managing the effects associated with its construction. This process is ongoing.

The CIAs represent a point in time and largely report on how Waka Kotahi and Iwi Partners have agreed that residual cultural effects should be managed. Additional design information and continued involvement of Iwi Partners is required to ensure that these effects continue to be effectively managed. Additional cultural effects are identified which relate to matters associated with celebrating the cultural landscape, the need for iwi's ongoing involvement in the design of Project (the material supply sites, local road connections and gateways), and the need to provide long term access to cultural resources. Proposed conditions, in particular the requirement for continued CEDF Design Audits, involvement in the preparation of ecology and erosion and sediment control management plans, and the requirement for the preparation of Management Plans (Muaūpoko Management Plan and Ngāti Raukawa ki te Tonga Management Plan), will help secure these outcomes.

Through formal partnership arrangement with Iwi Partners, and the commitment to develop the design consistent with the CEDF (including Design Audit processes) help ensure the rangatiratanga of the Iwi Partners is able to be upheld and that Iwi Partners tīkanga and kawa are appropriately recognised throughout the Project, including construction phases.

41 Transport

41.1 Assessment methodology

The transport effects of the Ō2NL Project have been assessed based on a range of assumptions, including in relation to the rate of growth, and with reference to:

- the 'current transport network' scenario representing present-day conditions (using 2018 traffic figures as a base);
- a ‘do minimum’ transport network that is the assumed transport network predicted for 2039[2] including safety improvement works that have been committed (or are currently being implemented) and a 2039 projected population; and
- the ‘Ō2NL Project’ scenario, being the ‘do minimum’ scenario plus the Ō2NL Project.

The assessment of transport effects generally considers the difference between the three scenarios. The assessment considers the matters set out in Table 41-1 with respect to transport effects.

[2] 2039 has been chosen as the future year of reporting effects as it is 10 years after the Ō2NL Project opens (which is normal practice when assessing and considering the actual and potential effects of new infrastructure projects) and is after a significant period of growth forecast by HDC.

Table 41-1 – Transport effects considerations

Transport Effects Considerations	
Safety	• Estimated number of DSIs.[3] • The KiwiRAP risk measures, being: - Collective Risk (crash density) - Personal Risk (risk to individuals) - Star Rating (rating of the safety of the infrastructure). • The Infrastructure Risk Rating ("IRR"), which is an alternative proactive measure of risk.[4] • The travel speed gap, which is the difference between the posted speed limit ("PSL") and the calculated safe and appropriate speed ("SAAS"). • Collective safety risk calculations using estimated DSI equivalents. • The safety of the Tararua Road and Liverpool Street rail crossings.[5]
Resilience	• Review of information on historic events along the network, volumes of traffic impacted, risk data, detour length and travel time from a variety of sources. • Assessment of the volume of traffic exposed to hazards using the traffic model for both the 'do-minimum' and 'Ō2NL Project'. • Consideration of the design standards for the Project, including the new bridges, to understand the likelihood of closures. • Estimated resilience benefits of providing a new route, which is less prone to closure.
Travel times and delays	• A comparison, with reference to the Ō2NL Project traffic model, of travel times and delays for the PM peak hour in 2039 when compared with the do-minimum for the Ōtaki to Levin route; the Ōtaki to north of Levin route and the Ōtaki to SH57 north of Levin route. • The Ō2NL Project traffic model was used to assess the future network performance, with particular focus on delays and level of service ("LOS") compared with the 'do-minimum' threshold.
Induced traffic	• Elastic/variable assignments (rather than fixed) are considered, that is. traffic patterns better reflect the ease, reliability, desirability and necessity of trips. • The impacts of elastic assignments being assessed by considering traffic volumes on the highways, changes in total trips across the network and total vehicle kilometres travelled (VKT).
Community connectivity	• Review of changes in distance and travel times between various areas (zones) using the Ō2NL Project traffic model.
Property access and connectivity	• Review of impacts on access to individual properties and the additional distance and travel times from each property to destinations to the north and south.
Construction	• Predicted safety performance using estimated construction traffic volumes, existing intersection layouts and historic crash data.

41.2 Operational transport effects

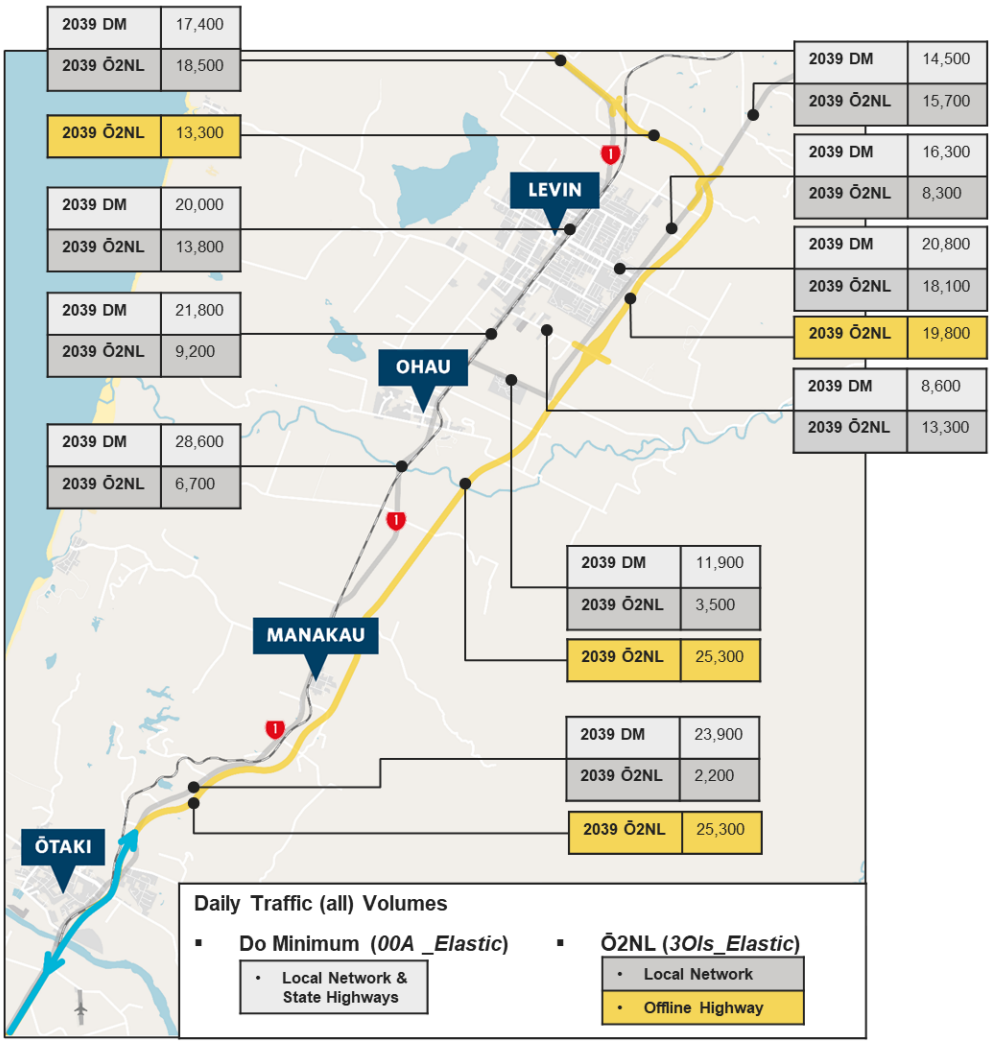
The Project will deliver significant transport improvements in terms of state highway and local road safety, resilience, and travel times. It will also provide benefits for community connectivity and active modes, and opportunities for enhanced public transport.

[3] Consistent with the Waka Kotahi 'Monetised Benefits and Costs Manual'.
[4] Calculated using the Waka Kotahi MegaMaps tool.
[5] Assessed using KiwiRail's Level Crossing Safety Impact Assessment Guidance (LevelCrossingRiskAssessmentGuide.pdf (kiwirail.co.nz)).

41.2.1 Traffic volumes

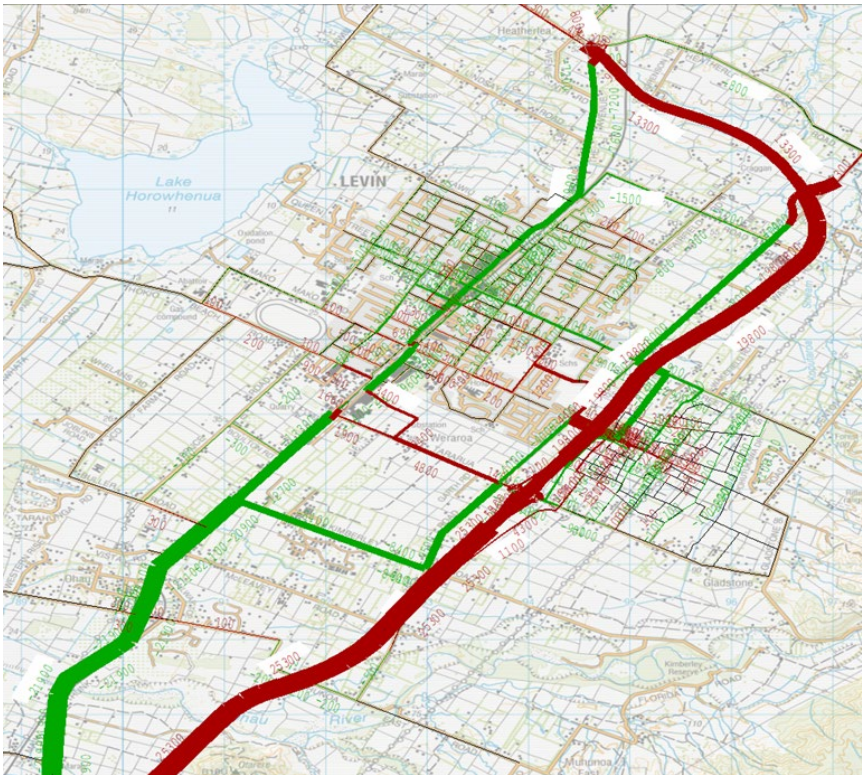
Once the Ō2NL Project is operational, there will be a significant shift in traffic volumes from the existing state highways and local roads onto the new highway as shown by the daily traffic volumes in the two following figures.

Figure 41-1 Traffic Volume Predicted for Do Minimum and Ō2NL Project



The daily flow difference plot shown in Figure 41-2 shows the forecast shift in traffic volumes on the network in the modelled year of 2039. The largest shift is from the current SH1 between Ōtaki and Levin to the Ō2NL Project; a reduction of 21,700 vpd on the current state highway between Ōtaki and Manakau and 21,900 vpd on the current state highway at Ohau. The Ō2NL Project is designed to be able to accommodate the anticipated future traffic volumes generated by the surrounding land use and demand growth.

Figure 41-2 - Forecast Shift in Traffic Volumes in 2039 (green shows traffic reduction and red shows traffic increase)



41.2.2 Safety

The 'do minimum' scenario includes significant safety upgrades to the current state highway network and therefore there are benefits when compared to an 'existing' scenario:

- a saving of approximately 27 DSIs per 5 year period;
- a very small increase in the Kiwi RAP star rating for the existing state highways, albeit offset, in part, by traffic volume growth and the removal of passing lanes on SH1, so that SH1 and SH57 increase to 3 stars;
- with a reduction in speed limit, the state highways will operate with the PSL equalling the SAAS for 73% of their length, compared to 15% for the existing situation;
- in terms of the IRR, 5% of the SH1 and SH57 road sections will be classified as 'Medium High' or 'High', compared to 15% under the existing situation; and
- in terms of collective safety risk or 'Collective Risk', 42% of road sections will be classified as 'Medium High' risk or higher, compared to 46% under the existing situation.

Under the 'Ō2NL Project' scenario, a number of further safety benefits will result from the Project's design and the reassignment of traffic to a new highway. These safety benefits of the 'Ō2NL Project' scenario, compared against the 'do minimum' scenario, are summarised as follows:

- saving of approximately 35 DSIs per 5-year period following the Project opening (this represents a 55% reduction in DSIs on the state highway network and a 10% reduction on local roads);
- an improved KiwiRAP star rating, with the Ō2NL Project to be designed to target a KiwiRAP 4 star or higher, compared with the 'do minimum' KiwiRAP 3 Star SH1 and SH57 rating (that will align with PP2Ō and provide a seamless road environment);
- a significant reduction in the percentage of the current state highways classified as 'Medium' or 'Medium High' IRR (reducing from approximately 84% to 39%);
- a significant reduction in the proportion of road sections classified as 'Medium High' Collective Risk or higher (reducing from 42% to 14%); and
- given that the Ō2NL Project has been designed with a design speed greater than or equal to the proposed speed limit, the 'Ō2NL Project' scenario will not result in a travel speed gap. In addition, the reduced traffic on the existing state highways will increase the SAAS and therefore reduce the travel speed gap.

41.2.2.1 Level crossings

Traffic volumes across 13 level crossings in the vicinity of the Project have been predicted, as shown in Table 41-2.

Table 41-2 – Modelled traffic flow across level crossings

Level crossing location	Modelled traffic flow across railway screenline (vpd)		
	'Do minimum' 2018	'Do minimum' 2039	With 'Ō2NL Project (change from 'do minimum)
Queen	13,100	20,100	+2,400
Bath	6,200	12,400	-4,300
Kimberley	5,200	10,800	-8,400
Tararua	3,500	12,800	+3,700
Liverpool	9,900	6,200	+6,900
Tyne	6,600	8,300	0
Roslyn	1,100	3,500	-1,700
Kuku Beach	700	800	0
South Manakau	600	1,000	-400
Mokena Kohere	800	900	+200
Heatherlea	500	1,400	-900
North Manakau	400	600	0
Taylors	200	200	0

Table 41-2 illustrates an increase in traffic volumes crossing the NIMT as a result of expected population growth and resulting east – west travel demand for the 'do minimum' without the Ō2NL Project. Overall, volumes increase by over 62% between 2018 and 2039. It is expected that these traffic volume increases, when coupled with the likely increase in future train volumes, will further exacerbate issues at level crossings which are already operating operating at a 'Medium-High' or 'High' ALCAM risk.[6]

[6] From the Australian Level Crossing Assessment Model level crossing risk database.

The Ō2NL Project will result in an overall volume reduction of approximately 7,100 vpd (or 14% reduction) crossing the NIMT, when compared to the 'do minimum' scenario, resulting in a safer environment for all users.

While the overall position is a significant reduction in crossings of the NIMT compared to the 'do minimum', the Tararua Road and Liverpool Street level crossings are predicted to have an increase in traffic flow of 3,700 and 6,900 vehicles per day respectively with the Ō2NL Project. These crossings have therefore been assessed using KiwiRail's Level Crossing Safety Impact Assessment (LCSIA).

Key findings from the LCSIAs are that, as a result of growth in the 'do-minimum' scenario:

- at the Tararua Road crossing the existing 2021 level crossing safety score (LCSS) is in the 'Medium-High Risk ban'd and by 2039 the LCSS score increases, but remains in the 'Medium-High Risk' band (but approaching the 'High-Risk' threshold);
- at the Liverpool Street crossing the existing 2021 LCSS is also in the 'Medium-High Risk' band and stays there in 2039;
- in addition, at Liverpool Street the pedestrian risk increases from 'Medium' in 2021 to 'Medium-High' by 2039.

The LCSIAs also set out the following improvements to both level crossings under the 'Ō2NL Project' scenario:

- the Tararua Road at-grade crossing is proposed to redesigned and signalised as part of the Project so that it achieves a safer level crossing at the forecast future 2039 traffic volumes when compared to the current layout in 2039, reducing risk from 'Medium-High' (existing) to 'Medium' with the Ō2NL Project'; and
- similarly, at-grade safety improvements are proposed for the Liverpool Street level crossing by KiwiRail so that this crossing also achieves a safer level crossing at the forecast future 2039 traffic volumes when compared to the current layout in 2039, albeit remaining at a 'Medium-High' risk.

41.2.3 Resilience

Under the 'do minimum' scenario, the following is anticipated:

- an increase, as a result of climate change, in closure frequency and duration due to flooding;
- the continued threat of closure of the four structures that are at risk from storm and earthquake events; and
- a 30% reduction in network closures due to crashes as a result of safety improvements (although this is tempered by the growth in traffic volumes over time).

The existing state highway network (including under the 'do minimum' scenario) does not have an appropriate alternative route and is vulnerable to closures caused by crashes, weather events and other natural hazards.

The Ō2NL Project delivers significant resilience benefits because the existing state highway network is retained as an alternative route. Further, the potential for closure of the existing SH1 due to crashes is also substantially reduced.

In addition, the modern design and specifications of the Ō2NL Project, which is designed to withstand 1:100 AEP[7] rain events (in 2130 and allowing for climate change) and 1:1500 year earthquake events, significantly reduces the vulnerability of the new route to closures, particularly when compared to the existing SH1.

[7] AEP = Annual Exceedance Probability, which is the probably of an event occurring in any given year.

41.2.4 Travel times and delays

Modelled travel times for the PM peak for the 'do minimum' scenario and 'Ō2NL Project' scenario are set out in Table 41-3.

Table 41-3 – 2039 modelled travel times

Route	2018 TomTom Travel Time	2039 'Do Minimum' 75th Percentile Growth	2039 'Ō2NL Project' 75th Percentile Growth
Ōtaki to SH1 north of Levin	26.0 minutes	32.7 minutes	21.5 minutes
Ōtaki to central Levin	16.9 minutes	23.4 minutes	17.5 minutes
Ōtaki to SH57 north of Levin	22.8 minutes	32.2 minutes	16.7 minutes

For the 'do minimum' scenario, travel times are predicted to increase by between 25-40% or by up to 10 minutes per journey, due to population growth and increases in traffic volumes.

Under the 'Project' scenario, the forecast travel time savings are significant, with up to 15-minute reductions for trips from Ōtaki to north of Levin when compared to the 'do minimum' scenario. Journey time reliability is also forecast to improve as a result of additional capacity that eases congestion and mitigates delays caused by disruption events (for instance, crashes).

In addition, the traffic model for the 'do minimum' predicts substantial delays at side road intersections with SH1 and at other key intersections, such as the SH57/Queen Street East intersection and SH57/Roslyn Road intersection. The shift of traffic onto the hew highway results in reduced delays and congestion on existing SH1 that, in turn, makes side road access significantly easier.

Figure 41-3 - Side Road Delays (PM peak) Without the Project (2039)

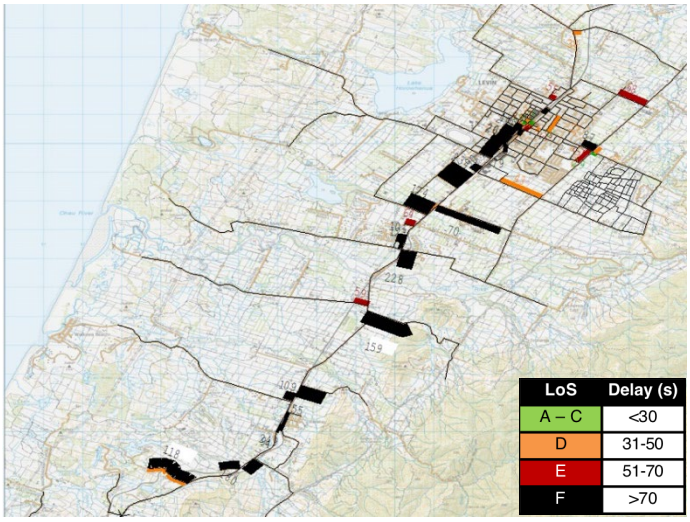
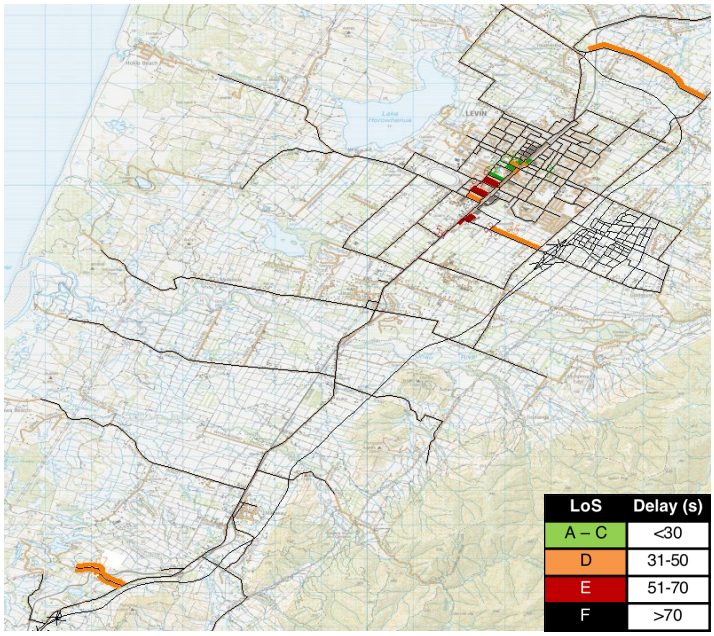


Figure 41-4 - Side Road Delays (PM peak) With the Project (2039)



41.2.5 Community connectivity

Under the 'do minimum' scenario community connectivity is predicted to worsen as traffic volumes increase. In addition, as traffic volumes increase, severance can become worse as roads act as a barrier to movement by preventing people from making a trip that crosses the road (due to volumes, flow or safety concern).

The Ō2NL Project involves the reinstatement of most of the local roads that are intersected by the proposed designations. Further, improved side road access onto the current SH1 due to the decreased traffic on the old highway, will also provide for improved connectivity within the community.

Figure 41-5 shows the forecast changes in travel distances for various model 'zones' in and around Levin comparing the 'do minimum' to the 'Ō2NL Project'. Figure 41-6 shows the forecast changes in travel time. These figures show that while the Ō2NL Project will result in some increased journey distances, these do not result in increased travel times. This is due to the Ō2NL Project reducing congestion, providing a new, faster, link in the transport network and allowing higher speeds on the new highway.

Figure 41-5 - Modelled Change in Average Travel Distance within Ō2NL Project

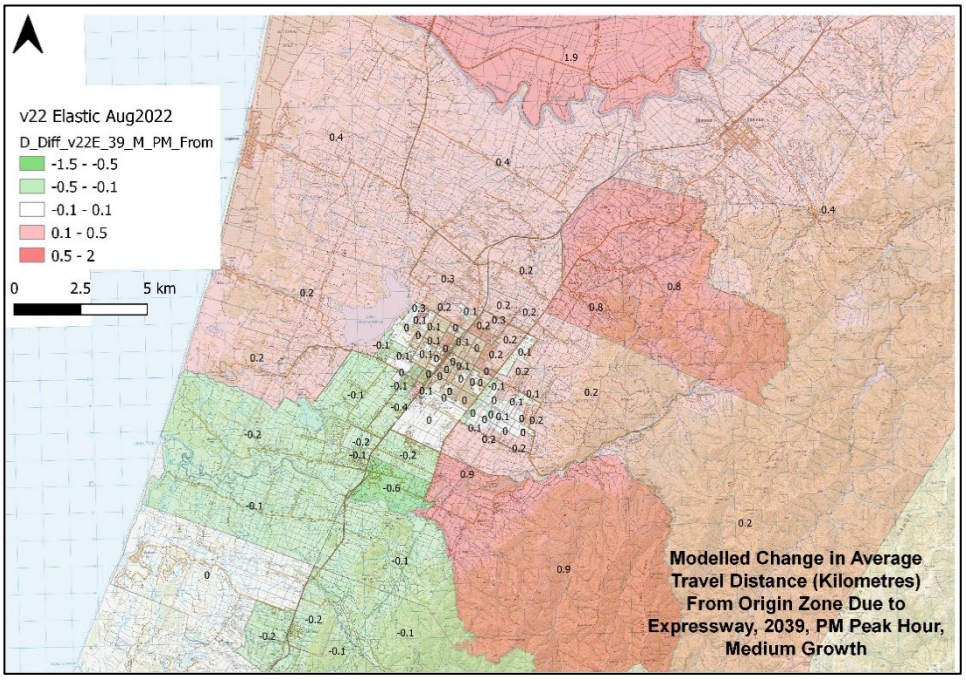
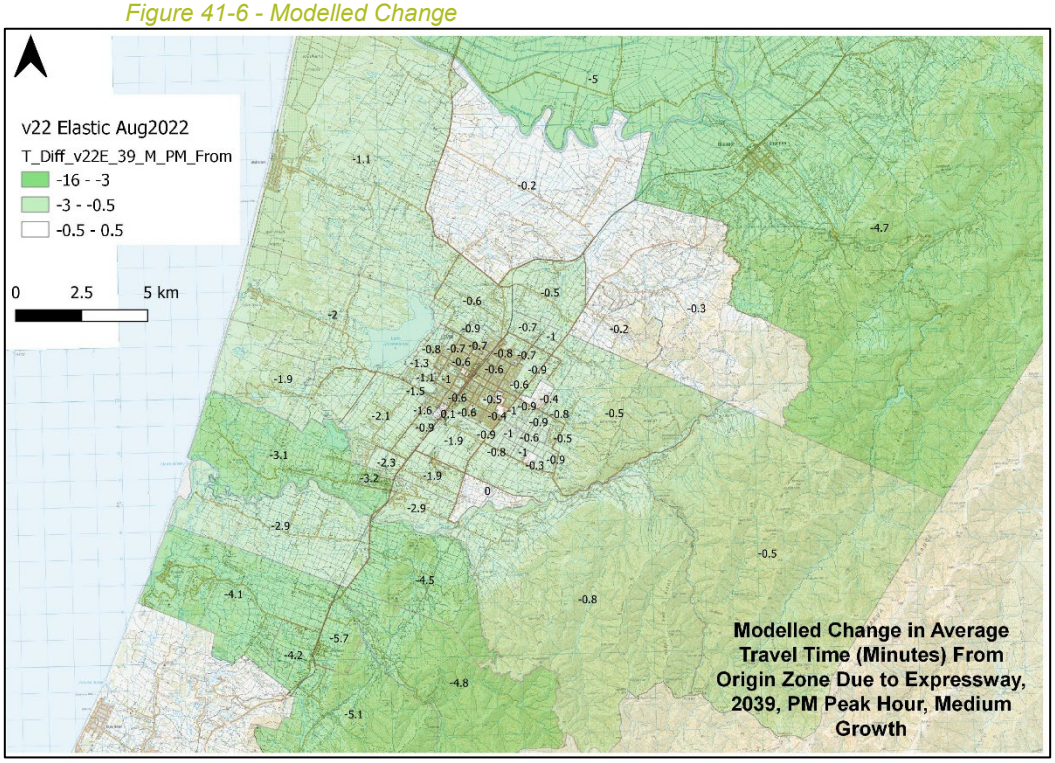


Figure 41-6 - Modelled Change



41.2.6 Property access and connectivity

The 'do minimum' scenario does not result in any further changes to property access (beyond those identified in relation to community connectivity).

Of the 215 properties directly affected by the proposed designations, 123 are intended to be acquired in full to allow construction and operation of the Project. The other 92 properties are provisionally identified

as partial acquisitions for which access will need to be retained. The travel times for 78 of those 92 properties will not be impacted by the Project as existing connections remain unchanged or the proposed access provides a like-for-like travel time solution.

There are three areas where a minor increase in travel times will arise for individual properties as a result of the Ō2NL Project:

- Kimberley Road – the Project results in trips from one end of Kimberley Road to the other being altered. This change does not affect journeys to/from Levin, Ohau or further afield, but any very short journeys would take approximately four minutes longer.
- Waihou Road – occupiers of properties on the eastern side will need to travel north to McDonald Road and SH57 before coming south. As such, traffic on Waihou Road heading south will have an increased travel time of approximately 2.5 minutes.
- Avenue North Road – as the northern end of Avenue North Road is to be closed to the current SH1, people leaving properties on this road and travelling north, will need to travel via the southern intersection of Avenue North Road and SH1 (approximately 800m away). This closure will result in a total additional distance of approximately 1.3km and an increased travel time of 1.3 minutes.[8]

The only area where a significant increase in travel time is expected, is for those residual pieces of land on the eastern side of the alignment south of Kuku East Road. These residual parcels do not contain any existing dwellings, and as such future owners/occupiers will only experience the altered travel time as a result of the Project.

41.2.7 Public transport

Prioritisation for public transport on the new highway has been considered, however, the existing SH1 will likely continue to be the primary route for public transport as this is the best route to connect the townships of Ohau, Manakau and Levin. Regional transport is served by inter-city buses and the capital connection rail service contracted by Horizons and GWRC.

With the reduction in traffic using the existing SH1, public transport services on this route will benefit both in terms of improved travel times and reliability. The Ō2NL Project will create opportunities to increase public transport frequency and attractiveness along the existing SH1, as well as on the new highway, if desired.

In addition, the Ō2NL Project is part of a programme of work that is investigating improving public transport options on the wider transport network, including bus and rail. The Ō2NL Project will reduce restrictions to upgrading rail and enable safer and more efficient access to rail and bus stations by reducing congestion on the existing road network.

41.2.8 Active modes

For pedestrians and cyclists, the proposed SUP will be routed and aligned to provide a high-speed commuter facility that is also appropriate for recreational use. The SUP will be easily and conveniently accessible for adjacent communities, including Levin (via Queen Street East or Tararua Road) and the Tara Ika Growth Area, Manakau, Ohau and all roads that cross the Project. The SUP will also link into the shared path facilities built as part of the PP2Ō expressway. Cumulatively this will create an inter-regional cycleway network and enable pedestrians and cyclists to safely move between townships. That compares to the current situation, where there is no separated walking or cycling (safe) facility between Ōtaki and Levin.

41.3 Construction traffic effects

While a construction method has not been developed, the general nature and scale of effects of construction traffic are well understood based on similar offline highway projects (including PP2Ō).

[8] It is noted that this alteration may be implemented by the Safety Improvement Programme before the Ō2NL Project is constructed.

Construction activities that may have a traffic and transport impact are:

- the arrival and departure of construction workers in light vehicles and/or mini-vans/buses (where reasonably possible);
- delivery of plant and materials using heavy commercial vehicles;
- the movement of overweight and/or over-dimension loads;
- the movement of bulk earthworks; and
- construction activities close to a live highway.

A large proportion of the construction will take place away from, or adjacent to, the existing SH1 and SH57, so that the Ō2NL Project can be built with minimum disturbance to other traffic. However, there will be additional traffic movements on portions of the adjoining SH1, SH57 and local road network during the construction phase of the Project. It is likely that there will be a series of mostly independent construction zones delivering separate sections of the of the Project, which will mean that construction traffic impacts will vary over location and time.

Taken together, and in considering the overlap of activities through the four-and-a-half-year construction period, truck traffic associated with the Ō2NL Project is expected to vary between 70 and 340 trucks per day (680 movements) as the work advances, with an overall average of around 250 trucks per day (500 movements) and approximately 650 light vehicles (1,300 movements). Some of these movements may be able to be made entirely within the Project works areas, without utilising public roads. Internal haul roads are proposed to be constructed to transport staff, earthworks and materials within the construction area and temporary bridges (and where practicable early construction of the final bridges) are proposed to enable these movements. The exact proportion of movements within the site is unknown at this stage.

Because the Ō2NL Project is generally constructed offline, the need for temporary road closures and diversions is limited. Potential site access points have been identified below in Figure 41-7.

Figure 41-7 - Location of Proposed Site Access Points

These anticipated site access points are expected to be formed using imported aggregate so that they may be trafficked by road legal vehicles. Where necessary and practicable, the first 10m will be sealed to help prevent detritus spreading onto the road.

With respect to additional heavy vehicles and increased vehicle volumes per day, all potential site access points are able to easily accommodate additional traffic with no safety issues. Access to each site will be controlled so that entry will only be possible for those authorised to access the site. Individual access locations will be positioned to provide an appropriate level of safety or to minimise safety hazards. All truck and machinery manoeuvring and parking will be provided clear of the state highways and within construction area.

The number of vehicle movements associated with the arrival and departure of construction workers in light vehicles or buses is considered to be small compared to the traffic flow on existing SH1 and SH57. The adverse effects of worker light vehicles on the efficient and safe performance of SH1 and SH57 is assessed as negligible when compared to the existing traffic environment.

At times, construction traffic may have a minor adverse impact on the efficiency of local roads and safety of road users (including for vulnerable users) where construction traffic uses the local road to provide construction access, or more generally where construction vehicles cause delays on the local road network.

A safety assessment has been undertaken of the side roads and their intersections with SH1 and SH57 in relation to their suitability to safely handle additional heavy vehicle movements. Due to the presence of community facilities and the like, certain roads have been avoided and some roads will likely require minor safety upgrades. SIP improvements on the state highways will help mitigate some of the safety risks associated with additional heavy vehicles. These safety risks will be considered and implemented in the final construction methodology.

41.4 Measures to avoid, remedy or mitigate adverse construction traffic effects

The potential adverse effects of construction traffic on the transport network, and road users (including vulnerable users) will be appropriately addressed by setting out practices and other mitigation measures in a Construction Traffic Management Plan (CTMP). These measures include:

- a plan for staging of works and identification of key activities during each work phase;
- the numbers, frequencies, routes, and timing of enabling construction works traffic movements;
- identification of site access routes, site access arrangements and site access points for heavy vehicles and measures to manage the movements of heavy vehicles during peak times;
- methods to manage local and network wide effects of the construction, including temporary traffic management measures, such as traffic detours and temporary speed limits;
- plans to limit heavy vehicle construction traffic movements through key areas during night and peak times;
- provision for maintaining safe pedestrian and cyclist access movements in the vicinity of the site;
- allowable construction vehicle noise and requirements for effective noise suppression;
- provisions for on-going vehicle access to private and adjacent properties;
- provisions for new permanent accesses to be formed to limit the adverse effects of construction and severance;
- management of fine material loads (for instance through the use of covers) and the timely removal of any material deposited or spilled on public roads; and
- reference to project communications approaches for traffic management communications.

41.5 Summary

The Ō2NL Project as a whole has significant positive transport effects. These benefits are realised primarily as a result of the design and standard of the new highway alongside the retention of, and reduction of traffic on, the existing state highway network. The significant positive effects (when compared to the ‘do minimum’ scenario) include:

- safety benefits as a result of:
  - a reduction in DSIs on the state highway network and connected local roads;
  - an improved KiwiRAP star rating;

  - a significant reduction in risk (in respect of IRR and 'Collective Risk') over sections of the existing State highway network;
  - a reduction or elimination of the travel speed gap (between the speed limit and the safe and appropriate speed) on the new and existing state highways;
  - improved or retained safety risk at level crossings;
- improved resilience in respect of the existing and new highways together (and also in terms of the way they operate separately);
- improved travel times for trips between Ōtaki and Levin, and more widely in respect of journeys across the region; and
- reduced delays on the state highway network and for side roads that access the existing state highways.

Connectively both across the Ō2NL Project, and for the individual properties directly impacted by the Ō2NL Project, is maintained.

The Project also has positive effects in terms of provision for active modes through the purpose-built SUP providing connectivity and accessibility and through improved safety for vulnerable users and also as a result of reduced traffic on the existing state highway network.

Potential construction-traffic impacts will be appropriately mitigated through construction management practices and measures that can be embedded through a Construction Traffic Management Plan.

42 Noise and vibration

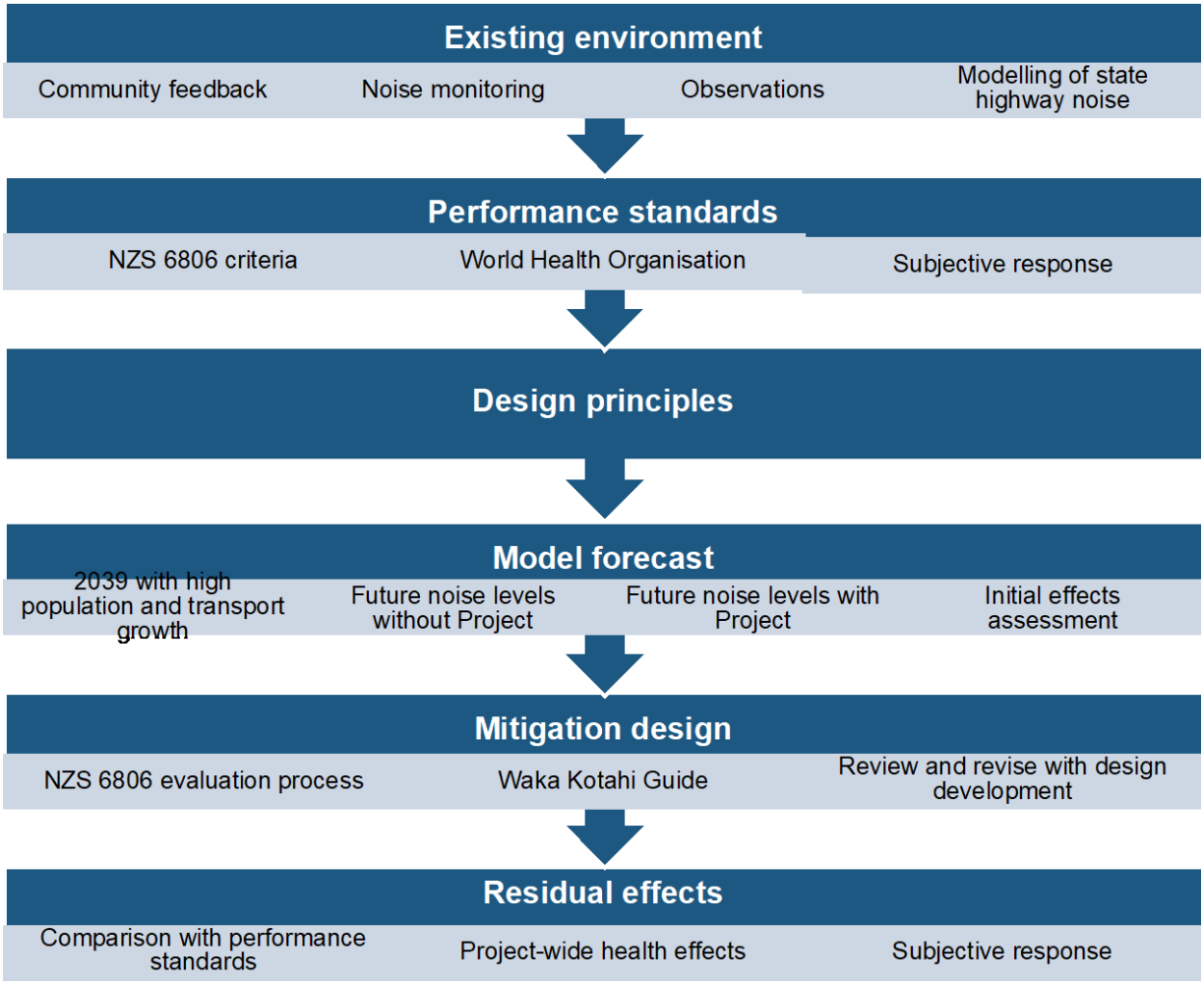
42.1 Assessment methodology

To assess potential adverse effects of operational and construction road traffic noise and road traffic vibration, the following tasks have been undertaken:

- investigating the existing noise environment;
- calculating future road-traffic sound levels associated with the Ō2NL Project;
- determining areas that may experience adverse effects from road-traffic noise, with reference to relevant criteria;
- identifying and recommending mitigation to reduce these effects;
- considering road-traffic vibration effects;
- identifying Protected Premises and Facilities ("PPFs") where construction noise and vibration may be at risk of exceeding relevant criteria;
- examining those areas to determine required construction mitigation measures and strategies; and
- assessing residual effects, with mitigation measures in place.

The design and assessment methodology adopted for the Ō2NL Project is shown in the figure below.

Figure 42-1 - Methodology Used for Assessing Operational and Construction Noise and Vibration



42.1.1 Operational road-traffic noise

Operational road-traffic noise effects have been assessed with reference to:

- the HDP and KCDP;
- New Zealand Standard NZS 6806:2020 Acoustics – Road-traffic noise – new and altered roads ("NZS 6806");
- long-term health impacts;[9] and
- reduction in amenity.

Assessments have relied on computer noise modelling of existing and future road-traffic noise levels using the 'Calculation of Road-Traffic Noise'[10] (CRTN) method in accordance with standard industry practice.[11]

[9] The quantification of health impacts is new in the context of infrastructure projects in New Zealand and, as such, should be considered cautiously and as supplementary to the assessment approaches that are typically used for projects of this nature.
[10] Calculation of Road Traffic Noise, UK Department of Transport and the Welsh Office ISBN 0115508473 (1988).
[11] Waka Kotahi, Guide to state highways noise mapping, v1.0 Draft (November 2013).

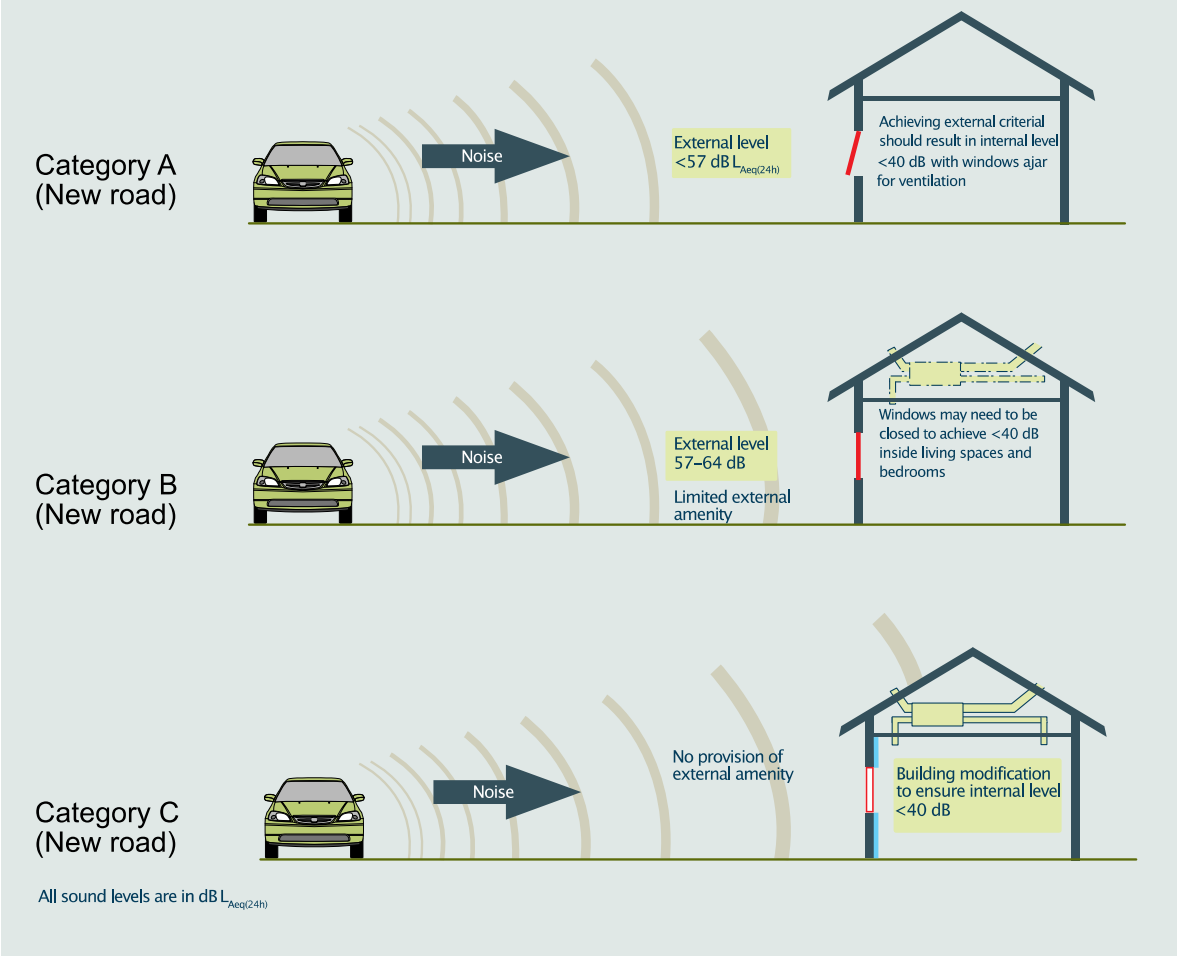
42.1.1.1 District plans and NZS 6806

There is no national environmental standard for operational road-traffic noise, and the HDP and KCDP both explicitly exclude the sound of vehicles on roads from rules or standards that establish general noise limits.[12] To address operational road-traffic noise, Waka Kotahi has adopted NZS 6806.

NZS 6806 provides for road-traffic noise to be assessed with reference to a year 10 to 20 years after the opening of a road. In this case, 2039 is the year that is used, with an expected opening year of 2029. NZS 6806 provides performance targets for noise received at PPFs" and requires evaluation of options for noise mitigation (often including barriers and low-noise road surfaces). That may be included as part of an integrated design process.

Rather than providing a pass/fail criterion that must be met in under all circumstances, NZS 6806 provides three noise categories, which provide different levels of external and internal amenity. Figure 42-2 illustrates how the categories apply (new road).

Figure 42-2 – Application of NZS 6806 Criteria for New Roads



NZS 6806 sets different criteria depending on whether a road is new or altered. The Ō2NL Project is a new road for the purposes of NZS 6806 (other than at tie-ins with existing road north of Levin and Ōtaki). For some areas in eastern Levin, road-traffic noise from Kimberley Road and Arapaepae Road (SH57) is, and will remain, the dominant source of noise, and therefore it is appropriate to apply the altered road criteria.

[12] HDP Rule 19.6.8(d)(vi) and KCDP Rules NOISE-R1(4)(d), NOISE-R2(4)(d), NOISE-R3(4)(d), NOISE-R4(4)(d), NOISE-R5(4)(d) and NOISE-R7(4)(c).

Criteria from NZS 6806 in terms of noise levels at relevant PPFs are set out in Table 42-1.

Table 42-1 – NZS 6806 Road Traffic Noise Threshold Criteria

NZS 6806 Category	Where applied	New road	Altered road
Category A (primary)	External	57 dB $L_{Aeq(24h)}$	64 dB $L_{Aeq(24h)}$
Category B (secondary)	External	64 dB $L_{Aeq(24h)}$	67dB $L_{Aeq(24h)}$
Category C	Internal	40 dB $L_{Aeq(24h)}$	40 dB $L_{Aeq(24h)}$

NZS 6806 requires consideration of road-traffic noise at all PPFs within 100m of a road in an urban area (defined by Statistics New Zealand) or within 200 metres of a road in a rural area. The effects of the Ō2NL Project have been assessed more conservatively, with all dwellings where noise from the existing or future state highway network would exceed 50 dB $L_{Aeq(24h)}$ being considered. In open areas this can extend 350 metres from the road.

In accordance with NZS 6806, noise effects on possible future (unbuilt) PPFs do not need to be considered, unless they have building consent. Waka Kotahi has made enquiries with HDC and KCDC to identify any unimplemented building consents for new houses within 200 metres of the proposed designations.

A number of properties have been (or will be) purchased by the Crown (Waka Kotahi) for the Ō2NL Project. While, owned by the Crown for the purposes of the Project, unless a dwelling has been identified as being demolished, it is considered to remain in residential use, resulting in a greater number of PPFs being identified than if Crown-owned properties were excluded.

Road-traffic sound levels at PPFs for the following six scenarios have been modelled:

- existing network (2019);
- with inclusion of PP2Ō and the safety improvement works that have been committed to (or are currently being implemented) on the existing State highway network (the 2029 scenario);
- with inclusion of PP2Ō and the safety improvement works that have been committed to (or are currently being implemented) on the existing State highway network but with future traffic (2039);
- Ō2NL Project (2039) without specific noise mitigation;
- Ō2NL Project (2039) with the proposed noise mitigation; and
- Ō2NL Project at road opening (2029) prior to the installation of low-noise surfaces.

In all 2039 scenarios with the Ō2NL Project, road traffic noise has been modelled on the assumption that:

- the operational speed limit is 110km/h (and not the planned 110km/h speed limit); and
- using a high 95th percentile growth scenario (the 95th percentile growth scenario represents the highest potential growth forecast that has been provided by HDC and is not adopted by the Ō2NL Project for transport modelling generally, which has instead used the more conservative 75th percentile growth scenario (the 95th percentile growth is used to sensitivity test transport modelling outputs)).

The noise modelling has however adopted these assumptions in order to provide a conservative noise prediction.

42.1.1.2 Long-term health effects

Health effects from road-traffic noise are assessed with reference to the World Health Organisation 'Environmental Noise Guidelines for the European Region (2018)' ("WHO Guidelines"). The WHO Guidelines note that there is a correlation between road-traffic noise and people experiencing annoyance, sleep disturbance and ischaemic heart disease.

Noise levels above 50 dB $L_{Aeq(24)}$ are considered to produce an increased risk of adverse health effects.

Health effects are expressed quantitatively in terms of:

- the population likely to experience adverse health outcomes, and
- the burden of disease expressed in 'Disability Adjusted Life Years' ("DALYs").
- Health impacts can only be assessed on a population basis and the consequence of exceeding he criterion at a single property cannot be determined.

42.1.1.3 Reduction in amenity

A qualitative assessment has been undertaken to understand how road-traffic noise may affect how people use their outdoor and indoor living spaces. For people currently exposed to road-traffic noise, the subjective response to change depends on the combination of magnitude of the change, the nature of the noise, as well as overall noise levels. For locations where the existing environment primarily consists of natural sounds, the amenity effects will often result as much from the change in character as from the change in level.

The potential response to road-traffic noise is considered with reference to criteria derived from UK Planning Guidance Document 005[13] and set out in Table 42-2. These have been set based on absolute noise level (relative to the existing environment) and aggregated at the community and Project level.

Table 42-2 – Criteria for Assessing Amenity Impacts of Road-Traffic Noise

Response to new road-traffic noise	Example of outcomes
Not present	No effect
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, for example, turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life of people living there.
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, for example, avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Quality of life for people affected is moderately diminished due to change in acoustic character of the area.
Present and very disruptive	The noise causes extensive and regular changes in behaviour, attitude or other physiological response. Quality of life for people affected is significantly diminished due to change in acoustic character of the area.

42.1.1.4 Mitigation measures

The evaluation of potential mitigation measures has been completed with reference to NZS 6806 and the WHO Guidelines and the potential for disruptive or very disruptive qualitative assessments. To test mitigation measures the Project was considered in subdivided assessment areas, with multiple mitigation measures being tested as follows:

- high performance road surface (open graded porous asphalt) is assumed to be used for the entire length of the Project, and is used as the default position;

[13] UK Planning Guidance 005 Reference ID: 30-005-20190722

- the inclusion of an even higher performance road surface (over and above the open graded porous asphalt included as part of the Project);
- road-side concrete safety barriers, replacing the wire rope barriers for that section of road;
- two or three metre high noise walls, either near the road or on the outside of the swales, depending on the topography in the area; and
- three metre high earth bunds.

42.1.2 Operational road-traffic vibration

There are no relevant New Zealand Standard or National Environmental Standard, and no relevant district plan rules that manage operational road-traffic vibration.[14]. Consistent with Waka Kotahi guidance,[15] a Norwegian Standard, NS 8176[16] has been applied. This Standard has been used for previous assessments of road (and rail) vibration in New Zealand and establishes a recommended criterion of 0.3mm/$s_{vw,95}$ for road-traffic vibration from new roads.

42.1.3 Construction noise and vibration

The KCDP and HDP[17] both include permitted activity standards requiring noise associated with construction activities to be measured and assessed in accordance with New Zealand Standard NZS 6803:1999 Acoustics – Construction Noise ("NZS 6803"). This also forms the basis of the Waka Kotahi guidance.[18]

NZS 6803 establishes noise limits for construction noise. Table 42-3 sets out the criteria that apply to the Ō2NL Project (being greater than 20 weeks construction duration).

Table 42-3 – NZS 6803 Construction Noise Criteria (External)

Day	Time	$L_{Aeq(15min)}$	L_{AFmax}
Occupied PPFs (as defined in NZS 6808:2010)			
Weekdays	0630h – 0730h	55 dB	75 dB
	0730h – 1800h	70 dB	85 dB
	1800h – 2000h	65 dB	80 dB
	2000h – 0630h	45 dB	75 dB
Saturdays	0630h – 0730h	45 dB	75 dB
	0730h – 1800h	70 dB	85 dB
	1800h – 2000h	45 dB	75 dB
	2000h – 0630h	45 dB	75 dB
Sundays and public holidays	0630h – 0730h	45 dB	75 dB
	0730h – 1800h	55 dB	85 dB
	1800h – 2000h	45 dB	75 dB
	2000h – 0630h	45 dB	75 dB

[14] The HDP includes Policy 10.3.12 that relates to reverse sensitivity effects and directs land use activities to protect themselves from vibration from state highways.
[15] NZ Transport Agency (2013) *Technical memorandum NV3 State highway noise and vibration management.*
[16] Norwegian Standard NS 8176:2017 *Vibration and shock – Measurement of vibration in buildings from land-based transport and guidance on evaluation of its effects on human beings.*
[17] HDP Rule 19.6.8(c) and KCDP Rule NOISE-R10
[18] NZ Transport Agency (2019) State highway construction and maintenance noise and vibration guide, August 2019, Version 1.1.

In addition to noise limits, NZS 6803 sets out recommended management methods for construction activities, screening, constraints on timing of activities, differing equipment and methods and notification of the works.

In terms of construction vibration, there are no rules in the district plans and no relevant New Zealand Standards or National Environmental Standards. In the absence of any standards, Waka Kotahi has developed construction vibration criteria based on standards from other countries,[19] as set out in Table 6-4. The criteria relates both to perception of vibration resulting in disturbance for people or annoyance (Category A) and also to potential cosmetic damage to buildings (Category B).

Table 42-4 – Construction Vibration Criteria

Receiver	Details	Category A	Category B
Occupied PPFs	Night-time 2000h – 0630h	0.3 mm/s ppv	1 mm/s ppv
	Daytime 0630h – 2000h	1 mm/s ppv	5 mm/s ppv
Other occupied buildings	Daytime 0630h – 2000h	2 mm/s ppv	5 mm/s ppv
All other buildings	Vibration - transient	5 mm/s ppv	BS 5228-2* Table B2
	Vibration - continuous		BS 5228-2* 50% of Table B2 values

* BS5228-2:2009 'Code of Practice for noise and vibration control on construction and open sites – Part 2 – Vibration'

These vibration criteria provide a tiered approach to the difference in vibration sensitivities of people and buildings.

42.2 Operational noise effects

The predicted road-traffic noise for the different modelled scenarios is shown on the noise drawings in Volume III, and include modelling with the selected mitigation options. Mitigation is discussed further in the below.

42.2.1 Positive effects

The Ō2NL Project will result in positive noise effects to those communities adjacent to the existing SH1 and SH57 corridors due to a reduction in the number of vehicle movements in general and heavy vehicles being routed to the Ō2NL Project. Table 42-5 shows the change in noise environment for PPFs near the existing state highway network. The typical reduction in noise level for PPFs along the existing SH1 corridor is 5-6dB.

Table 42-5 – PPF in NZS 6806 categories (existing state highway network)

Scenario	Health Thresholds		NZS 6806 Categories		
	<= 50 dB	>50 dB	Category A	Category B	Category C
2019 -Existing state highway network	248	993	1017	122	102
2029 with PP2Ō and safety improvement works (without the Ō2NL Project)	342	899	1063	100	78
2039 with PP2Ō and safety improvement works (without the Ō2NL Project)	244	997	1016	120	105

[19] British Standard BS 5228-2 and German Standard DIN 4150-3.

2039 with the Ō2NL Project*	561	680	1176	42	23

* excludes PPFs near the Ō2NL alignment, which previously were not exposed to state highway noise.

Table 42-6 illustrates that there are 225 PPFs that would be exposed to 'high levels of road-traffic noise in 2039 without the Ō2NL Project (Category B or C), and with the Ō2NL Project, this total is predicted to reduce to 65 PPFs. Further, the total number of PPFs that would be exposed to noise levels greater than 50dB in 2039 (and therefore potentially experiencing some adverse health effects) reduces from 997 to 680 consequent of the Ō2NL Project.

In all, the reduction in noise levels adjacent to existing SH1 and SH57 is assessed as a minor to moderate positive effect.

With respect to the assessment against NZS 6806, the Levin main street precinct is not considered a noise-sensitive area. However, HDC's 'Transforming Levin Town Centre Study' identified that a pleasant acoustic environment is an important component of improving the vibrancy of the area. Without the Ō2NL Project, the number of vehicles using the main street is forecast to almost double from 2018 to 2039, including an extra 1000 heavy vehicles each day. With the Ō2NL Project, the 2039 traffic volumes remain similar to the current level, however, a 47% reduction in heavy vehicles is predicted. Preventing further increases in traffic on SH1 through Levin and reducing the number of heavy vehicles, will improve the character of the noise environment in this area and is assessed as a moderate positive effect.

42.2.2 Adverse effects

42.2.2.1 NZS 6806

The number of PPFs (not currently exposed to significant road-traffic noise from the existing state highways) in each exposure category with and without mitigation is shown in Table 42-7.

Table 42-6 – Number of PPFs in Categories (New Roads only)

Scenario	Health Thresholds		NZS 6806 Categories		
	<= 50 dB	>50 dB	Category A	Category B	Category C
2039 without mitigation (standard thickness porous asphalt)	81	195	227	49	0
2039 with mitigation	109	167	255	21	0

The number of PPFs 'with mitigation' in each exposure category is further disaggregated by community in Table 42-7.

Table 42-7 – Number of PPFs in Categories (New Roads only – With Mitigation)

Community	Health Thresholds		NZS 6806 Categories		
	<= 50 dB	>50 dB	Category A	Category B	Category C
North-East Levin	9	17	22	4	0
Levin East	21	28	46	3	0
Ohau East	34	39	65	8	0
Manakau	40	69	105	4	0
North Ōtaki	5	14	17	2	0

42.2.2.2 Health effects

With the recommended mitigation, the number of PPFs exposed to noise levels from the Ō2NL Project over 50 dB will reduce from 195 to 167 (when compared to the 'without noise mitigation' scenario). As explained above, for those currently exposed to state highway noise, the number of PPFs exposed to noise levels of over 50 dB will reduce from 997 to 680.

Based on this exposure, the adverse health outcomes anticipated from the Ō2NL Project (with reference to WHO Guidelines) are able to be calculated. The DALYs n Table 42-8i represents a reduction compared to the current state highway network situation (18.79 DALYs) and the 2039 position without the Ō2NL Project (23.8 DALYs).

Table 42-8 – Burden of Disease from Road-Traffic Noise for PPFs Near the Existing State Highway Network

Scenario	Burden of Disease (Disability Adjusted Life Years (DALYS))		
	From Ō2NL Project	From existing SH network	Total
2019 Existing state highway network		18.7	18.7
2039 with PP2Ō and safety improvement works (without the Ō2NL Project)		23.8	23.8
2039 with the Ō2NL Project	2.3	14.3	16.9

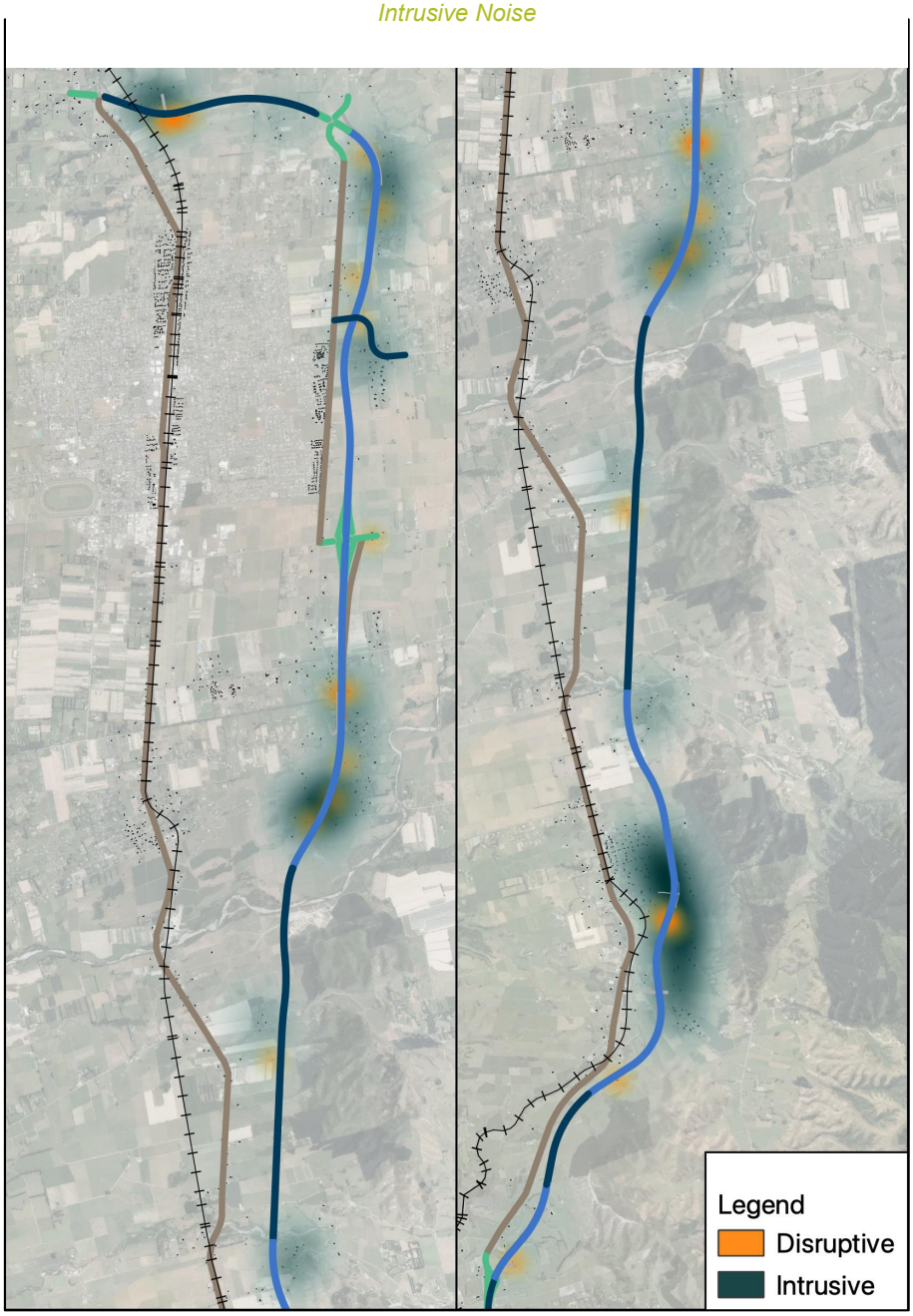
42.2.2.3 Amenity effects

The Ō2NL Project will result in a change in noise environment for a number of communities along the route. The effect of this change will vary between individuals depending on their own sensitivity to noise and how they currently use and enjoy their indoor and outdoor spaces.

While for some people within the 20 affected PPFs (which overlap with the 21 category B PPFs) these changes are identified as disruptive or very disruptive (with the likely consequence that the residents will change how they use their property with some activities occurring inside rather than outside), the predicted noise levels are within 'reasonable' ranges as defined by NZS 6806. This is because it is the introduction of a new noise source to the area that causes the effect, rather than the absolute level of noise.

The likely subjective response at each PPF has been estimated based on absolute noise levels and the existing environment and then aggregated to a community level. The 'heatmap' in Figure 42-3 shows the areas where noise from the Ō2NL Project (with mitigation) is likely to be intrusive or disruptive with the darker colours represent a greater number of PPFs that are potentially affected.

Figure 42-3 Heatmap' Showing Potential Areas That May Experience Disruptive or Intrusive Noise



42.2.2.4 Temporary effects

The current road design does not allow construction of either the standard porous asphalt or the high-performance road surface prior to the opening of the Ō2NL Project. Instead, an interim chipseal surface would be installed for used for the first year of the Ō2NL Project's operation, prior to the final asphalt being laid. For this reason, during this first year predicted noise levels will be up to 8 dB higher. Specific requirements for public engagement have been recommended such that these effects are reasonable and will result in a minor adverse effect over a limited duration (one year).

42.3 Operational vibration effects

Vibration from road-traffic (particularly heavy vehicles) has the potential to cause disturbance for people near roads, particularly roads in poor condition.

Road-traffic vibration from new roads generally achieves compliance with the NS8170 criterion of 0.3 mm/$s_{vw,95}$ at greater than 15 metres from the edge of a new road (with some new roads showing compliance at much shorter distances).

All PPFs are located considerably more than 15 metres from the indicative edge of the new highway and therefore the Project does not give rise to any adverse operational road-traffic vibration effects.

Further, while not quantified, the Ō2NL Project will result in a reduction in vibration that is likely to cause disturbance to people living near SH1 and SH57 based on the anticipated reduction in heavy vehicles on the existing road network. A reduction in magnitude of vibration effects on the former SH1 is also likely due to speed reductions.

42.4 Construction noise and vibration effects

Construction of the Ō2NL Project will include activities that generate noise such as extensive earthworks, paving and compaction, piling for structures and construction related traffic movements. As the construction methodology has not been developed conservative parameters were applied to determine unmitigated construction noise levels. Actual noise levels, after mitigation cannot reasonably be determined at this stage due to the complexities of noise sources and its attenuation within the environment.

The proposed construction works will cause temporary daytime disturbance to residents, with noise and vibration often being significantly above existing ambient levels even when the required limits are met. However, most people should be able to continue normal domestic activities with only minor adjustments, particularly if there is effective advanced communication about when construction activities are due to occur.

There should not be significant night works near PPFs, other than potentially short-term activity that may be required to connect to the existing road network without causing daytime traffic disruption. Therefore, any potential sleep disturbance effects should be limited.

Compliance with the 70 dB $L_{Aeq(15min)}$ daytime construction noise standard will generally be achieved for all receivers located more than 50 metres from construction works. That said, adverse effects of construction activities will extend beyond 50 metres but it is anticipated that at a distance of 200 metres the effects from daytime works will be within the limits of NZ 6806 and acceptable. It is also expected that vibration from construction will be in accordance with the vibration standards (German Standard DIN4150/BS 5228). The conditions, and the Construction Noise and Vibration Management Plan, provide industry standard construction noise mitigation practices which are proven to work well.

42.5 Measures to avoid, remedy or mitigate adverse effects

42.5.1 Operational noise

Following the noise modelling, the future road-traffic noise contours were reviewed to identify where mitigation should be considered, and where PPFs would benefit from common mitigation. This resulted in 16 discrete assessment areas, referred to by NZS 6806 as ‘clusters’.

A multi-disciplinary and iterative approach has been taken to determining appropriate mitigation so that noise levels are minimised as far as practicable, within engineering constraints and the potential for mitigation measures to also have adverse effects on the environment (for instance, cultural impacts and visual impacts or neighbouring properties and users of the new highway).

The following describes the recommended mitigation (including its location) and represents the ‘Best Practicable Option’ in terms of NZS 6806.

Table 42-9 – Road-Traffic Noise Mitigation: Road Surfaces

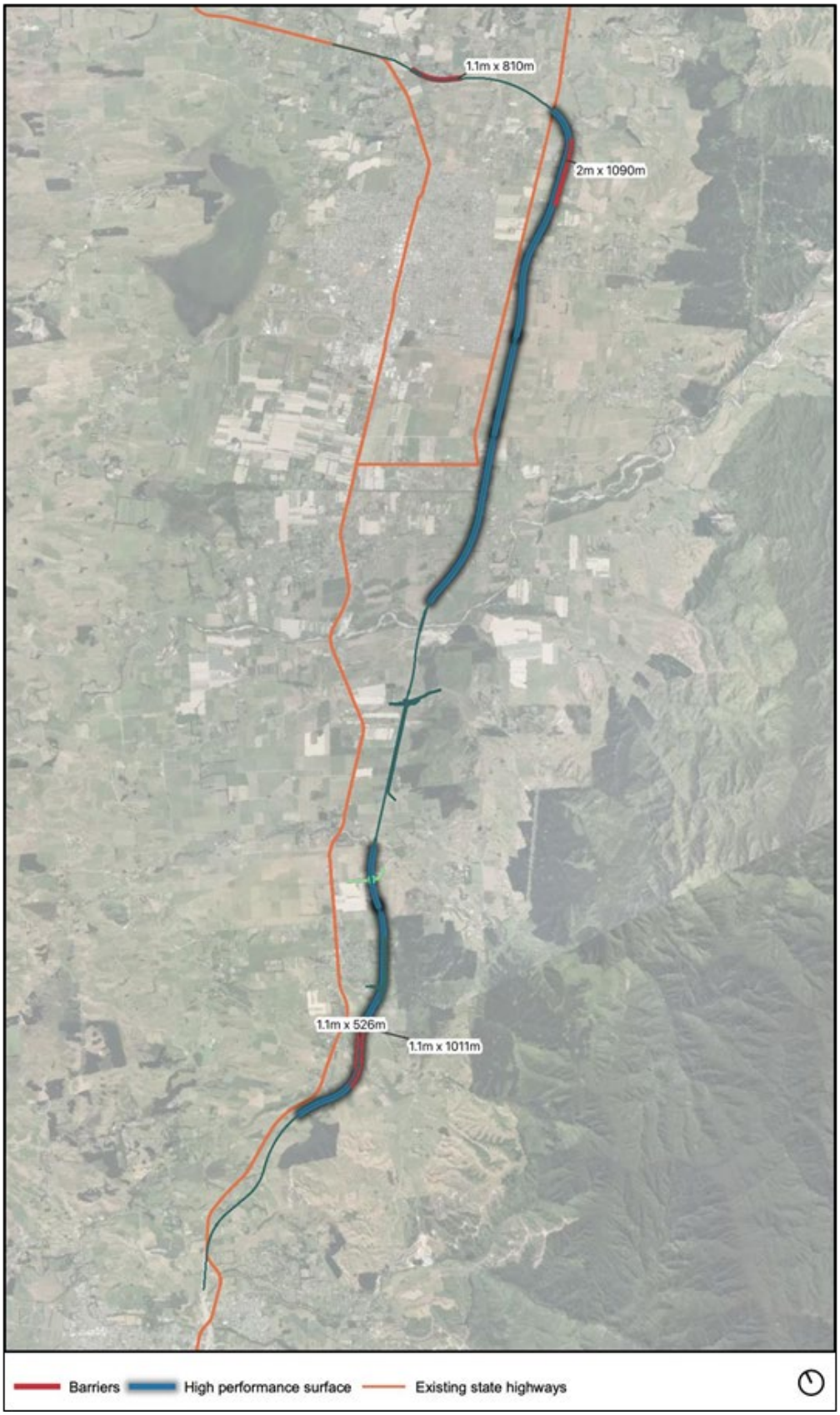
Location	Chainage	Length	Road Surface Type
Muhunoa East through to the SH57 – roundabout	CH22200-CH13400	8.8km	50mm thick EPA7 or equivalent
South of Manakau to the Waikawa Stream Bridge, Manakau	CH31700-CH26500	5km	50mm thick EPA7 or equivalent
North Ōtaki from tie-in with PP2Ō	CH39000-CH34900	4.1km	50mm thick EPA7 or equivalent
All other locations	-	6.9km	Standard thickness porous asphalt

Table 42-10 – Road-Traffic Noise Mitigation: Noise Barriers

Location	Chainage	Length	Barrier Type
Levin Rail Bridge, South Bound	CH10700 – CH11500	810m	1.1m high concrete safety barrier
Waihou Road	CH13900 -CH15000	1.2km	1.1m high concrete safety barrier
Waiauti Stream and South Manakau Road bridge North Bound	CH29700 – CH30400	530m	1.1m high concrete safety barrier
Waiauti Stream and South Manakau Road bridge, South Bound	CH29700 – CH30700	1.1km	1.1m high concrete safety barrier
North Ōtaki overbridge, north bound	CH33600 – CH34200	600m	1.1m high concrete safety barrier

The location of the proposed mitigation is generally illustrated in Figure 42-4. In addition, in the order (this will be confirmed in final design) of six privately owned PPFs are to be offered investigations for building modifications to condition that internal noise levels will remain below 40dB $L_{Aeq(24h)}$.

Figure 42-4 – Location of Proposed Road-Traffic Noise Mitigation



To ensure that the Project is designed and constructed as anticipated, conditions are proposed that:

- require the mitigation measures (barriers and high performance surface) identified in Table 42-9 and Table 42-10 and shown in the figure above, to be implemented;
- the predicted levels for the detailed design maintain the same NZS 6806 category as the consented design or achieve a quieter category;
- set construction noise limits for construction activities to comply with or, if they cannot, provides a clear, structured and tested process for minimising construction noise;
- identifies at this stage assessment of 21 Category B PPFs, 6 of which are privately owned, that are required to be investigated for building modifications to be undertaken in order to reduce internal noise levels and for any relevant works to be completed as soon as reasonably practicably; and
- a post-construction review to confirm noise mitigation has been installed as designed.

42.5.2 Construction noise and vibration

The potential adverse effects of construction noise and vibration will be controlled through the key parameters set in the conditions and then imbedded industry standard management and measures in the CNVMP[20] and the Construction Traffic Management Plan. Mitigation measures can range from equipment selection, equipment operation and site works programming, measures may also include temporary screening and the avoidance of site access points, heavy vehicle routes, yards, laydown areas and fixed plant close to PPFs. Communication with the occupants of affected PPFs, and the wider community, is also critical for successful noise mitigation and specific provisions are included in the Communication Plan conditions.

Subject to compliance with the consent conditions for good practice management to mitigate the noise and vibration effects of construction activities, the adverse noise and vibration effects caused by construction activities are appropriately managed.

42.6 Summary

The assessment of effects of the Ō2NL Project on noise and vibration concludes:

- operational road traffic noise levels from the Ō2NL Project will be reasonable in the context of a large infrastructure project (guided by criteria from NZS 6806 and the WHO criteria), and will result in an improved noise environment for a large number of people currently exposed to road traffic noise from the existing State highways such that overall in 2039;
    - the number of PPFs exceeding 67 $dBL_{Aeq(24h)}$ (Category C) is predicted to reduce from 105 to 23 - a reduction of 78%.
    - the number of PPFs exceeding 64 $dBL_{Aeq(24h)}$ (Categories B and C combined) is predicted to reduce from 225 to 65 - a reduction of 71%.
    - the number of PPFs exceeding 50 $dBL_{Aeq(24h)}$ (WHO Guidelines) is predicted to reduce from 997 to 680 - a reduction of 32%.
- the Ō2NL Project will have operational adverse effects on 21 Category B PPFs[21], the owners of which will be offered building modification. The subjective amenity effects at those locations will be disruptive, or very disruptive. Building modifications will be offered for those PPFs. The Ō2NL Project will alter the quiet rural lifestyle noise environment in certain locations and within close proximity to the proposed designations and the BPO approach has been designed to reduce effects to the extent practicable;

[20] As set out in the Waka Kotahi Guidelines.
[21] 15 of these properties are either owned by the Crown or are within the proposed designations.

- there will be minimal operational vibration effects from the Ō2NL Project;
- any temporary noise and vibration from construction activities, including construction traffic, can be appropriately mitigated and managed by the condition requirements and the relevant management plans but noise levels will change from the present rural amenity levels during construction; and
- with the appropriate mitigation and management processes, the residual effects are reasonable, particularly for a project of this nature and scale.

43 Air quality

43.1 Assessment methodology

The assessment of potential air quality effects has been undertaken in accordance with the following guidelines and standards:

- Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NES-AQ);
- Ministry for the Environment, Good Practice Guide for Assessing Discharge to Air from Land Transport (2008) (Ministry for the Environment (2008) guide);
- Ministry for the Environment, Good Practice Guide for Assessing and Managing Dust (2016) (Ministry for the Environment (2016) guide);
- Ministry for the Environment, Good Practice Guide for Atmospheric Dispersion Modelling (2004) (Ministry for the Environment (2004) guide); and
- Waka Kotahi, Guide to Assessing Air Quality Impacts from State Highway Projects, version 2.3 (2019) (Waka Kotahi guide).

43.1.1 Assessing operational effects on air quality

The operational effects of the Ō2NL Project on air quality are assessed using a methodology based on a combination of the Waka Kotahi guide and Ministry for the Environment (2008) guide (for discharges from land transport).

The Waka Kotahi guide sets out a three staged approach:

- Stage 1: Environmental and social responsibility screen, consisting of a simple checklist of questions relating to air quality.
- Stage 2: Preliminary assessment to establish whether the proposed project or cumulative air quality impact is likely to result in the relevant air quality criteria being exceeded.
- Stage 3: Technical assessment, which is designed to evaluate in detail the likely effects of air quality risks or opportunities arising from a project. The assessment also aims to provide information of how any effects can be mitigated.

The Ministry for the Environment guide sets out a similar three-tiered approach as follows:

- Tier 1: Preliminary assessment to identify whether there are likely to be significant air quality effects.
- Tier 2: Screening assessment
- Tier 3: Full assessment, including increased complexity in modelling and reliance on site-specific data.

The potential effects of the Ō2NL Project on air quality are assessed using a staged approach akin to the Waka Kotahi guide; with the Stage 2 assessment incorporating the Ministry for the Environment (2008) guide Tier 1 and 2 assessment; and Stage 3 assessment incorporating Tier 3.

A Stage 2 assessment has been undertaken for the area from Taylors Road to Ohau River, and a Stage 3 assessment has been undertaken for the area from Ohau River to North Levin. This is due to the relatively large number of sensitive receptors being located in Levin and in the surrounding area.

It is noted that airborne contaminant levels from vehicle emissions are measured from the edge of a road carriageway. That said, for the purposes of assessment 'sensitive receptors'[22] within 200m of the boundary of the proposed designations have been identified as being potentially affected and consequently assessed individually.

43.1.2 Assessing construction effects on air quality

The construction effects of the Ō2NL Project on air quality have been assessed in accordance with the Waka Kotahi guide and Ministry for the Environment (2004) guide (for assessing and managing dust).

The assessment involved reviewing the activities that are being undertaken at a particular location and determining the potential for these activities to generate nuisance dust that might affect representative sensitive receptors.

43.2 Operational effects on air quality

The following vehicle related air pollutants have been identified as having potential to cause adverse health effects:

- gases such as nitrous oxide ("NO_2"), carbon monoxide ("CO") and volatile organic compounds ("VOCs") such as benzene; and
- particulate matter in different size fractions, such as PM_{10} and $PM_{2.5}$.

In addition to effects on human health, there is also potential for air pollutants to have adverse effects on ecosystems. These effects generally only occur when concentration levels are higher than those used as assessment criteria for determining adverse effects on human health. Therefore, provided that pollutants are below health-based effects assessment criteria, then it is highly unlikely that there would be any effects on ecosystems.

NO_2, PM_{10} and $PM_{2.5}$ concentrations have been predicted for areas adjacent to existing SH1, SH57, the Ō2NL Project and main arterial routes in Levin for the following scenarios (as set out in the Waka Kotahi guide):

- 2018 (base year);
- 2029 (without the Project/'do minimum');
- 2029 (with the Project);
- 2039 (without the Project/'do minimum'; and
- 2039 (with the Project).

43.2.1 North of Levin to the Ohau River

For the area from north of Levin to the Ohau River, Table 43-1 includes a summary of modelled concentrations of air pollutants for the different scenarios, including in respect of the significance in changes in concentration, based on Ministry for the Environment criteria.[23]

[22] A 'sensitive receptor' is defined by Manawatū -Whanganui Regional Council as a location where people or surroundings may be particularly sensitive to the effects of air pollution and includes (but is not limited to) residential buildings, hospitals, education facilities, rest homes, motels, public places, public roads, surface water bodies, marae, water supply catchments and intakes, rare, threatened and at risk habitats and sensitive crops.
[23] Ministry for the Environment New Zealand Ambient Air Quality Guidelines

Table 43-1 - Summary of Predicted Change in Concentration of Air Pollutants

Summary of Predicted Change in Concentration of Air Pollutants	
99.9%ile 1-hour NO_2	The highest maximum 99.9%ile 1-hour concentration of NO_2 recorded at any receptor in 2029 (without the Project/'do minimum') is 73 µg/m^3. When combined with the background concentration of 58 µg/m^3, the cumulative concentration is 131 µg/m^3. This is below the NES-AQ guideline value of 200 µg/m^3 (62%). The highest maximum 99.9%ile 1-hour concentration recorded for 2029 (with the Project) is 49 µg/m^3 (107 µg/m^3 including background) at the same location. The maximum 99.9%ile 1-hour concentration decreases in 2039, with the highest concentration (including background) predicted to be 98 µg/m^3 (without the Project/'do minimum') and 84 µg/m^3 (with the Project). The predicted changes in concentration can generally be described as showing a reduction in concentrations close to the existing SH1 and an increase in concentrations close to the Ō2NL Project. However, these increases are not significant and will not result in exceedances of relevant air quality assessment criteria.
24-hour NO_2	The maximum predicted 24-hour NO_2 concentration at a receptor in 2029 (without the Project/'do minimum') is 14 µg/m^3 and, when combined with the background concentration, has a cumulative concentration of 52 µg/m^3. This is below the Ministry for the Environment New Zealand Ambient Air Quality Guidelines concentration of 100 µg/m^3 (51%). The maximum 24-hour concentration for 2029 (with the Project) is 10 µg/m^3, with a cumulative concentration of 48 µg/m^3. The maximum 24-hour concentration decreases in 2039, with the highest concentration (including background) predicted to be 46 µg/m^3 (without the Project/'do minimum') and 43 µg/m^3 ('with the Project). The predicted increases in 24-hour NO_2 concentration are not significant and will not result in exceedances of relevant air quality assessment criteria.
Annual NO_2	The highest annual predicted NO_2 concentration in 2029 are 7.6 µg/m^3 (without the Project/'do minimum') and 5.1 µg/m^3 (with the Project). With background concentrations included, the annual NO_2 is 16.6 (without the Project/'do minimum') and 14.1 µg/m^3 (with the Project). In 2039 the annual NO_2 concentrations decrease to 13.1 µg/m^3 (without the Project/'do minimum') and 11.9 µg/m^3 (with the Project). These results are negligible and highly unlikely to result in exceedances of relevant air quality assessment criteria.
24-hour PM_{10}	The highest maximum 24-hour concentration predicted at any receptor for the 2029 (without the Project/'do minimum') scenario is 2.8 µg/m^3. When combined with the background concentration of 31.2 µg/m^3, the cumulative concentration is 34.0 µg/m^3. This concentration is below the NESAQ guideline value of 50 µg/m^3 (68%). The highest maximum 24-hour concentration recorded for the 2029 (with the Project) scenario is 1.9 µg/m^3 (33.1 µg/m^3 including background). The maximum 24-hour concentration increases from 2039, compared to 2029 with the highest concentration (including background) predicted to be 34.7 µg/m^3 (without the Project/'do minimum') and 33.5 µg/m^3 (with the Project). The predicted increases are not significant and will not result in exceedances of relevant air quality assessment criteria.
Annual PM_{10}	The highest annual predicted PM_{10} concentration in 2029 is 1.5 µg/m^3 (without the Project/'do minimum') and 1.2 µg/m^3 (with the Project). With background concentrations included, the annual PM_{10} is 14.4 µg/m^3 (without the Project/'do minimum') and 14.1 µg/m^3 (with the Project). In 2039 the annual PM_{10} concentrations increase to 14.7 µg/m^3 (without the Project/'do minimum') and 14.3 µg/m^3 (with the Project). These results are negligible and highly unlikely to result in exceedances of relevant air quality assessment criteria.

Summary of Predicted Change in Concentration of Air Pollutants	
24-hour $PM_{2.5}$	The highest maximum 24-hour concentration recorded at any receptor in the 2029 (without the Project/'do minimum) scenario is 2.2 µg/m$^{3.}$ When combined with the background concentration of 20.9 µg/m^3, the cumulative concentration is 23.1 µg/m^3. This is below the proposed Ministry for the Environment criteria value of 25 µg/m^3 (92%). The highest maximum 24-hour concentration recorded for the 2029 (with the Project) scenario is 1.4 µg/m^3 (22.3 µg/m^3 including background). The maximum 24-hour concentration decreases in 2039, with the highest concentration (including background) predicted to be 21.8 µg/m^3 (without the Project/'do minimum' scenario) and 21.5 µg/m^3 (with the Project scenario). These concentrations represent a negligible change and are extremely unlikely to result in exceedances of relevant air quality assessment criteria.
Annual $PM_{2.5}$	The highest annual predicted $PM_{2.5}$ concentration across the scenarios is 1.0 µg/m^3 for the 2029 (without the Project/'do minimum' scenario) and 0.7 µg/m^3 (with the Project). With background concentrations included, the annual $PM_{2.5}$ is 7.6 µg/m^3 (without the Project/'do minimum') and 7.3 µg/m^3 (with the Project). The annual $PM_{2.5}$ concentration decreases in 2039 to 7.0 µg/m^3 (without the Project/'do minimum') and 7.0 µg/m^3 (with the Project). These concentrations are highly unlikely to result in exceedances of the relevant air quality criteria.

The significance of the predicted change in these concentrations of air pollutants was then analysed (based on Ministry for the Environment significance of change criteria).

The Stage 3 Assessment results indicate that none of the thresholds stated in the significance criteria are exceeded, for any of the modelled scenarios.

All scenarios result in a reduction in concentrations for the 'with the Project' scenario when compared to the without the Project/'do minimum' scenario for the corresponding year, with the exception of PM_{10} in 2029.

This reduction in concentrations is due to a decrease in vehicle emissions expected as vehicle emission control technologies improve, and people move to electric powered vehicles. The decrease in emissions is slightly offset by the small increase in vehicle traffic expected over this period, however, overall, the reduction is significant. The small increase in 24-hour PM_{10} concentrations in 2039 compared to 2029 can be attributed to the increase in vehicle numbers outweighing the benefits of enhanced vehicle emission technologies.

Traffic dispersion modelling indicates a predicted reduction in the concentration of air pollutants from vehicles using the existing SH1 with the Ō2NL Project in place, when compared to the current roading network. In particular, there is a decrease in concentrations of air pollutants in the township of Ohau and the Levin town centre.

With the Ō2NL Project constructed, it is predicted that minor increases in concentrations will generally occur in areas located within 200m of the carriageway. Regardless of the scale of any increase, predicted concentrations will remain well below relevant air quality assessment criteria.

In places, the SUP is likely to be located within 200m of the carriageway. The air quality for users of the SUP will be at concentrations that are predicted to be below relevant air quality assessment criteria. Therefore, users of the SUP will not experience any adverse health effects. As the SUP provides a new north-south facility and walkers and cyclists no longer need to use the hard shoulder of the state highway, the Ō2NL Project provides a potential significant air quality health benefit for current for walkers and cyclists who choose to use the new SUP.

In all, in the area from north of Levin to the Ohau River the Ō2NL Project does not result in exceedances of relevant air quality assessment criteria and will result in improved air quality as a result of improved

traffic flows, which correspond to reduced vehicle emissions, and reduced vehicle movements through Levin.

43.2.2 Ohau River to Taylors Road

For the area from Taylors Road to Ohau River, screening model results indicate that sensitive receptors located along existing SH1 will experience improved, or at worst no change in, air quality for the 'with the Project' scenario. Sensitive receptors located near the proposed designations will experience no change or, at worse, a minor adverse effect for the 'with the Project' scenario.

Under the 'without the Project' scenario, the screening model predicts an adverse impact on air quality (or, at best, no change) for sensitive receptors along existing SH1.

Despite these relative changes between the scenarios, the cumulative concentrations remain well below the relevant health criteria. Overall, the air quality effects from the 'with the Project' scenario are positive compared to the without the Project/'do minimum' scenario. As such, there will be an overall improvement in the air quality as a result of the Ō2NL Project in the area between Ohau River and Taylors Road.

43.3 Construction effects on air quality

During the construction phase of the Ō2NL Project there is potential for nuisance dust from construction activities and combustion emissions from construction vehicles to affect the environment in close proximity to the construction areas. Dust nuisance can include things like visual soiling of clean surfaces (such as cars, window ledges and household washing) and dust deposits on flowers, fruit or vegetables.

Construction activities that have the potential to result in the generation of dust include:

- stripping of topsoil;
- excavation of cut material;
- placement of fill;
- stockpiling of soil/cut material;
- traffic movements on the haul road; and
- rehabilitation of completed areas.

Construction zones are located in close proximity to areas or land uses that are sensitive to dust and therefore there is a high potential for dust nuisance effects to be experienced by people and property as a result of construction activities.

Sensitive receptors located within 50m of construction activities may experience adverse dust nuisance effects that are more than minor over the duration of construction activities in that locality. For receptors located between 50m and 200m from construction activities, dust nuisance effects will have less than minor adverse effects. Generally, receptors more than 200m from the construction activities are unlikely to experience any construction related dust nuisance because dust settles within this distance.

There are no areas of ecological value that are highly sensitive to dust located in the vicinity of the Project and, as such, it is concluded that there are no adverse construction related dust impacts on sensitive ecological environments. Further, there are no other potential effects on air quality effects from construction related activities, for example, from construction vehicles.

43.4 Measures to avoid, remedy or mitigate adverse effects

Consistent with the Waka Kotahi guide and Ministry for the Environment (2008) guide (for assessing and managing dust) a Construction Air Quality Management Plan (CAQMP) is proposed to set out measures to manage construction practices to control dust and appropriately minimise any adverse effects of dust nuisance outside of the designations.

The CAQMP will address the following:

- the identification of sensitive receptors;
- approaches to the mitigation of odour in the event an odour source (such as an offal pit or septic tank) is encountered;
- methods for the suppression of dust that may include chemicals, water, wind-breaks and wheel-washes;
- methods for the management of earthworks and stockpiles that may include limiting the timing, scale, location and/or area of works and the needs to suppress dust through covers or vegetation (for temporary sites and completed works);
- procedures for the management and operation of construction vehicles, including speed limits in specific locations, minimising haul distances and maintaining vehicles to minimise vehicle related emissions;
- methods for the management of construction yards, and the material stored at these yards;
- construction staff training requirements in respect of dust management methods;
- methods for the management of haul roads, including dampening of dust and location specific speed limits;
- reference to the Project's community liaison personnel;
- reference to the Project's complaints procedure that, in turn, sets out possible dust management and complaints response requirements; and
- approaches to wind monitoring and visual dust monitoring.

Overall, with the mitigation measures described above and embedded in a CAQMP, dust emissions and effects will be minimised so that they are not considered offensive or objectionable. In order to reduce the potential for these nuisance effects so that they are not considered offensive or objectionable, a number of well tested mitigation measures have been recommended. These measures will be required through the consent conditions and detailed in a CAQMP.

The concentration of air pollutants from vehicle emissions from the operation of the Project is predicted to be well below the relevant assessment criteria. Therefore, the Project results in a decrease in concentrations when compared to the 'without the Project/'do minimum' scenario for the corresponding year, and no mitigation of the operational effects is required. In addition, given the predicted contribution of vehicle pollutants to ambient air quality in the Ō2NL Project Area is negligible, no post-Project air quality monitoring is necessary.

43.5 Summary

The assessment of effects of the Ō2NL Project on air quality concludes:

- the assessment of potential adverse air quality effects during the operation of the Ō2NL Project predicts that any ambient concentrations of NO_2, PM_{10} and $PM_{2.5}$ from vehicle emissions from the Project and existing SH1 and SH57 for 2029 and 2039 are less than the relevant health impact assessment guidelines and values;
- a reduction in ambient concentration of all air pollutants can be expected between 2029 and 2039 due to a decrease is vehicle emissions as a result of improvement in vehicle emission technologies and a move to electric vehicles;
- the Ō2NL Project is unlikely to result in any adverse effects on air quality in the area, with all predicted concentrations less than the relevant health standards;
- the Project will improve air quality in areas adjacent to existing state highways (including in Levin) through improved traffic flows and reduced vehicle movements;

- the primary potential air discharge from the construction of the Ō2NL Project will be dust, which has the potential to cause diminished amenity values; and
- with the implementation of appropriate mitigation measures (through a CAQMP) any adverse effects of dust discharged from construction activities will be less than minor.

44 Landscape and visual

44.1 Assessment methodology

The potential effects of the Ō2NL Project on landscape and visual amenity values have been assessed in a manner consistent with '*Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines*' (2022), which has been adopted by Tuia Pito Ora/NZ Institute of Landscape Architects.

Landscape character and values are assessed with reference to:

- a desk-top review, including a review of reference works relating to the area;
- field work; and
- targeted engagement, including with representatives of the Project Iwi Partners.

The specific method for assessing landscape and visual matters is summarised as follows:

- description of landscape character and values relevant to landscape and visual effects of the Ō2NL project;
- brief description of the aspects of the Ō2NL Project relevant to landscape and visual effects;
- review of relevant provisions of the statutory plans to help frame the assessment;
- summary of input to Project shaping that was undertaken to avoid and reduce potential adverse landscape effects;
- assessment of the effects on landscape character and values for each of the six landscape character areas traversed by the Project, including a description of mitigation within each area;
- assessment of the visual effects on amenity values, drawing on an estimate of effects from individual dwellings, without and with mitigation; and
- description of the integrated landscape plan and CEDF that coordinates the landscape design and mitigation.

Photo-simulations have been prepared to depict the appearance of the Ō2NL Project to support the assessment and are provided in Volume III.

This assessment process has included input to Project shaping, especially the route selection process. The location of the Ō2NL Project east of Levin and at the back of the plains avoids the more sensitive landscape in the western and central parts of the districts and what would likely have been greater adverse landscape effects if the Project had been located in those areas. Project shaping also included landscape input to the concept design and the definition of the designations, including the location and form of elements such as interchanges and reconnection of local roads.

This assessment process has also been carried out in tandem with the ongoing development of the CEDF to provide continuity in assessment and responses. This approach has helped ensures alignment with the assessment with the CEDF in terms of identifying existing landscape values, addressing potential adverse effects on landscape values, and taking opportunities to enhance and improve outcomes for landscape values.

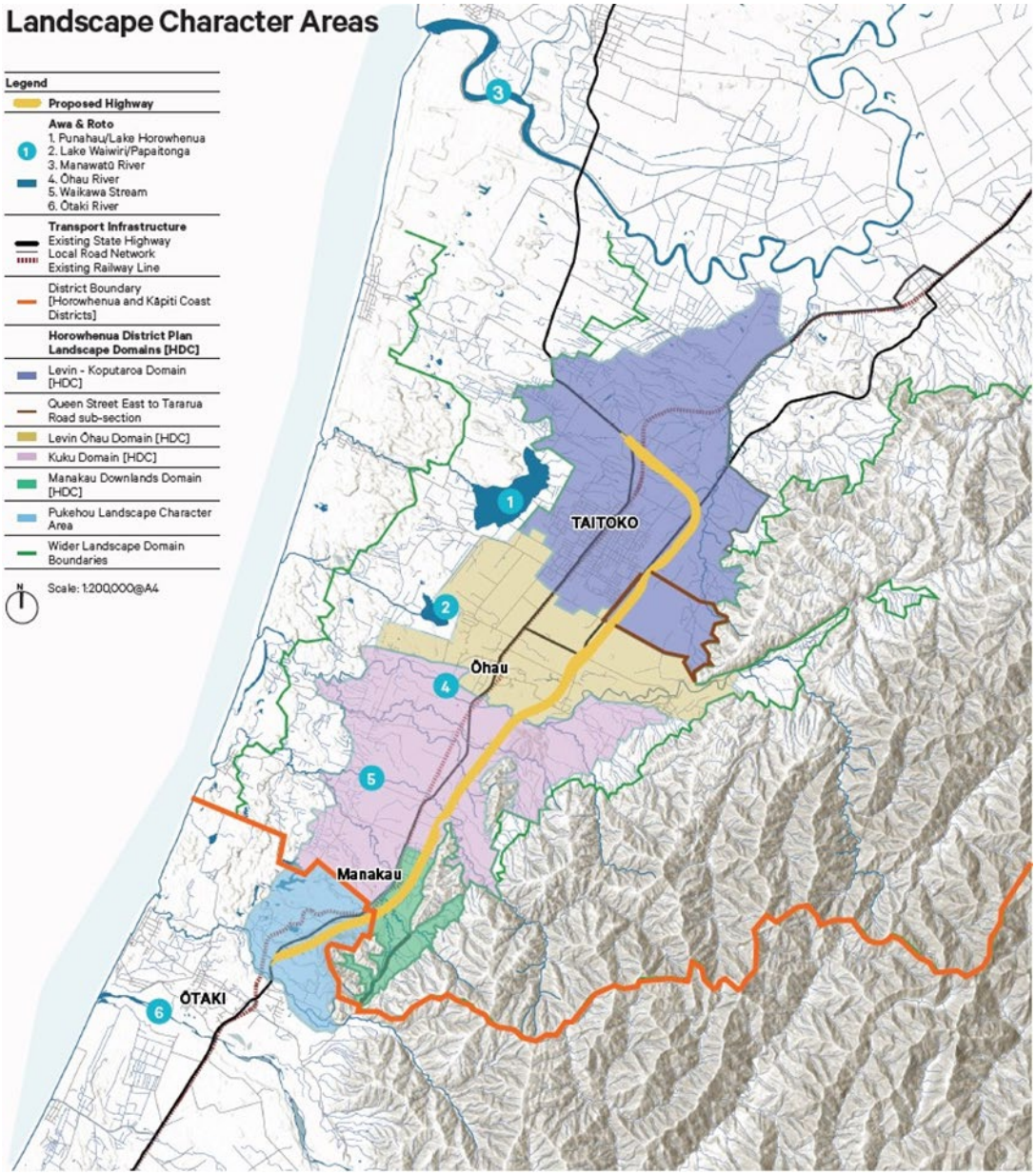
Landscape and visual matters considered include:

- the appropriateness of the alignment of the proposed designations (compared to alternatives);

- the nature and degree of effects on rural landscape character and amenity values (with respect to physical, perceptual and associative aspects); and
- visual effects from public and private views, including during construction.

Effects on landscape character and amenity values are assessed with reference to the six landscape character areas traversed by the Project. The landscape character areas are shown in Figure 44-1 and align with the five 'landscape domains' that are identified and described in the HDP and a sixth (Pukehou), which encompasses and the balance area that is located in Kāpiti Coast District. One of the HDP 'landscape domains' (Levin-Koputaroa) has been divided into two sub-sections to recognise the difference between the rolling farmland north and north-east of Levin, and the terrace east of Levin that has been earmarked for urban development. Effects on landscape values are assessed on a seven-point scale of magnitude from 'Very-Low' to 'Very-High'.

Figure 44-1 – Landscape Character Areas



The assessment of visual effects from houses is based on a desk top analysis (aerial photos, plans) and road-side observation. Factors influencing the degree of effect include:

- distance (measured from the house to the edge of the carriageway);
- apparent orientation of the house;
- the nature of the Ō2NL Project at each location;
- the extent of screening; and
- elements in the foreground and middle-ground that would contribute to perspective depth.

Construction effects may include biophysical effects (such as increased potential for sediment discharge during the time surfaces are open) and visual effects of construction. The latter are likely to be experienced from similar locations as permanent effects but are typically amplified during construction, especially from residential properties, by the raw appearance of works and heavy construction machinery.

44.2 Operational effects on landscape character and visual amenity

The Ō2NL Project introduces a major element of infrastructure and substantial change to the existing landscape. As such, the Project will have potential adverse effects on:

- landscape character and amenity values; and
- visual effects with respect to public and private views.

44.2.1 Landscape character and amenity values

The Ō2NL Project is major infrastructure that will inevitably change the existing landscape. The Project will potentially disrupt natural processes, disrupt rural activities and local circulation patterns, and detract from existing rural amenity values. A commentary on the potential adverse effects on landscape character and visual amenity values is included in the Table below. This commentary particularly focuses on the elements of the Project that give rise to the most significant adverse effects, along with those aspects of the Project that reduce or minimise adverse effects. The Table includes an assessment of the magnitude of adverse effect for each landscape character area.

Table 44-1 – Operational Effects on Landscape Character and Visual Amenity Values

Landscape Character Area	Effects on Landscape Character and Visual Amenity Values	Overall Magnitude of Effects (without mitigation)
Levin-Koputaroa (north of Levin sub-section – from tie-in with existing SH1 to Queen Street East)	The elements with the greatest adverse effects will be the following: • NIMT overbridge: The proposed bridge over NIMT must cross the rail line at an oblique angle with ramps rising to approximately 8m high, resulting in a dominant structure in its immediate locality at the end of Sorensons Road. • Roundabout intersection with SH57: The configuration of the roundabout (rather than a grade separated interchange) and its approaches is at odds with the existing landscape grain, including disrupting the current straight alignment of Arapaepae Road/SH57. This is unavoidable given the sweeping approach from the south and the need for safe sightlines and stopping distances. • Curving alignment through Waihou Road area: The need for the proposed designation to skirt north and east of Levin in a wide curve will disrupt existing landscape patterns in the Waihou Road area and result in significant adverse effects on character and amenity in this locality. It will	**High** (between SH57 and Waihou Road on the north-east corner of Levin) **Moderate** (across all other areas)

Landscape Character Area	Effects on Landscape Character and Visual Amenity Values	Overall Magnitude of Effects (without mitigation)
	require removal of houses from the eastern leg of Waihou Road (that is, the 'back leg' of the Waihou Road loop), disrupting the community of houses along the road, and severing the local road connections. It will require a new local road to link the disconnected section of Waihou Road and McDonald Road with Arapaepae Road, and result in a slightly more circuitous connect between this area and Levin. The following elements of the Project will contribute to reducing potential adverse effects: • the tie in with existing SH1 is located in a relatively unobtrusive location; • the location of the NIMT railway overbridge is reasonably unobtrusive, having relatively low visibility beyond its immediate surroundings because it is set back from the existing SH1 and other through roads; • the proposed designation north of Levin is located in a rural area and lies beyond the ends of two no-exit roads (Sorensons Road and Fairfield Road), reducing potential effects on settlement patterns and land use; • the proposed designation north of Levin follows the topographic grain and minimises encroachment into headwater gullies of the Koputaroa Stream; and • while the proposed designation's curving alignment around the north-east corner of Levin unavoidably cuts across landscape patterns, it nevertheless follows the topography and avoids encroaching onto the main Koputaroa Stream.	
Levin-Koputaroa (east of Levin sub-section – Queen Street East to Tararua Road)	The following elements of the Project contribute to its 'fit' with the landscape, and the extent to which it avoids and reduces potential impacts on the planned Tara-Ika urban development. The Project: • enables the Tara Ika urban development area to be developed as a coherent neighbourhood around a neighbourhood centre on the east side of the highway; • is generally square to the cadastral grid, assisting with efficient land development. The proposed Queen Street East bridge over the Ō2NL Project will deviate from Queen Street East's current straight alignment, but it will maintain its continuity and legibility of the connection between the town centre and Tararua Range. The proposed bridge will detract to some extent on connectivity especially for pedestrians and cyclists and have localised adverse visual effects.	**Moderate-High**
Levin-Ohau	Factors that contribute to the Project's 'fit' with the landscape, and the extent to which it avoids and reduces potential adverse effects in this area are, as follows: • the location of the Ohau River crossing fits the landscape in that it is aligned with the hills at the back of the plains on the opposite bank, and visually anchored by Ōtarere hill; • the 175m long bridge and cylindrical piers will enable the river to maintain a natural bed and channel/s; • the avoidance of stands of remnant bush near Muhunoa East Road to the west;	**Moderate**

Landscape Character Area	Effects on Landscape Character and Visual Amenity Values	Overall Magnitude of Effects (without mitigation)
	• the Muhunoa East Road overbridge will maintain the connection between Ohau and the upper Ohau valley; and • a pattern of local connectivity with both Levin and Ohau will be maintained on both sides of the proposed designation. The SUP will provide positive effects on connectivity linking communities on either side of the Ohau River. The Muhunoa East Road overbridge will stand out because of its height and its misalignment with existing landscape patterns, although it will maintain the important landscape connection along the north bank of the Ohau River.	
Kuku	The following factors will contribute to the extent to which the Project reduces such potential adverse effects in this area: • the Project follows the topography and land use patterns along the toe of the hills. • the Project's visual prominence will be reduced by the backdrop hills and the highway's low elevation typically in shallow box cuttings and low embankments. • the Project's perpendicular crossing of the Kuku and Waikawa Streams, and most of the minor tributaries, will minimise the highways potential footprint on the streams and help maintain legibility of the natural features; • the crossing of the Kuku East Road and North Manakau Road on a perpendicular alignment, and in cut, will reduce the potential height of the overbridges; • the Project will maintain the landscape connectivity of the two local roads that follow the valleys of the Kuku and Waikawa Streams towards the Tararua Range; • with the exception of the small clusters of houses at Kuku East Road and North Manakau Road, the Project otherwise crosses an agricultural landscape with low settlement density; • the Project will be in a cut at North Manakau Road, which will reduce potential visual effects for the cluster of houses at that location; • visual connections between the Ngāti Wehi Wehi marae and the Tararua Range will be maintained by the highway's low profile including being in a box cutting south of Waikawa Stream; and • there will be positive connectivity effects from the SUP, which will create a new local north-south connection at the back of the plains.	**Low-Moderate**
Manakau Downlands	Adverse effects are most pronounced south of Manakau Village where the Project crosses the valley of the Manakau and Waiauti Streams on a fill embankment and occupies the outlook from properties on the terraces at the back of the amphitheatre-like valley mainly Manakau Heights Drive and Mountain View Drive. The following aspects will contribute to reducing the potential adverse effects: • the Project is aligned with valley behind and below Manakau Village largely avoiding adverse effects on the village itself (acknowledging there will be effects for properties on the eastern edge of the village and in the Eastern Rise area);	**High**

Landscape Character Area	Effects on Landscape Character and Visual Amenity Values	Overall Magnitude of Effects (without mitigation)
	• the sweeping 'S' alignment of the Project across the open valley south of Manakau village maximises separation from the Manakau Heights Drive and Mountain View Drive subject to the desire to also avoid Staples Bush; • the crossing location of the Waiauti Stream and Manakau Stream is anchored (physically, visually, and in terms of reducing effects on meanders) by a small terrace landform; and • local road connectivity will be maintained at South Manakau Road and Manakau Heights Drive, and connectivity for active modes will be improved by the SUP.	
Pukehou	The Project passes around the toe of Pukehou, a feature of landscape significance, across a series of gullies and terraces. This part of the proposed designation is likely to have the deepest cuttings and highest embankments of the Project. The following factors contribute to the Project's fit with the landscape and the extent to which it avoids or reduces the magnitude of potential adverse effects: • the Project responds to topography by sweeping around the toe of Pukehou, and avoiding Pukehou's steeper greywacke hill faces. Pukehou will be a prominent landmark on the new route; • the gullies traversed are highly modified tributary watercourses. The proposed measures will restore some of the gullies adjacent to the Project as wetlands; • the Project avoids the Staples Bush stand of old-growth coastal bush, and the other stands of modified and regenerating bush; and • the Project is sufficiently separated that existing SH1 will retain its attractive character through this area and the SUP will take advantage of this alignment on the existing road.	**Moderate**

44.2.2 Visual effects from public and private views

44.2.2.1 Public views

The Ō2NL Project will be widely experienced as an integral part of the Horowhenua landscape. People will see the highway as they go about their everyday life, and they will experience the Horowhenua landscape from the highway. The fit of the Project with the landscape character patterns set out in the Table above is, therefore, key to the visual effects on public views.

Otherwise, there are no particular public places that warrant special assessment. Places such as scenic reserves, scenic lookouts, public historic places, cemeteries, wāhi tapu, marae, schools and public buildings are some distance from, and separated from, the Ō2NL Project.

44.2.2.2 Private views

Major infrastructure such as the Ō2NL Project through a settled landscape such as the Horowhenua will unavoidably require the removal of some houses and have adverse visual effects on other properties.

The visual effects of the Project on individual dwellings are assessed with reference to the conceptual highway design having regard to distance of the dwelling from the carriageway, apparent orientation of the dwelling with respect to the highway, the nature of the Project at the location, any existing screening, and foreground/middle-ground elements that might contribute to perspective depth. Such effects range in

magnitude from 'Very Low' to 'Very High' and 'Removal' (that is, those properties within the proposed designations that would require removal to construct Project).

The properties assessed as having effects 'Moderate' or greater in each of the landscape character areas are set out in Table 44-2.

Table 44-2 – Properties with Moderate or Higher Visual Effects

Landscape Character Areas	Moderate	Moderate-High	High	Very High	Removal
Levin-Koputaroa (SH1 to Queen Street East)	13 (10)[24]	11 (6)	18 (11)	10 (5)	19 (14)
Levin-Koputaroa (Queen Street East to Tararua Rd)	22	3	4	1	1
Levin-Ohau	12	17	7	6	9
Kuku	4	6	4	0	6
Manakau Downlands	9	8	7	4	6
Pukehou	6	2	8	2	3
Totals	**66**	**47**	**48**	**23**	**44**

The concentration of moderate or greater adverse visual effects in the area between the north end of the Project and Queen Street East reflects the clusters of rural residential properties on the outskirts of Levin (especially in Sorensons Road and Waihou Road), and the fact that the large curve in the proposed designation around the north-east corner of Levin cuts across the landscape patterns.

The table above includes approximately 37 (of the 71) properties that had been purchased by Waka Kotahi at April 2022. Negotiations are continuing with respect of other properties required for the Project, which include many of those houses identified as having 'Very High' and 'High' adverse visual effects. The number of dwellings in the 'High' and 'Very High' categories that are not subject to property acquisition process is 26 in the 'High' and 4 in the 'Very High' categories.

44.3 Construction visual effects

Potential adverse effects on the biophysical landscape arising from construction activities may include effects on streams through construction of bridges and culverts, and from stormwater discharge during earthworks. Such matters overlap with natural character. They also include potential effects on bush through clearance or potential changes to groundwater. These effects are to be managed through consent conditions and management plans that manage work in streams, earthworks and related potential for soil erosion and consequent need for sediment control, and fencing of bush areas and buffer planting to avoid accidental and incidental effects.

Visual effects during construction include the raw appearance of earthworks; construction 'clutter' (construction yards, machinery, safety barriers, stored materials); and the machinery operations that attract attention to the raw appearance of the works. Such effects cannot be completely avoided.

Nine construction yards/laydown areas are identified on the Accommodation Works drawings (Volume III) and are 'temporary works areas'. Each is located adjacent to major elements of the Project such as interchanges and bridges and will generally be seen against the backdrop of the construction works for the highway itself.

In general, the visual effects during construction will be amplified for those properties already identified as having adverse visual effects from the operation of the Ō2NL Project. Such temporary adverse visual

[24] Numbers in brackets are those in the section SH57 to Queen Street East.

effects will also occur during the construction of those elements that will eventually have positive landscape effects, such as large stormwater wetlands, the rehabilitated material supply sites and other planting that will progressively soften the visual effects of the Project. It is acknowledged that such effects will occur over the five years (or longer) estimated it will take to construct the Project.

Five material supply sites are proposed due to the significant shortfall of cut relative to fill material required for the Project. Four sites are in alluvial deposits and located in upper terraces set back from the beds of the Ohau River and Waikawa Stream. While the design and rehabilitation is subject to detailed design, as part of the CEDF, the approach is to excavate the terraces to mimic natural landforms and tie in with indigenous vegetation proposed for natural character and ecological offset reasons. There will be adverse amenity effects during excavation, but they will occur in the context of constructing the whole Ō2NL Project. Following rehabilitation, the constructed landforms will have a naturalistic appearance, and indigenous vegetation cover, and will include new wetlands. There will consequently be positive net effects on landscape values.

Spoil sites are distributed along the route so as to meet the principle that spoil be disposed of within its original catchment. Most are located to merge with the Ō2NL earthworks (such as over-filling fill batters) and intended to be contoured to help tie the highway into the landscape.

44.4 Measures to avoid, remedy or mitigate adverse effects

44.4.1 Mitigation of effects on landscape character and visual amenity values

The proposed measures to mitigate adverse effects on landscape character and visual amenity values are detailed in Table 44-3. A residual effects rating (after mitigation) is also provided for each landscape character area.

Table 44-3 – Landscape Character Area Mitigation Measures and Residual Effects

Landscape Character Area	Mitigation Measures	Overall Magnitude of Residual Effects (with mitigation)
Levin-Koputaroa (north of Levin sub-section – from tie-in with existing SH1 to Queen Street East)	• Establishing screening vegetation on part of the link road between Koputaroa Road and Heatherlea East Road. • Contouring spoil around the roundabouts to anchor these features into the landscape. • Planting the high fill batters on the overpass ramps to soften views of the highway and traffic. • Restoring wetlands and swamp forest near the end of Sorensons Road and restoration of riparian vegetation along the stream just to the west of the SH57 roundabout. • Planting fill batters on the low embankment and the SH57 roundabout, and on the SH57 approaches to the roundabout. • Naturalising the stormwater wetlands and detention basins adjacent to the SH57 roundabout. • Planting parallel with Waihou Road to soften views of the highway from properties on the east side of that road. Spoil will be formed into a contoured bund to assist screening and noise mitigation. • Establishing an avenue of trees on Waihou Road and the realigned link road between Waihou Road and Arapaepae Road to visually separate the local road from the highway and soften views toward the highway from the east. The proposed avenue of trees will also follow the curve of the highway and help visually anchor the highway.	**Low-Moderate** (north of Levin) **Moderate-High** (Waihou Road to SH57)

Landscape Character Area	Mitigation Measures	Overall Magnitude of Residual Effects (with mitigation)
Levin-Koputaroa (east of Levin sub-section – Queen Street East to Tararua Road)	• Planting a band of dense vegetation through the whole section Queen Street East to Tararua Road to screen and soften views to the Project. On the east side of the highway, the screen planting will be between the SUP and the highway. • Planting screening vegetation on the fill batters around the overbridges at Queen Street East and Tararua Road to soften these structures. • Extending vegetation around the stand of bush between the highway and Arapaepae Road, including a contiguous area of indigenous revegetation incorporating a large stormwater wetland area south of the bush, and an ecological offset area between the bush and Queen Street East. • Naturalising the stormwater wetlands including contouring the form of the wetlands and naturalised margin planting.	**Moderate**
Levin-Ohau	• Planting screen vegetation on all fill batters and alongside at-grade sections of the highway to soften views from dwellings. • Planting an avenue of trees along parts of the new local roads parallel with the proposed designation to help separate the local roads from the Ō2NL Project, contain the views within the local roads, soften views toward the highway and break up the width of combined highway and local roading. • Enriching riparian vegetation along the Ohau River. • Naturalising the stormwater wetlands and connecting this area with the river bank restoration.	**Low-Moderate**
Kuku	• Restoration of sections of riparian vegetation along the Kuku and Waikawa Streams, upstream and downstream of the proposed designation and of a Kuku Stream tributary. • Planting to naturalise the stormwater wetlands and linking this planting with restoration of nearby stream margins. • Planting the west-facing fill batters between the Ohau River and Kuku Stream to soften views of the highway and traffic in views across the plains and to help avoid distracting from visual connections between Tukorehe Marae and the Tararua Range. • Planting the highway's east-facing batters between to screen the quarry, while retaining views to the Ōtarere hill. • Planting the west-facing fill batters between Kuku East Road and the Waikawa Stream to soften views of the highway and traffic. Retaining open east-facing fill batters on this section to provide views of the Poroporo hills. • Planting the west-facing fill batters south of North Manakau Road to soften views of the highway and traffic from the plains and help avoid distracting from visual connections between Ngāti Wehi Wehi marae and the Tararua Range. Retaining open east-facing fill batters on this section to provide views of the Poroporo hills from the highway. • Reinstating access to productive land severed by the designation. • Contouring of surplus spoil north of the Kuku Stream to mimic stream terraces.	**Low**

Landscape Character Area	Mitigation Measures	Overall Magnitude of Residual Effects (with mitigation)
Manakau Downlands	• Revegetating all west facing highway fill batters in the valley behind Manakau and some west facing fill batters between [CH29800] and South Manakau Bridge and between [CH30500] and [CH30850]. • Revegetating all east facing fill batters across the valley to soften views from the Manakau Heights Drive and Mountain View Drive areas. • Planting an avenue of trees along part of the Eastern Rise and Manakau Heights Drive to help contain views along the local road, and to further soften views and increase the perspective depth for properties to the east. • Restoring riparian vegetation along the Manakau and Waiauti Streams upstream and downstream of the proposed designation to accentuate the natural features to help offset the presence of the highway and to soften views and increase perspective depth for properties on Mountain View Drive. • Restoring riparian vegetation along Mangahuia Stream parallel with the proposed designation behind Manakau Village to help soften views of the Project in that area. • Naturalising stormwater wetlands and merging the wetlands with the adjacent restoration of the Mangahuia and Waiauti Streams respectively.	**Moderate-High**
Pukehou	• Avoiding benched cut or fill batters to enable a cleaner line for the highway through the terraces and gullies. • Restoring wetlands and wet forest along gullies adjacent to the highway to help integrate the highway into its context. • Naturalising the stormwater wetlands and merging the stormwater wetlands with the restoration of the adjacent wetland gullies and wet forest. • Planting buffer vegetation between the highway and Staples Bush. The planting will extend and accentuate the bush and protect its edge conditions and amplify its visual presence. • Replanting all west facing batters in indigenous species to soften views from the existing SH1 and houses in this area. • Maintaining an open outlook to Pukehou through re-grassing or low vegetation on the east side of the Project.	**Low-Moderate**

44.4.2 Mitigation of visual effects from private views

The matters outlined above relating to landscape character and amenity also address public views of the Project. There are no specific public viewpoints that warrant additional mitigation.

Mitigation is recommended for those private properties assessed as having moderate visual effects or greater. Mitigation techniques include planting to screen the Project, soften (filter) views and increase perspective depth (that is, planting in foreground and middle-ground layers). In most instances, the broad landscape design proposed for the Project (that is, planting within the proposed designation or otherwise for landscape and natural character reasons) will also mitigate visual effects from dwellings. Such mitigation includes the proposed planting on fill batters, screen planting adjacent to the highway, planting associated with stormwater wetlands, natural character restoration along streams, and avenues of trees on some local roads.

When planting within the designation is not sufficient to reduce adverse visual effects to a reasonable level (being moderate or less), it is proposed to offer additional planting on the affected properties. A

recommended condition requires such an offer to be made to owners of properties assessed as having visual effects moderate or greater, and implemented if the owners agree. The work would be subject to individual negotiation between the owners of affected properties and Waka Kotahi and would occur as part of the future outline plan process or processes.

While focussing on those properties assessed as having 'moderate' effects or greater, the recommended planting will also benefit other properties.

44.4.3 Mitigation of construction effects

The mitigation of the adverse visual effects of construction activities is achieved through measures proposed to address the effects of construction activities more generally. Specifically, the measures to manage construction that are to be set out in the suite of management plans address the following matters and as such also mitigate the visual effects of construction:

- measures to manage works in streams, including their restoration and rehabilitation;
- erosion and sediment control measures;
- measures to manage dust;
- ecological mitigation and offset measures; and
- the demarcating bush areas to avoid removal or accidental damage.

In addition, spoil disposal sites will be replanted as part of the broader landscaping that is to be undertaken, in some instances with grass, and in many instances with indigenous rehabilitation planting.

44.4.4 Cultural and Environmental Design Framework

Importantly, proposed mitigation measures are coordinated through the CEDF. The CEDF coordinates design and mitigation activities across different disciplines including cultural matters, stormwater design, stream diversion design, stream retirement planting, terrestrial ecological planting, earthworks contouring and rehabilitation, landscape restoration, and planting for mitigation of visual amenity values. The CEDF has been developed under, and is directed by, the partnership between Waka Kotahi and the Project Iwi Partners. Such a whole of landscape approach is intended to result in an overall landscape outcome that is greater than the sum of the parts. It will:

- 'soften' the Ō2NL Project;
- help tie the Project into the landscape; and
- improve the landscape's biophysical processes and patterns.

Consequently, measures proposed to address any unavoidable adverse effects, coordinated into a whole-of-landscape approach through the CEDF, will effectively mitigate such effects and contribute some positive landscape outcomes.

44.5 Summary

While potential adverse landscape and visual effects have been avoided to a substantial degree by the location of the Project, the overall magnitude of effects, prior to mitigation of the Ō2NL Project on landscape character and amenity values on the landscape character areas will range from 'Low-Moderate' to 'High'.

There are no additional specific public viewpoints that are affected.

Visual effects for individual properties prior to mitigation range in magnitude from 'Very Low' to 'Very High'.

Mitigation measures are proposed to address residual adverse effects to ensure that the existing landscape character area values are retained and that adverse effects on visual amenity values from dwellings are mitigated. The individual measures are also coordinated into a cohesive whole-of-landscape

approach through the CEDF, which is being developed to maximise the effectiveness of mitigation and to contribute positive landscape outcomes.

The proposed design is considered to represent a best practice approach to integrating a new highway into the landscape and mitigating the unavoidable residual adverse effects.

45 Natural character

45.1 Assessment methodology

The potential effects of the Ō2NL Project on the natural character of rivers, streams and wetlands has been assessed in a manner consistent with '*Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines*' (2022), which has been adopted by Tuia Pito Ora/NZ Institute of Landscape Architects.

Natural character is assessed with reference to:

- a desk-top review, including a review of reference works relating to the area;
- field work;
- workshops with specialists in natural hydrological processes, water quality (including stormwater treatment), aquatic ecology, terrestrial ecology, landscape, and cultural and CEDF matters; and
- targeted engagement, including with representatives of the Project iwi Partners.

The assessment and design of rehabilitation and restoration measures has been carried out in tandem with the ongoing development of the CEDF to provide continuity in assessment and design responses. That approach ensures alignment with the CEDF in terms of identifying existing natural character values; addressing potential adverse effects on those values; and taking opportunities to enhance natural character through restoration and rehabilitation of the water bodies.

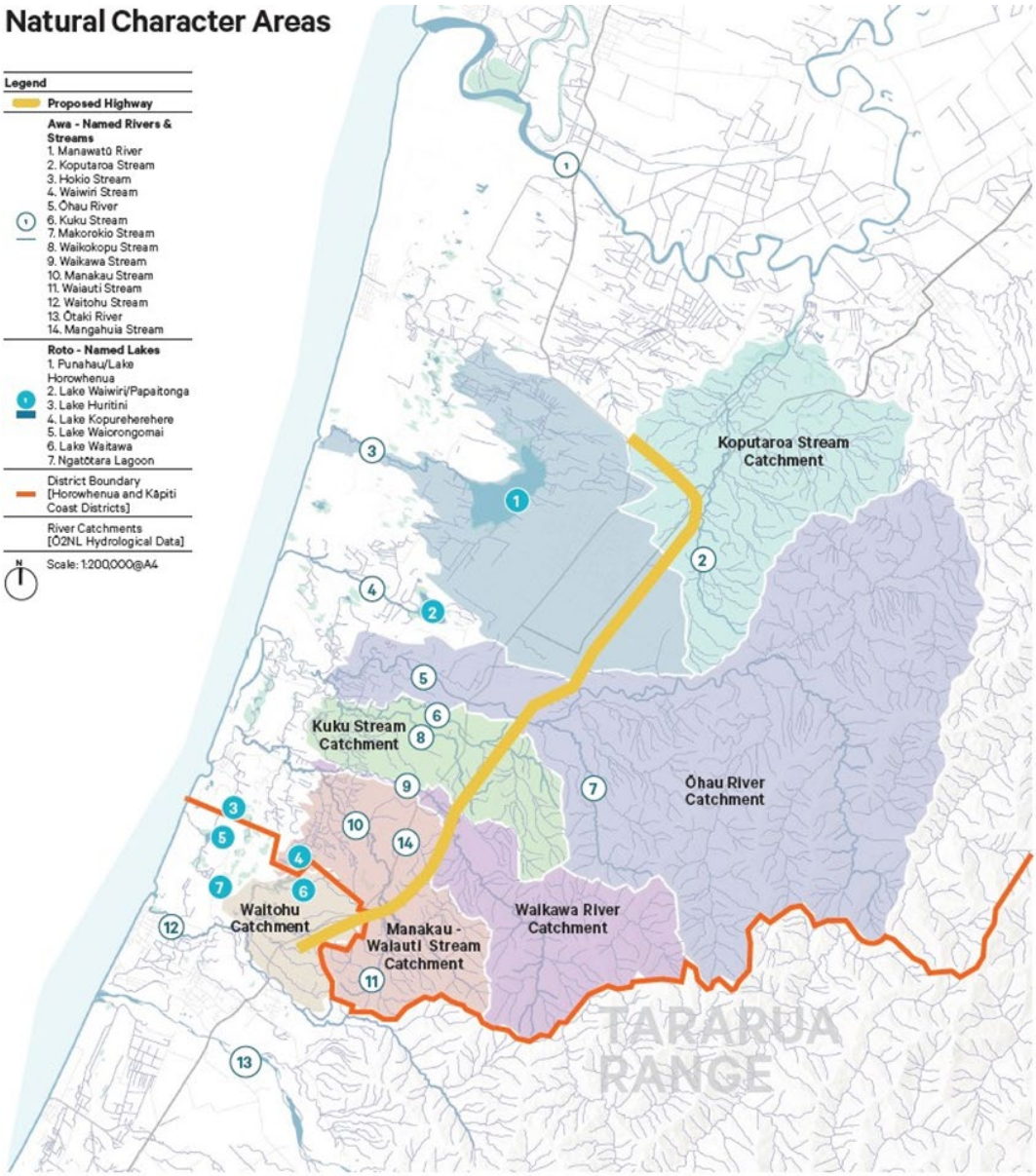
The effects of the Ō2NL Project on natural character values are assessed with reference to the waterbodies (river, streams, wetlands) in six main catchments traversed through the Project (shown in the figure below). While the Project also traverses the Punahau/Lake Horowhenua catchment, it does not cross any surface waterbodies in this area and was not considered to have any effect on the natural character of Punahau/Lake Horowhenua.

Effects on the natural character of the waterbodies traversed by the Project were assessed through:

- an analysis of the natural characteristics and qualities that contribute to the natural character of each waterbody and catchment, including existing degree of naturalness, and an assessment of overall natural character for each catchment (made against a seven-point scale from 'Very Low' to 'Very High');
- a description of the elements of the Project relevant to effects on natural character;
- an assessment of effects on natural character with respect to the natural characteristics and qualities;
- description of proposed mitigation (including restoration and rehabilitation); and
- an assessment of the net natural character.

Consideration is given to both the immediate areas around each crossing point, and to the wider landscape context of the relevant waterbody.

Figure 45-1 – Natural Character Areas



45.2 Effects on natural character values

Landscape input to the selection of a route east of Levin and at the back of the plains helped the Project avoid areas with greater natural character including the significant wetlands and lakes in the western part of the area.

Project shaping to address potential effects on natural character also includes the bridge designs at the Ohau River and each of the main streams, fish-friendly culverts for minor streams and watercourses, and stormwater treatment to address water quality.

The Project however has a functional requirement to cross the river and streams that flow east-west across the plains. At each crossing point there will be potential effects on biophysical aspects of natural character and unavoidable effects on perceptions of naturalness.

Measures to address adverse effects on natural character (see below) include restoration and rehabilitation of stream margins upstream and downstream of the Project and ecological offset mitigation.

The potential effects on of the Ō2NL Project on natural character prior to mitigation are described in the table below. The table shows the natural character rating for the area with the Project (but not factoring in mitigation), compared to the current position.

Table 45-1 – Operational Effects on Natural Character Before Mitigation

Natural Character Area	Assessment of Effects	Natural Character Rating
Koputaroa Stream tributaries	• Potential adverse effects on freshwater ecology through the displacement of ponds (albeit artificial) and culverts and diversions. • Potential adverse effects from lighting at the SH57 roundabout on the freshwater ecology of two adjacent streams. • Improved water quality of the Koputaroa catchment through treated stormwater from Ō2NL replacing untreated stormwater from existing SH1 and SH57. • The presence of the Ō2NL Project will reduce perceptions of naturalness of the wetland gullies and streams. • There will be adverse effects on the already relatively degraded natural character of the Koputaroa tributaries because of the further loss of wetland and stream length, and further reduction in perceptions of naturalness.	Low natural character (with Project) Low-Moderate existing natural character
Ohau River	• The bridge will accommodate natural bed and channel morphology and meanders. • The instream conditions will be substantially unchanged with respect to freshwater ecology. • Improved water quality of the Ohau River through treated stormwater from Ō2NL Project replacing untreated stormwater from existing SH1. • The presence of the Ō2NL Project will reduce the perception of naturalness, with effects on perceptions of the river's naturalness being moderated by the existing quarry on the south bank immediately adjacent to the Project.	Moderate natural character with Project Moderate-High existing natural character
Kuku Stream	• The replacement of the existing farm culvert with a bridge will allow the Kuku Stream to revert to more natural flows and bed. • Improved water quality of the Kuku Stream catchment through treated stormwater from Ō2NL replacing untreated stormwater from existing SH1. • The presence of the Ō2NL Project will reduce the perception of naturalness of the Kuku Stream with such effects being tempered by the modified context.	Moderate-Low natural character with Project Moderate existing natural character
Waikawa Stream	• The bridge will accommodate natural bed and channel morphology and meanders. • Improved water quality of the Waikawa Stream catchment through treated stormwater from Ō2NL Project replacing untreated stormwater from existing SH1. • The presence of the Ō2NL Project will adversely affect the perceived naturalness of the Waikawa Stream including through the consequential loss of the tributary stream length and loss of a remnant stand of old growth trees.	Moderate natural character with Project Moderate-High existing natural character

Natural Character Area	Assessment of Effects	Natural Character Rating
Manakau and Waiauti Streams	• The twin bridges will enable the streams to maintain a natural bed and channel morphology. • However, the earthworks will disrupt some meanders and require diversions of both streams. • Improved water quality of the Manakau Stream catchment through treated stormwater from Ō2NL replacing untreated stormwater from existing SH1. • The presence of the Ō2NL Project will adversely affect the perceived naturalness of the Manakau and Waiauti Streams, although such effects will be moderated by the modified surroundings including the uncontrolled stock access, lack of riparian vegetation, and presence of buildings, roads, and railway line.	Low-Moderate natural character with Project Moderate existing natural character
Waitohu Stream tributaries	• The Ō2NL Project footprint will encroach on wetland gullies – although the significance of the such effects is moderated by the extent to which the gullies are drained and modified. • Improved water quality of the Waitohu Stre/am catchment through treated stormwater from Ō2NL Project replacing untreated stormwater from existing SH1. • The presence of the Ō2NL Project will adversely affect the perceived naturalness of the Waitohu Stream tributaries, although such effects will be moderated by the current extent of modification.	Low natural character with Project Low-Moderate existing natural character
Punahau/ Lake Horowhenua	• The Project is remote from Punahau/Lake Horowhenua and there will be no adverse effects on natural character.	**N/A**

45.3 Measures to avoid, remedy or mitigate adverse effects

Input to Project shaping helped avoid and reduce potential adverse effects on natural character through route selection and design of stream crossings as discussed above.

Where adverse effects on the natural character values of rivers, streams and wetlands cannot be avoided, restoration and rehabilitation measures are proposed. Table 45-2 sets out these measures and provides a residual effects rating (after restoration and rehabilitation) compared with existing natural character for each natural character area. The primary restoration and rehabilitation measures are planting in the vicinity of the relevant stream crossing.

Table 45-2 – Restoration and rehabilitation measures and resultant natural character rating

Natural Character Area	Restoration and Rehabilitation Measures	Natural Character Rating
Koputaroa Stream tributaries	• The restoration and rehabilitation of a wetland gully that is located parallel to the Project beyond the end of Sorensons Road and connects with stormwater wetland planting and, in turn, providing connectivity to Punahau/Lake Horowhenua by providing habitat for bittern, spotless crake, and fernbird.	Low-Moderate natural character with Project

Natural Character Area	Restoration and Rehabilitation Measures	Natural Character Rating
	• The restoration of riparian vegetation along a stream upstream and downstream of a culvert at CH12850. • Contouring the stormwater treatment wetland adjacent to the roundabout at SH57 to appear as a natural wetland. • Installation of culverts that provide fish passage on tributary streams.	Low-Moderate existing natural character
Ohau River	• The restoration of riverside vegetation through weed control and inter-planting with indigenous species and connection of the restored vegetation to ecology offset measures that are to be implemented upstream. • The replacement of concrete rubble on the south bank of the Ohau River in the vicinity of the new bridge and with gabions of river cobbles in conjunction with replanting.	Moderate-High natural character with Project Moderate-High existing natural character
Kuku Stream	• The fencing and revegetating of the riparian margins of Kuku Stream in the vicinity of the stream crossing and linking this restoration with the nearby bush remnant that is also proposed to be restored. • The fencing and revegetating of parts of the riparian margins of the Kuku Stream tributary.	Moderate natural character with Project Moderate existing natural character
Waikawa Stream	• The fencing and enhancement of riparian vegetation along the stream banks and scarps and through inter-planting of indigenous species and weed control. • Revegetating the floodplain of the tributary stream and its confluence with the Waikawa Stream to create a 1.5 ha native forest in the lee of the bridge embankment.	Moderate-High natural character with Project Moderate-High existing natural character
Manakau and Waiauti Streams	• The fencing and planting stream banks upstream and downstream of the Project and similarly fencing and planting the margins of the parallel tributary Mangahuia Stream.	Moderate natural character with Project Moderate existing natural character
Waitohu Stream tributaries	• Restoration of raupō wetland, and planting margins with wet forest. • Installation of culverts that provide fish passage on the restored wetlands.	Low-Moderate natural character with Project Low-Moderate existing natural character

As noted above, the Ō2NL Project will have no adverse effects on the natural character of Punahau/Lake Horowhenua and therefore no mitigation measures are deemed necessary.

Overall, with the proposed restoration and rehabilitation measures, all natural character areas will retain their current degree of natural character. In addition, the benefits of the proposed restoration will continue to increase over time.

Effects during the construction phase of the Project will be managed through a management plan approach (including the Ecology Management Plan and Erosion and Sediment Control Plan), covering such matters as:

- working in streams, and erosion and sediment control; and
- demarcating bush areas (including those in proximity to stream crossings and wetlands) to avoid accidental damage.

45.4 Summary

The location of the Ō2NL Project east of Levin and at the back of the plains avoids more significant natural character in the west part of the area, including significant wetlands, streams and lakes.

However, the Ō2NL Project will have potential adverse effects within each catchment, primarily in respect of perceptions of naturalness of the rivers, streams, and wetlands. This is an unavoidable consequence of the functional requirement for the Project to cross the east-west river, streams and wetlands that cross the plains.

Proposed mitigation, restoration and rehabilitation measures will:

- improve or maintain biophysical aspects of natural character (hydrological processes, water quality, aquatic and terrestrial ecology); and
- increase the natural appearance of river/stream/wetland corridors to offset the presence of the Ō2NL Project impact on perceived naturalness.

These proposed measures in combination will maintain natural character in each natural character area. In addition, the benefits of the proposed restoration will continue to increase over time.

46 Social

46.1 Introduction and assessment methodology

The Ō2NL Project will provide improved safety, connectivity, and resilience, as well as a SUP along the full Project extent. Those benefits are assessed as having potentially moderate to high positive social impacts for the community (regional, local and sub-local communities), by helping respond to current social issues (such as safety, congestion, limited active transport modes and connectivity) and future growth. That, in turn positively impacts how people live (move around the area), connect to each other, remain safe when travelling (all modes) and have active transport mode options.

By taking traffic away from the centre of Levin, Ohau, Kuku, Manakau and North Ōtaki, the Project will improve the quality of the living environment and amenity of these community centres.

Overall, the Project is anticipated to generate moderate to high positive social impacts.

At a regional level, potential operational social impacts are wholly positive and at a local community level they are largely positive. As members of these communities, the sub-local residents will also experience these benefits. While there is a concentration of potential negative impacts, these are highest at the sub-local level (both in terms of construction and operational impacts) and will generally reduce with increasing distance from the new corridor.

Social effects have been assessed with reference to the International Association of Impact Assessment ("IAIA") Social Impact Assessment Guidelines and the Waka Kotahi '*New Zealand Transport Agency: People, Place and Environment Series: Social Impact Guide'* (2016), which acknowledges and works alongside the IAIA guidelines and provides New Zealand and transport infrastructure context. The social impact methodology is summarised in Figure 46-1.

Figure 46-1 – Social Impact Methodology Overview

Social impacts have been considered at a regional community, local community and sub-local community level and can be generally described as:

- Regional community – the wider area connected by the whole of the Ō2NL Project, being the region around SH1 and SH57 between Palmerston North and Wellington.
- Local community – the established communities that the proposed designations traverse through, including Levin, Ohau and Kuku, and Manakau.
- Sub-local community – the neighbourhoods located within or adjacent to the proposed designations. The geographic extent of each sub-local community depends on local side street communities and/or neighbours surrounding the Project (this considers the social connections/characteristics established rather than the individual properties).

With reference to the IAIA guidance, the Project is assessed in respect of the potential impacts on:

- Way of life:
  - living: how people carry out and get to their activities of daily living, including access to and between communities, and places where people live, work and play; and
  - sustaining oneself: how people sustain themselves both financially, and providing for themselves including viability and feasibility of economic production.
- Community cohesion: connection and participation in the community and stability; character, culture and identity; and services and facilities in a community.
- Health and wellbeing: a state of complete physical, mental, social and spiritual wellbeing, as opposed to being limited due to the absence of disease or infirmity.
- Quality of living environment: sense of place, changes in comfort and attractiveness of areas, liveability and fears and aspirations of lifestyle in relation to the environment.

The scale of impact, for both positive and negative impacts, is identified as either very low (negligible), low, moderate, high or very high. This assessment is made on an overall consideration of the scale of impact (including duration, likelihood, severity and extent).

46.2 Operational social impacts

46.2.1 Regional community

The following sets out the potential social impacts of the Project on the wider region. These impacts are significantly positive; there are no material negative social impacts at a regional scale.

46.2.1.1 Way of life

Within the region, people travel between Ōtaki and Levin and further afield to Wellington and Palmerston North for recreation, education, specialist health services, work opportunities and connecting with friends and family. Currently long travel delays can be experienced on SH1 and SH57, particularly around public holidays and at times where there are accidents on SH1 in this area.

Businesses are also dependent on travelling between Ōtaki and Levin, including for moving goods and being accessible for employment. Current delays and issues with resilience of the existing section of SH1 and SH57 cause disruptions to business operations both in terms of efficiency and function and have economic consequences. If employees cannot reliably travel to work there is an impact on the ability of people within the region to sustain themselves financially.

The Project provides improved route resilience, travel time savings and reduced delays. Combined, these improvements will have a positive impact for people within the region who are dependent on the region for employment and moving goods. Depending on the communities' frequency of use and reliance on this route, the new corridor has moderate positive way of life impacts at the regional level.

46.2.1.2 Community cohesion

The SUP has the potential to become a key community resource as it will link to shared path facilities, extend the regional cycle network and connect communities using alternate forms of transport. It has a low positive social impact at the regional level (with benefits accruing to the small portion of the community that will use the SUP at these distances).

46.2.1.3 Health and wellbeing

The Ō2NL Project will reduce significant future adverse social impacts on the region by reducing the likelihood and severity of outcomes of crashes and associated social impacts of these events (such as emotional trauma, loss of income and future income potential, loss of members of families and community members who service various roles within these social structures, loss of quality of life). This is assessed as a high positive impact on the health and well-being of the region.

46.2.2 Local community and sub-local community social impacts

46.2.2.1 Way of life

The Ō2NL Project will have moderate to high positive impacts as a result of:

- more efficient and reliable connection for movements between local communities as a result of improved resilience, safety and travel times, including associated social benefits; and
- reduced congestion on existing SH1 and SH57, resulting in positive impacts for the local communities that rely on SH1 and SH57 to move within the area.

For Ohau, Kuku and Manakau the improved connections have a long term moderate positive impact on way of life. The improved resilience, travel time savings and reduced delays as a result of the Ō2NL Project will have a moderate positive impact on local and sub-local communities who rely on the Ōtaki to Levin corridor for work and the transportation of goods – allowing them to sustain themselves.

Reduced traffic through Levin town centre will improve the function of the town centre and will make travel across and through the town centre easier. This has a low to high positive impact on the way people work, educate, live and play.

The SUP has a potentially low (initially) to moderate positive impact on way of life, including how people sustain themselves by providing an attraction for locals and visitors, along with being an alternative transport option for some.

At a local level, the Ō2NL Project will potentially have the following adverse impacts on way of life for specific communities, prior to mitigation:

- Levin: Changes in the noise environment may impact on how people live their lives in terms of moving around, lifestyle and sustaining oneself and is assessed to have a very low to low potential negative impact. Severing the direct link from Levin via Kimberley Road is assessed as overall having a negligible adverse impact on way of life. Businesses, such as horticultural properties and farms that are acquired for the Project may result in a loss of jobs, which is assessed as having a low potential adverse impact. Over time this will reduce to negligible.
- Ohau and Kuku: As linkage roads are maintained, or subject to minor changes, these communities are not considered to be negatively impacted in terms of way of life and overall are assessed as having a very low potential negative impact. Businesses, such as horticultural properties and farms that are acquired for the Project may result in a loss of jobs, which is assessed as having a very low potential adverse impact due to the low number of people in this local community that are employed locally.
- Manakau: Reduction in traffic volumes on SH1 will have a low negative impact on employment and businesses reliant on passing trade. Some local business such as horticultural properties and agricultural farms will be affected by property acquisition processes. Businesses, such as horticultural properties and farms that are acquired for the Project may result in a loss of jobs, which is assessed as having a low potential adverse impact.

After mitigation, the above adverse way of life impacts at a local level reduce to negligible across all areas.

At a sub-local level, the Ō2NL Project will potentially have the following impacts on way of life for specific communities:

- Levin: Similar to the local community, changes in the noise environment may impact on how people live their lives in terms of moving around, lifestyle and sustaining oneself and is assessed to have a very low potential negative impact, prior to mitigation. Some trips will result in additional travel times that will change how people move and connect to the local community. The changes in travel times for these sub-local communities will have minor adverse effects. After mitigation, impacts reduce to negligible.
- Ohau East, Muhunoa East (western portion) and Kuku East: Some individual farm properties will be required to change daily operations. Alterations to the road network may increase travel time. Overall adverse impacts are assessed as low, prior to mitigation. After mitigation, impacts reduce to very low.
- Manakau: Properties including farms will be severed as a result of the Project and houses remaining within 200m of the Project will experience changes to both noise and visual amenity, which may require changes to how people live and particularly recreate outdoors. Overall adverse impacts are assessed as low, prior to mitigation. After mitigation, impacts reduce to very low.
- North Ōtaki: Properties including farms will be impacted, resulting in changes to farm operations and employment within this small sub-community. Overall impacts are assessed as low, prior to mitigation. After mitigation, impacts reduce to very low.

46.2.2.2 Community cohesion

Reassigning traffic from existing SH1 and SH57 reduces traffic volumes and results in potentially moderate to high positive impacts on community cohesion.

The SUP provides opportunities for social connection and unplanned interactions, including linking to current or future footpaths, cycleways and access to recreation and key community resources. The SUP has a low to moderate positive effect on cohesion, character and community services within the communities.

At a local level, the Ō2NL Project will potentially have the following adverse impacts on community cohesion for specific communities:

- Levin: The Project improves sense of place and cohesion through retention of community connections. Fewer local connections from the Project may impact on cohesion east to west with both

established communities to the east and the proposed Tara-Ika development, however, this is not considered significant, and overall adverse impacts are identified to be very low to negligible, prior to mitigation. After mitigation, impacts reduce to negligible.

- Ohau and Kuku: The Project may change the rural character of parts Ohau (Muhunoa East Road) by introducing a new busier road environment. However, reduced traffic volumes on SH1 may reduce the existing severance. Overall adverse impacts are assessed as very low to low, prior to mitigation. After mitigation, impacts reduce to very low.
- Manakau: The Project will create a physical barrier between rural and residential communities, in particular the village and Manakau Heights area. However, for the local Manakau community as a whole, adverse impacts are assessed (prior to mitigation) as low due to the scale of change to the local community. After mitigation, impacts reduce to very low.

At a sub-local level, the Ō2NL Project will have the following adverse impacts on community cohesion for specific communities:

- Levin: Some properties between the Project and SH57 will be severed from the eastern community, including a portion of the proposed Tara Ika development. Overtime (and particular in the case of the Tara-Ika Growth Area) a new sub-community may form. A number of households will be impacted by land acquisition, resulting in potentially low to moderate adverse impacts, however, over time these communities will create a 'new normal' responding to the changed community dynamics. Overall, the project is assessed to have a low negative impact on community cohesion at Levin's sub-local level, reducing to very low post-mitigation.
- Ohau East, Muhunoa East (western portion) and Kuku East: Approximately a quarter of sub-local households will be affected by property acquisitions and for those living between SH1 and SH57, will be physically separated from the rural community (albeit retaining local road connections). Overall adverse impacts are assessed as low to moderate (prior to mitigation), which may reduce to low over time. Post-mitigation, impacts reduce to very low.
- Manakau: A number of sub-local households will be affected by property acquisitions. The Project will also create a physical barrier to those living in the east of the village from feeling connected to the community. These changes will impact a large portion of the remaining sub-community in particular Manakau Heights. Subsequently, overall adverse impacts are assessed as low to very low (prior to mitigation). After mitigation, these reduce to very low over time.
- North Ōtaki: Approximately half of the households in this area are impacted by disrupted connections but the scale of the adverse impact is assessed as low to moderate, prior to mitigation. After mitigation, the impact reduces to very low.

46.2.2.3 Health and wellbeing

The Ō2NL Project results in a reduction of 35 DSIs per 5-year period following its opening. This reduces future social impacts and is assessed as having a high positive impact on the health and wellbeing of local communities and sub-local communities.

The provision of the SUP will contribute to the physical, mental, social and spiritual wellbeing of users and being separated, will provide a safe walking and cycling environment. Recognising the uncertainty at this stage on the frequency of use, the SUP potentially has a low to moderately positive impact on health and wellbeing of communities.

In addition, at a sub-local level, the Ō2NL Project will potentially have the following adverse impacts on health and wellbeing for specific communities:

- Levin: Despite noise levels of the Ō2NL Project being within accepted limits, some residents east of Levin may experience some stress, however overall, this is not likely to be a large proportion of the community. Members of the immediate community currently experience daily stress associated with navigating SH57 intersections. It is anticipated that reduced traffic volumes will reduce this impact. Overall, potential adverse impacts on health and wellbeing for the sub-local Levin community are

assessed as negligible to low, prior to mitigation. After mitigation, impacts reduce to negligible to very low.

- Ohau East, Muhunoa East (western portion) and Kuku East: Some properties located in the more rural and remote sections of this community will experience a high degree of change with respect to noise and visual impact, particularly those within 200m of the Project, resulting in reduced enjoyment of living in this location. Overall, adverse impacts are assessed as low to very low (prior to mitigation), and anticipated to reduce over time. After mitigation, impacts reduce to negligible to very low.
- Manakau: Likely impacts on Manakau village and Manakau Heights relate to operational noise and residential amenity, particularly in Manakau Heights, which may result in some individuals experiencing high levels of stress and potential anxiety. Overall, adverse impacts are assessed as low, prior to mitigation. These impacts reduce to very low after mitigation.
- North Ōtaki: The main change experienced in this sub-community will be as a result of property acquisition, leading to potential isolation, stress and anxiety for some individuals. Overall, adverse impacts on individuals are assessed are potentially very low prior to mitigation, reducing to negligble to very low after mitigation.

46.2.2.4 Quality of living environment

The reduction of traffic, and particularly heavy vehicles, through Levin will have high positive amenity impacts on the Levin town centre and the way people are able to experience it. For residences and business located along SH1 and SH57 in North Ōtaki, Manakau, Kuku, Ohau and Levin, the reduction of traffic will reduce noise and improve the quality of the environment for the central spine for each community, which will have potentially low to moderate positive impacts for local communities.

The SUP provides an amenity for local communities. It will also provide access to communities and resources such as walking paths, the river and reserves. Overall, the SUP will have high positive benefits on the amenity of the environment for users of the SUP and low to moderate positive impact on the local communities as a whole due to the potential to activate these communities.

In addition, at a local level, the Ō2NL Project will potentially have the following adverse impacts on quality of living environment for specific communities:

- Ohau and Kuku: The Project will impact rural properties due to property acquisition or partial acquisition as well as potential transition from a less rural focussed community to semi-urban. Whilst road connections remain, the Project creates a physical barrier. Overall, adverse impacts are assessed to be very low, prior to mitigation. This reduces to negligible post-mitigation.
- Manakau: The Project will sever the eastern edge of the village's physical connection with nature and the Tararua Range (and in particular Hanawera Ridge), which will impact on the quality of living environment for this sector of the community. From a visual amenity perspective, the Project largely avoids adverse effects on Manakau Village itself and that the Project will have a good fit with the landscape patterns behind Manakau, but will cut across the picturesque landscape of South Manakau. Overall, adverse impacts are assessed to be low, prior to mitigation, reducing to negligible after mitigation.

At a sub-local level, the Ō2NL Project will potentially have the following adverse impacts on quality of living environment for specific communities:

- Levin: For people residing near SH57, there may be benefits associated with reduced traffic and improved safety on SH57. For those now closer to the new interchanges or between SH57 and the proposed designation, there will be less connection to the rural environment to the east, which may impact their desire for a more rural lifestyle. In this regard, it is noted that change in this environment is anticipated as part of the development of the Tara-Ika Growth Area. Overall, adverse impacts are assessed as low, prior to mitigation, reducing to very low to low after mitigation.
- Ohau East, Muhunoa East (western portion) and Kuku East: Approximately one third of this sub-community lives within close proximity to SH1 and experience a noisier, busier environment within a rural location. Where some sub-local residents are currently some distance from SH57 and SH1 and

experience a rural living environment, the Project will change the sense of place from a quiet rural area to being within close proximity to a major new state highway with additional noise and visual impacts. Overall, adverse impacts are assessed as moderate, prior to mitigation, reducing to moderate to low after mitigation.

- Manakau: Some members of this sub-community already live in close proximity to SH1 and experience noisier, busier environments even if these are rural. Others, particularly those up on a ridge, can hear the existing SH1 as background noise only. The presence of the Ō2NL Project will change the quality of this living environment, whereby it could compromise the aspirations held by residents in terms of their rural lifestyle and rural views. Those properties adjacent to the Project in rural areas where properties currently have a direct connection with nature and the Tararua Range, may experience negative impacts to their living environment due to noise and visual impacts. Overall, adverse impacts are assessed as moderate to high, prior to mitigation, reducing to moderate to low after mitigation.
- North Ōtaki: Members of this sub-community that live to the west of the Project, will lose direct connection to a rural backdrop, leading to a disconnection with the rural area, particularly those who are adjacent to the Project. Overall, adverse impacts are assessed as low to moderate, prior to mitigation, reducing to low after mitigation.

46.2.3 Summary of operational social impacts

All of the community will benefit from the positive social impacts of improved safety, efficiency and resilience as a result of the Ō2NL Project. From the regional to the sub-local scale, people will experience improvements in way of life, cohesion, quality of living environment and health and wellbeing.

The location of an individual, and how often they use the new state highway (and the SUP) or experience the changes to the existing SH1 resulting from the Project (and associated reduced traffic volumes), will change the degree of positive impact experienced. Overall, the Ō2NL Project will have moderate positive impacts.

Negative social impacts are more spatially specific, that is, they are related to proximity of certain areas and people to the Ō2NL Project. The closer someone is to the Project, the more change to the overall environment will be experienced. Those furthest from the existing SH1 and/or SH57, in a quiet, sparsely populated rural area, but adjacent to the Project, will experience the highest degree of change. Overall, at a local level, without mitigation the potential negative social impact will be low to very low/negligible. At sub-local level, overall (prior to mitigation) impacts will be very low to high.

46.3 Construction social impacts

46.3.1 Way of life

The construction of the Project as a whole will result in increased activity in both the regional and local communities. This in terms of jobs constructing the Project, local support required by the Project and activities of people on the Project (such as local spend and accommodation). These impacts are assessed as low to moderate positive impacts of the Project as a whole.

At a local and sub-local level, where local roads are used for construction access, and where works occur on, or near, local road the way people live, work and play may also be disrupted as a result of increased traffic and delays due to construction activities.

Those in close proximity to construction activities have the potential to experience disruption to way of life due to construction noise. Partially acquired properties have potential disruption to how they live including work and access to their properties, even though this is anticipated to be a small number. Overall, this is assessed as potentially having a low to moderate negative impact, prior to mitigation, reducing to low negative after mitigation.

46.3.2 Community cohesion

Potential impacts on community cohesion are not evenly distributed across the Project. It is generally anticipated that directly affected landowners and those living adjacent to the Project may be impacted as a result of feeling isolated from the wider local community because of different experiences of the process, concerns and levels of impact. The construction of the Project as a whole may also have an impact on community cohesion due to the level of destabilisation, disruption, and social change to each community during construction. Overall, these impacts are assessed as potentially having a very low to low negative impact on local communities and moderate for sub-local communities. These effects are expected to dissipate over time as the community adjusts to the changes. Overall, these effects are assessed as low to moderate negative prior to mitigation, reducing to very low negative after mitigation.

46.3.3 Health and wellbeing

Construction activities have the potential to impact on health and wellbeing as a result of construction noise and vibration and construction related traffic and dust.

In terms of noise and vibration, subject to good practice management, construction noise and vibration effects are considered to be minor. In terms of air quality, impacts on health and wellbeing from dust is at a sub-local level that can be also addressed by construction dust management practices. Similarly, construction traffic and construction activities on local roads may also result in safety impacts for road users, including pedestrians and cyclists, but, subject to the appropriate management of construction traffic (having particular regard to the safety of more vulnerable road users), the impact of construction traffic is assessed as minor. These impacts are assessed as being very low to low negative, prior to mitigation, reducing to very low negative after mitigation.

46.3.4 Quality of living environment

Changes to the quality of the living environment during construction of the Project will include changes to the landscape and noise generated by the construction activities, with visual effects including the raw appearance of earthworks and construction clutter and noise effects including frequent construction trucks passing by.

At a sub-local level, and during working hours, construction activities will result in temporary disruption to the living environment. The level of this impact will depend on the duration of construction, level of activity and degree of change from current environment. The degree of change is not considered significant for those who currently live near existing SH1 or SH57.

Having regard to the existing environment and temporary nature of activities, the potential impact of construction activities on the quality of the living environment are assessed as negligible at a local level and low to moderate at a sub-local level. Overall, effects are assessed as low to moderate negative prior to mitigation, reducing to low after mitigation.

46.4 Measures to avoid, remedy or mitigate adverse effects

In terms of measures to manage potential construction social impacts, the measures and procedures recommended with respect to construction traffic, noise and vibration and air discharges (embedded through management plans) provide appropriate mitigation of construction related social impacts. However, in addition, the following further measures will further reduce potential adverse impacts:

- planned and responsive community communications set out in a management plan and delivered by a liaison person (or people) to provide up-to-date information, respond to queries and complaints and assure interested or impacted parties there is a point of contact to address any concerns;
- ongoing community and stakeholder meetings to discuss the development of the Project and to potentially be extended into the detailed design and construction phase to provide updates and a forum for concerns to be raised, and opportunities to be discussed; and

- consider wayfinding signs to inform road users of services in local villages and Levin to encourage through traffic to make stops to mitigate loss of business of those reliant on passing trade.

The measures proposed to mitigate landscape, visual and noise effects will serve to mitigate many of the identified operational social impacts. In addition, the following further measures will reduce adverse impacts:

- ongoing local community meetings for the first three to six months following the opening of the highway to aid in the transition and provide a contact point if initial issues arise;
- engage local communities in processes to address the future of SH57 and SH1; and
- the provision of pedestrian facilities on local roads connections.

The mitigation measures proposed will reduce the scale of the assessed local and sub-local adverse impacts, as referenced in the 'effects' sections above.

46.5 Summary

Overall, the improved safety, connectivity and resilience of the state highway network and the provision of a SUP are assessed as having long term moderate to high positive social impacts on the community at all levels.

At a regional level, potential operational social impacts are wholly positive and at a local community level they are largely positive.

At a sub-local level residents will experience the benefits of the Project, but some specific sub-local communities will also experience adverse effects of both the construction and operation of the Project. These effects reduce with distance from the Project. The large scale of the Project within the sub-local communities represents a high degree of change to the rural environment (to more peri-urban environment) and potential changes in social cohesion. Overall, without mitigation, impacts range from negligible to high adverse impacts prior to mitigation. After mitigation, they range from 'negligible' to 'low to moderate' negative (noting only two areas are categorised as 'low to moderate negative').

Measures to manage potential construction effects with respect construction traffic, noise and vibration, and dust (embedded through management plans) will provide appropriate mitigation of construction related social impacts. Additional planned communications, meetings and involvement of the community in mitigation planning will assist to reduce social impacts.

Measures to manage operational transport, noise and landscape and visual effects will serve to mitigate many of the identified social impacts identified. Further measures such as community participation at meetings, provision of additional pedestrian facilities on local roads and engagement with communities regarding the future of SH1 and SH57 will reduce adverse social impacts.

47 Hydrology and groundwater

47.1 Assessment methodology

47.1.1 Hydrogeology and groundwater

A range of geotechnical, hydrogeological and groundwater investigations have been undertaken to support the assessment of effects of the Ō2NL Project. This included boreholes, test pits, cone penetration tests, monitoring bores, hand auger holes, slug tests and soil infiltration tests. The information from these investigations, together with data from other sources, provides an understanding of the depths of groundwater along the Project corridor, groundwater level variation over time, maximum groundwater levels, and the dominant sources of groundwater recharge beneath and adjacent to the Ō2NL Project.

Modelling, calibrated against the measured groundwater levels, allows daily groundwater levels to be predicted. Groundwater, and its interaction with surface water, including wetlands and springs within the Ō2NL Project Area have also been modelled. In turn, the modelling informs the assessment of any potential effects of the Project on groundwater.

47.1.2 Hydrology

The assessment of impacts of the Project in respect of hydrology is informed by hydrological and computational hydraulic models that represent both the 'baseline' and 'with-scheme' environments. The 'with-scheme' model includes an indicative 'concept' scheme design of the Project. The two models have been compared with reference to four scenarios to allow the potential effects of the Ō2NL Project on hydrology and flooding to be evaluated.

The potential effects of the Project are assessed in relation to the difference in water surface elevation between the 'with-scheme' and the 'baseline' models. Any changes in flood level between these modelling scenarios during the 1% AEP with climate change RCP 6.0 to 2130 (the design event), that are greater than 0.05m, have been identified. The potential effect of this increase in water level has been assessed against potentially impacted receptors.

47.2 Operational effects on hydrology and groundwater

47.2.1 Operational effects on groundwater

The stormwater management system that forms part of the Project will:

- reduce peak runoff (even though the total runoff volume will likely remain approximately the same). This will reduce the existing and future flood hazard;
- collect any rainfall that would have infiltrated the ground surface beneath the footprint of the Project with this water infiltrating the area beneath and adjacent to the stormwater devices after treatment, therefore maintaining the existing water balance so that the Project will have no adverse effects on groundwater supported wetlands and forests;
- result in slightly higher soil moisture and groundwater recharge than under current conditions that will mitigate some of the existing flood hazard to the Project area and down-gradient;
- result in greater infiltration and percolation of surface water to groundwater that will give rise to a small increase in potential groundwater recharge, particularly during larger rainfall events, and will reduce the amount of surface runoff;
- treat all stormwater before disposal to ground or existing waterways and therefore has no impact on the water quality of existing groundwater users, wetlands or streams;
- maintain, and potentially enhance, the existing surface to groundwater hydraulic connections; and
- ensure that as far as practical any surface hydraulic connections are maintained, or, where this is not practicable, the length of any diversion or deviation from the existing flow paths will be minimised.

In terms of groundwater quality, because of the proposed change in land use, the Project has the potential to reduce contaminants from entering the groundwater. This is because:

- while runoff from the highway may contain a range of potential contaminants, treatment of these will be provided by specially designed and constructed wetlands;
- nutrient (nitrogen and phosphorus) and pathogen (bacteria, virus, protozoa) loading to groundwater will decrease where agricultural land uses are replaced by the Project.

Therefore, it is likely that the nutrient and pathogen contaminant load to the groundwater, and groundwater-fed surface water bodies such as Punahau/Lake Horowhenua, will decrease slightly because of the Ō2NL Project.

The Ō2NL Project will generally avoid, and where this is not possible, minimise any direct interaction with groundwater. This is because the Project will be at-grade, and above the maximum height of the water table, wherever practicable. In the few localised areas where avoiding any potential interaction with groundwater may not be practicable, provided that the hydraulic connections are maintained and the quality and quantity of water is not diminished, the interaction of the Ō2NL Project with the groundwater will have no adverse effects. Groundwater flow paths and the hydraulic gradient of groundwater will be unchanged as a result of the Project.

The only 'community bore' near the Project is the Manakau Water Scheme, also known as the Glenmorgan Water Supply Scheme. This scheme supplies potable water to a number of households and is located just north of the Project. Given the location and the depth of this bore, it is not anticipated to be affected by the Project.

Road cuts may intercept and reduce groundwater levels in wetlands within and adjacent to the Ō2NL Project that are connected to groundwater. Seven wetlands are identified as potentially impacted, however, these impacts, including ecological impacts, are assessed as less than minor. Despite this, the Project has assumed that these wetlands will be lost and this will be compensated by the remediation and offsetting proposed.

Increasing infiltration to ground beneath the stormwater treatment devices has the potential to cause mounding of the groundwater. Any mounding will be of generally short duration, immediately following any rainfall event. The risk of mounding causing local high water tables, and potentially exacerbating flooding, depends on specific site conditions and the magnitude, duration and intensity of rainfall. Detailed analysis has shown that any risk will be less than minor.

With the exception of one area, excess stormwater will be discharged to surface water bodies within the proposed designations. Consequently, any risk from mounding will be negligible. The area where mounding is considered to have potentially the greatest effect is east of Levin, from approximately 500m north of Queen Street to approximately 500m south of Tararua Road. Five treatment facilities are proposed in this area to capture, treat and then discharge to ground all stormwater from the Project and keep it within the Punahau/Lake Horowhenua Catchment.

Comprehensive modelling has shown that the potential effects of mounding are of limited extent and short duration. Greater effects are only likely during extreme design events and even then, the effect of the stormwater treatment facilities will be localised and of short duration. For events larger than the design event (the 1% AEP rainfall increased for the effects of climate change), ,it is likely that the entire ground would be saturated, and overland flow would occur. The Project will not affect this situation.

47.2.2 Operational effects on hydrology

The Project will traverse a number of coalescing alluvial fans formed by rivers and streams draining the Tararua Range and its foothills. These rivers and streams pose a flood hazard to the existing highway, which may be exacerbated by the predicted effects of climate change. This risk of flooding will be avoided, and where this is not possible, mitigated by the Project.

Comprehensive computational hydraulic modelling of a concept design for the Project during an extreme design event has shown that any risk of flooding within the proposed designation can be either avoided or mitigated so that the overall the effects of the Project on hydrology and flooding are less than minor. Any potential effects of constricting existing flow paths across the floodplains are contained within the proposed designation boundaries.

During the design event (that is, the 1% AEP flood increased to allow for the effects of climate change to 2130) modelled increases in water level dissipate to less than 0.1m within 50m upstream of the proposed designation boundaries, or 70m in the case of the Ohau River. The short durations of increased water levels are considered unlikely to have a material effect on sediment deposition or crop recovery.

During smaller and more frequent design events, any increase in water level is contained within the proposed designations, except for the Ohau River where any effect dissipates to less than 0.1m within 50m of the proposed designation.

Even these small effects will likely be reduced further during detailed design of the Project.

No buildings outside the proposed designations are impacted by the Project even during the design event (that is, the 1% AEP flood increased to allow for the effects of climate change to 2130).

Given the rural (landscape and land-use) context; the extreme nature of the design event used when assessing the potential effects of the Project; the short duration of even extreme floods; and small footprint of any impact, any effects of the Project in respect of flooding and hydrology will be less than minor.

Where the Project crosses rivers and streams, the design philosophy ensures the continuity of flow of both water and sediment. The structures may result in localised increases in velocity, by restricting existing flow across the adjacent floodplains. Scour protection will be provided to mitigate this effect where necessary. Any effects on hydrology and flooding as a result of the water body crossings will therefore be less than minor.

Downstream of any potential crossing, flows redistribute laterally within a very short distance to conform to their original flow paths. This occurs generally within the proposed designations or within 100m downstream (but approximately 115 metres in the case of the Ohau River) during the design event modelled. Consequently, any adverse effects on hydrology and flooding downstream of the Project are assessed as less than minor.

The Project will provide a more resilient highway during heavy rainfall, which is predicted to increase with climate change. The proposed Ō2NL Project will lower risk of exposure and provide greater regional resilience benefits to emergency responders, operators and users of the road network compared to the existing SH1.

47.3 Construction effects on hydrology and groundwater

47.3.1 Construction effects on groundwater

Potential contamination of the groundwater during construction of the Ō2NL Project will be avoided by ensuring that all runoff from construction activities and adjacent areas is diverted away from any earthworks and land disturbance. Most of the sediment and any pathogens in the runoff will be removed as it passes through the soil and unsaturated zone. The residual risk of groundwater contamination from bulk earthworks on existing groundwater users, groundwater dependent ecosystems, lakes and streams will therefore be less than minor.

Since most of the Ō2NL Project will be constructed at grade and above the maximum groundwater level, little construction related dewatering is likely to be required. Any dewatering will be of short duration, likely no more than one to two months, and be of limited extent. Dewatering will be to allow installation of culverts and so any effects will be limited to the immediate vicinity of the works. Since culverts will be installed sequentially and not all at once, any effects of dewatering will be extremely localised and have negligible effect on the wider groundwater system.

The proposed material supply sites will not have any effects on surface water features or the water balance. The resulting pits may provide some flood mitigation, but the magnitude of this will depend on the location of the pit relative to rivers and streams and the volume of the pit relative to the magnitude of the flood. Any benefit is likely to be greatest during smaller and more frequent events.

Construction activities will take place in the near future and therefore under the current, rather than future, climate. For this reason, the effects of the construction phase on hydrology and flooding are likely to be less than those of the operational stage; and will be less than minor.

A strategy has been adopted for the abstraction of water to support construction of the Project that will minimise the overall construction water requirements, re-use water collected through construction, utilise existing sources (for example, boreholes), only take water from the existing Core Allocation of a catchment (unless water in streams and rivers is above median levels), only abstract water above minimum flow, and make extensive use of water storage to meet demand during any extended period of

low flow. Water will be abstracted from a combination of sources to minimise any potential effect on the environment.

The adoption of this strategy, and working within the existing resource management framework of the Regional Councils, mean that any potential effects of the abstraction of construction water will be less than minor.

47.4 Measures to avoid, remedy or mitigate adverse effects

The Ō2NL Project avoids, and where this has not been practicable, minimises effects on groundwater. Groundwater monitoring is proposed for the duration of construction activities and for one year after completion of the Project to confirm this outcome, manage any residual uncertainty, and to monitor for unforeseen effects.

The potential impacts of construction activities on groundwater, hydrology and flooding will be avoided by adopting standard methods and measures for construction management that will be set out in the CEMP and the ESCP. This will avoid any risk to groundwater (primarily through contamination).

All existing monitoring bores located within the construction footprint or that will no longer be required after completion of the Project will be decommissioned in accordance with the New Zealand Environmental Standard for Drilling of Soil and Rock (NZS 4411:2001). This will remove any direct pathways for contaminants to potentially enter groundwater.

47.5 Summary

The Project has a number of expected positive benefits including reducing the existing flood hazards; improving resilience; and potentially increasing groundwater recharge; improving groundwater quality; and enhancing groundwater-fed water bodies.

Further, the Project has no effect on:

- the existing water balance;
- any direct interaction with the groundwater system;
- the existing water surface and groundwater hydraulic connections;
- the existing links between surface water and groundwater;
- adverse groundwater mounding; and
- existing groundwater users.

In terms of hydrology and flooding, the Ō2NL Project may result in some minor localised increases in water level during extreme flood events. However, these effects are assessed as less than minor because:

- the increase in water level relates only to an extreme event (such as the design event);
- any increase in water level is localised, of short duration, and in a rural context within which flooding already exists;
- no buildings are impacted by any increase in water level;
- any increase in water level is primarily within the proposed Ō2NL Project designations or dissipates within a short distance of the proposed designations.

The location and design of the bridges will avoid encroachment on the active floodplain, None of the bridge structures will cause high velocity concentrations that, following mitigation by scour protection, will have more than minor effects on the surrounding environment.

Overall, in respect of the impacts of flooding, the Ō2NL Project will provide significant resilience benefits to users of the state highway network.

Any adverse effects of the construction of the Ō2NL Project on groundwater, flooding and hydrology are assessed as less than minor, subject to usual construction management measures and mitigation being implemented.

48 Surface water quality

48.1 Assessment methodology

The potential effects of the Ō2NL Project on surface water quality are identified based on the following:

- the Environment Institute of Australia and New Zealand (EIANZ) Ecological Impact Assessment Guidelines;
- a review of Horizons' water quality data at sites in the Koputaroa Stream, Ohau River, Waikawa Stream, Manakau Stream and inflow streams of Punahau/Lake Horowhenua and GWRC water quality database in the Lower Waitohu Stream;
- water quality monitoring and analysis of all streams that are traversed by the Project; and
- modelling the load of key road stormwater contaminants discharged from the Ō2NL Project to each stormwater catchment using the Contaminant Load Model (CLM) to estimate annual contaminant loads and to understand relative effects on water quality both with and without the Project;

Water quality, and the level of effect of the Project on the ecological values in the receiving environment, have been assessed using the steps of the EIANZ Guidelines that are described in detail below in respect of approach to assessing effects on terrestrial and freshwater ecology.

48.2 Operational effects on surface water quality

Potential operational effects of the Ō2NL Project on surface water quality are related to the effects of operational stormwater on hydrology, water temperature and water quality. Such effects are determined by the contribution to the percentage of impermeable land in the surface water catchment and the type of treatment and attenuation.

For those catchments receiving treated stormwater, the total impermeable surface from roads after the Ō2NL Project (SH1, SH57, local roads and the new road) are small percentages of the overall catchments with a low risk of causing hydraulic effects on the streams.

Some catchments will not receive any stormwater as the road stormwater will discharge via the swales and treatment system to adjacent catchments, which will result in 'negligible' to 'low' hydraulic effects.

Overall, any adverse effects of operational stormwater discharges from the Ō2NL Project (after treatment) on stream hydrology or water temperature is likely 'negligible' or 'low' in all catchments.

From a surface water quality perspective, treated stormwater from the Ō2NL Project and the reduction on traffic loads on existing SH1 and SH57 will result in an overall improvement in water quality (through a reduction of contaminants entering water bodies) in all of the major catchments traversed by the Project. In one sub-catchment (Kuku) there will be a higher loading for road stormwater contaminants due to a greater length of road draining to that sub-catchment, but the magnitude of effects on this catchment will be very low.

Overall, any adverse effects of operational stormwater from the Ō2NL Project (after treatment) on water quality is likely to be 'low' in all catchments.

48.3 Construction effects on surface water quality

48.3.1 Sedimentation in streams

Earthworks and vegetation removal associated with construction activities can present a risk of erosion and sediment release, potentially affecting stream water quality and aquatic life, including reducing water clarity, increasing turbidity and potential sediment deposition on the stream bed. High sediment loading can cause a combination of environmental changes that adversely affect fish, even when most taxa are tolerant of short durations with high sediment concentrations in the water itself.

Suspended sediment can affect aquatic macroinvertebrate abundance and diversity by smothering and abrading, reducing their periphyton food supply or quality, and reducing available interstitial habitat. Moreover, sediment deposition can alter substrate composition and change substrate suitability for some species.

An analysis of the changes in sediment load due to earthworks and how this may influence concentrations of total suspended solids (TSS) and water clarity in the streams indicates that the estimated decline in water clarity due to earthwork induced sediment load is within the relevant One Plan and PNRP targets for all but one catchment. Most additional loads from earthwork sites will be only enter stream during higher flows and flood events, while there is likely to be relatively little change in sediment loads during baseflow conditions. The ESCP and Site-specific Erosion and Sediment Control Plans will provide a hierarchy of measures aimed at minimising sediment generation and implementing sediment control for all sediment-laden discharges.

For aquatic life, the risk of sedimentation from discharges from treatment devices is reduced because appropriately designed treatment devices are particularly effective at removing the fraction of sediment most prone to settling.

48.3.2 Effects from vegetation clearance

Removing vegetation can expose soil, make it more prone to erosion and cause sedimentation. In addition, the accumulation or storage of sawdust, chip or mulch near or over waterways can cause leachate that can, if entering streams, affect water quality, aquatic life and leach potentially toxic compounds.

Only relatively small amounts of large woody vegetation will need to be cleared in any one surface water catchment and therefore the wood chip from these relatively small areas will be straightforward to manage.

Overall, the effect of vegetation clearance on water quality is expected to be negligible, subject to good practice measures being in place prevent leaching of wood chip residue to water bodies or overland flow paths.

48.3.3 Concrete and other hazardous materials

Water that comes in contact with cement, uncured concrete, concrete fines, concrete dust or concrete washwater can become very high in pH. If this runoff enters receiving waters untreated, it can have adverse effects on aquatic life and ecosystems.

The greatest effect of concrete on pH occurs while the concrete is curing and the hydration process releases hydroxyl ions into the water. Concrete curing can take up to four weeks and the effect on pH reduces over this time. Construction works for the Ō2NL Project will require the pouring of concrete in or near waterways for bridge piles, culvert installation, and the lining of some open channels.

The improper storage and use of hazardous chemicals during construction can negatively impact water quality. A wide range of chemicals such as oil, diesel, lubricants, sealants and paint are used on construction sites. Leaks and spills can pollute groundwater and surface water, leading to toxic conditions and adverse effects on water quality and aquatic ecology.

48.4 Measures to avoid, remedy or mitigate adverse effects

The potential adverse effects of sedimentation on surface water quality are addressed through performance targets and the implementation of a range of management, monitoring and response measures that are set out in detail in an ESCP. In addition to the approaches to the minimisation of sediment generation, the ESCP incorporates the following plans and procedures:

- Chemical Treatment Plan;
- Erosion and Sediment Control Monitoring Plan;
- Dewatering Management Procedure;
- Emergency Spill Response Procedure;
- Stream Works Procedure; and
- Hazardous Substances Procedure.

Site-specific erosion and sediment control plans will also be prepared in order to deliver a detailed and tailored approach to measures to manage and monitor adverse effects of sedimentation at specific locations.

To avoid and minimise the risk of vegetation clearance affecting water quality, the ecology management plan includes procedures to manage vegetation clearance, including in respect of the proximity to water bodies.

Standards in conditions, along with the stream works and hazard substances procedures minimise potential risks of hazardous chemicals (including cement) to aquatic life and water quality. The measures include bunded containment facilities, minimising volumes, staff training and emergency procedures in case of a spill.

With respect to long term surface water quality, all operational stormwater from the Ō2NL Project will be treated by multiple treatment devices including vegetated batter slopes, vegetated swales, vegetated wetlands, detention basins, soakage pits, wetland swales, and erosion control at discharge points. These devices provide functions that will assist in mitigating adverse effects on surface water, including filtering water and infiltration into the soil before discharging, providing water quality treatment, detention to allow for attenuation of storm flows, treatment of sediment and any contaminated discharge, soakage to groundwater, and prevention of erosion.

48.5 Summary

The adverse effects of operational stormwater discharges will be managed through a multitude of treatment devices including vegetated battered slopes, vegetated swales, vegetated wetlands, detention basins, infiltration, wetland swales and erosion control at discharge points. The discharge of treated operational stormwater from the Ō2NL Project to surface water will have a negligible or low/less than minor adverse effect on stream hydrology and water temperature. In terms of surface water quality, the Project results in positive effects including overall improvement in water quality in all manor catchments.

Earthworks have the potential to increase sediment loss and reduce water clarity. This is more apparent during high flow events and in smaller sub-catchments. Adverse effects of sedimentation from earthworks, vegetation clearance and concrete or hazardous chemicals during construction can be avoided, remedied or mitigated through the preparation and implementation of the proposed suite of management plans.

49 Contaminated land

49.1 Assessment methodology

The disturbance of contaminated land is primarily managed by the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS), supported by the 'Contaminated Land Management Guidelines No.1: Reporting on contaminated sites in New Zealand '(June 2021) published by the Ministry for the Environment.

Consistent with Regulation 6 of the NES-CS, a site wide preliminary site investigation (PSI) has been undertaken over the full extent of the Ō2NL Project. This has been informed by a site visit, along with a review of the following to identify sources of potentially contaminated soils:

- District and Regional Council contaminated sites databases and historical records of known Hazardous Activities and Industries List (HAIL) or Selected Land Use Register (SLUR) sites;
- drone footage, Google Earth and Google Street View images to identify current land uses;
- 1939 – present day aerial photography including historical images[25] to identify historical land uses; and
- the hydrology, hydrogeology and geotechnical technical assessments and site investigation work.

Based on the information collected, a preliminary conceptual site model (CSM) was developed to identify potential risks to human health and/or environmental health. The model considers the following three elements in determining whether harm to humans or the environment might occur due to a contamination pathway. It is unlikely that there will be a risk of exposure where one or more of these elements are absent:

- Source - a substance that is capable of causing an unacceptable risk to human and/or environmental health;
- Pathway - a mode or route by which the substance/source can migrate to a receptor; and
- Receptor - someone and/or something that could be adversely affected by the substance/source.

49.2 Effects on contaminated land

The potential effects of construction of the Ō2NL Project on contaminated land include:

- disturbance of contaminants in soil and groundwater and consequential discharges of contaminants to air, land and water (surface and/or groundwater), where there may be an effect on the environment; and
- discharge of such contaminants where there may be an effect on human health – including site workers and the public.

Applying the CSM, the locations listed in the table below are considered a potential medium-high risk to human health and/or the environment and require further site investigations prior to construction.

Table 49-1 – Medium-High Risk Sites

Address	HAIL Activity	Contamination Status	Possible Contaminants	Risk
703 State Highway 1, Manakau	A10 Market Garden	Unverified: Land use noted on project property information as current	Pesticides and heavy metals	Medium Risk - Market Garden present in the 1970s

[25] Retrolens (https://retrolens.co.nz/) for the pre 1990 imagery and LINZ (https://data.linz.govt.nz) for 1991-current imagery

Address	HAIL Activity	Contamination Status	Possible Contaminants	Risk
695-703 State Highway 1	A10 Market Garden	Unverified: Land use noted on project property information as current	Pesticides and heavy metals	Medium Risk - Market Garden present in the 1970s
559 State Highway 1, Manakau	G3 Landfill sites or G5. Waste disposal to land (excluding where biosolids have been used as soil conditioners)	Verified field sampling has been undertaken	hydrocarbons, heavy metals and asbestos.	High Risk as waste material observed by geologist during site investigation. Soil contaminants tested low
416 Arapaepae South Road, Levin	A10 Market Garden	Unverified Land use noted on project property information as current	Pesticides and heavy metals	Medium Risk - no imagery available to determine if present in the 1970s
232 Kimberley Road, Levin	A10 Market Garden	Unverified Land use noted on project property information as current	Pesticides and heavy metals	Medium Risk - no imagery available to determine if present in the 1970s
34 Arapaepae Road, SH57 Levin	A10 Market Garden	Unverified Land use noted on project property information as current	Pesticides and heavy metals	Medium Risk - Imagery shows multiple fields and crops present in the 1970s
1051 Queen Street East, Levin	A10 Market Garden	Unverified Land use noted on project property information as current	Pesticides and heavy metals	Medium Risk - Imagery shows multiple fields and crops present in the 1970s
101 Waihou Road, Levin	A10 Glass houses	Unverified	Asbestos, pesticides and heavy metals.[26]	Medium – High Risk – Site observations and testing indicate that asbestos cement corrugated roofing material is present on this site.
50 Arapaepae Road, Levin	A10 Orchard	Unverified Land use noted on project property information as current	Pesticides and heavy metals	Medium Risk - Imagery shows multiple fields and crops present in the 1970s

Land where horticultural and/or orchard activities have historically been undertaken are assessed as being low-risk if the activity was established later than 1980; or the activity is outside the footprint of the area of soil disturbance or downgradient of the works.

[26] Other contaminants pathogens, nutrients, emerging organic contaminants, viruses may be present depending on historical use of poultry waste on the site.

In addition, a number of dwellings and outbuildings will be removed as a result of the Project. Where these buildings are pre-1990, there is the potential for lead and asbestos to have been used in the construction or renovation of these buildings, and as such, present a potential risk to human health during demolition. In this regard, the demolition of buildings is managed by the Health and Safety at Work (Asbestos) Regulations 2016.

While investigations have been undertaken to try and locate all HAIL sites within the proposed Ō2NL Project designation, there is always the possibility that unknown/unrecorded areas of historic contamination could be encountered during the Ō2NL Project works.

The main migration pathways (that is, a means by which a receptor can be exposed to or affected by a contaminant) identified for the Ō2NL Project are dermal contact and sediment runoff during construction works and migration of exposed soils or contaminated water. The main potential receptors are site construction personnel and surface water ecosystems if contaminated soil is discharged from the site through runoff, dust or reused within planted recreational areas.

49.3 Measures to avoid, remedy or mitigate adverse effects

In order to mitigate the potential adverse effects of disturbing contaminated soil as part of the construction of the Ō2NL Project a detailed site investigation (DSI) is to be undertaken on those sites identified above as medium or high risk. The DSI will determine the presence of contaminants at the identified sites, review the CSM and confirm where resource consent is required under the NES-CS Regulations, the One Plan and/or the PNRP and/or the relevant regional plan.

Any future resource consent will set out appropriate mitigation and management approaches that are deemed necessary by the DSI, and may include:

- leaving the material undisturbed in situ and design the Project over it;
- encapsulating any disturbed soils that are within the NES-CS guidelines but higher than background values;
- reusing any disturbed soils from the HAIL sites deemed to be similar to background values; or
- removing and disposing of all unsuitable material offsite to an authorised facility.

If unexpected contaminated material (not identified via the PSI or DSI process) is disturbed during Ō2NL Project works, the procedures for an unexpected discovery should be implemented; any work at the contaminated site will cease until any necessary investigations and management processes are put in place, and resource consent granted, if applicable.

49.4 Summary

There are sites that are potential sources of contamination within the Ō2NL Project. A DSI will be undertaken, prior to the commencement of earthworks and land disturbance, to confirm whether there are any sources of contamination that present a risk to human health or the environment. In such situations, adverse effects are primarily managed by the NESCS Regulations and conditions to specific resource consents that would need to be obtained under those Regulations (and potentially the One Plan or the PNRP) that set out how particular contaminants are appropriately managed.

50 Terrestrial ecology

50.1 Assessment methodology

The assessment of the potential adverse effects on terrestrial and wetland habitat types and associated flora and fauna that are anticipated from the Ō2NL is based on the following:

- the EIANZ Ecological Impact Assessment Guidelines;

- a review of recent aerial imagery to identify properties that may contain indigenous woody vegetation and/or wetland habitats; and
- field surveys to the identify, map, and describe vegetation types.

Habitat types have been coded and mapped (including artificial components such as gardens and roads) using aerial imagery and are shown on the Ecology Plans in Volume III.

Terrestrial ecological values, and the magnitude and 'level of effects' of the Project on these values, have been assessed using the EIANZ Guidelines following the steps set out in the table below.

Table 50-1 – EIANZ Guidelines assessment approach to assessing effects on terrestrial and freshwater ecology

Stage	Approach
Step 1	Determining the level of 'ecological value' of vegetation, habitats, waterways and species scored on a scale of 'Negligible' to 'Very High'.
Step 2	Assigning the 'magnitude of effect' of the Project using a six-point scale ('Very High', 'High', 'Moderate'; 'Low', 'Negligible' and Positive') being a measure of scale of effect from the construction and operation of the Project in the absence of any effects management actions. Assessing the magnitude of effect takes into account: • level of confidence that effects will occur in the way anticipated; • spatial scale/extent of the effect; • duration of the effect; • reversibility; and • timing of the effect in respect of key ecological cycles and patterns.
Step 3	Determine the magnitude overall level of residual ecological effects of the Project after all efforts to avoid, remedy, or minimise potential adverse effects have been implemented. using the magnitude of effect matrix approach of the EIANZ Guidelines.
Step 4	Determine the overall level of residual effect based on the ecological value magnitude of effect matrix approach of the EIANZ Guidelines. Adverse effects may need to be addressed via to guide the recommended type and quantum of offsetting or compensation if they cannot be addressed at the site of impact measures to adequately address adverse effects (with reference to the outcomes directed by the relevant planning provisions).

50.2 Operational effects

50.2.1 Loss of indigenous and exotic vegetation and associated effects

The effects assessment assumes that the Ō2NL Project will result in the total loss of habitat within a Project 'construction footprint'. That is an indicative area which includes the highway, SUP, material supply and spoil sites, laydown areas and any other elements including stormwater treatment devices, along with a 20-metre-wide construction buffer[27] (on either side of the physical works).

The Ō2NL Project construction footprint covers a total of 364ha (out of 618ha total within the designation corridor). A large majority of that footprint comprises low value terrestrial ecology habitat: 86% of the footprint is comprised of pasture and cropping land, while a further 7.5% is occupied by houses and associated gardens, quarries, and road and rail corridors. The footprint avoids 'High' and 'Very High' value forest habitats.

That said, the construction footprint does include:

[27] The construction buffer would facilitate access for heavy machinery required for earthworks and equipment for performing various ancillary activities. The area is a conservative approach, because not all of the full 20m wide buffer along the length of the Project will be required for construction. However, all habitats within the construction buffer in this assessment are assumed to be lost.

- 3.48 hectares of terrestrial habitats (forest, treeland, scrub and fernland) dominated by indigenous species;
- 0.8 hectare of mixed indigenous and exotic forest and scrub;
- 8.6 hectares of other terrestrial vegetation types that are dominated by exotic species; and
- 3.84 hectares of wetlands and open water (of which 2.3ha is exotic wetland).

In addition to the habitats within the Ō2NL Project construction footprint, the remainder of the area within the proposed designations has been assessed in respect of potential adverse effects (other than direct habitat loss).

The direct loss of terrestrial indigenous vegetation and habitats, and some exotic vegetation and habitats, will reduce the extent of habitat available for indigenous biodiversity in the Ō2NL Project area. As such, there will be effects on birds, lizards, and invertebrates.

The areas of terrestrial woody vegetation (that is, forest, treeland, and scrub) in the construction footprint are relatively small, modified areas of indigenous habitat, but all occur on 'Acutely Threatened Land Environments' with less than 10% indigenous cover remaining (at a national level).

The direct loss of 3.50 hectares of wetland habitat (excluding open water habitats) will result in changes in hydrology for receiving environments downstream. This is the key adverse effect for most of the wetland loss. While almost all the directly affected wetlands meet the 'natural wetland' definition under the NPS-FM, most of the wetlands in the Ō2NL Project footprint are grazed, exotic-dominated wetlands of relatively low ecological value.

At two locations, wetland loss within the footprint will result in the removal of indigenous wetland vegetation of high ecological value. These wetlands are partially protected from grazing (either due to deeper water, or a low intensity grazing regime), and their loss will result in the removal of habitats that are representative of the former wetlands of the Manawatū Plains Ecological District.

50.2.2 Hydrology or flood regime of natural areas

Construction work could alter the hydrology of areas upstream, downstream, or adjacent to the Project. However, analysis of surface water and ground water flows has confirmed that the construction works will be 'hydrologically neutral', meaning that it is highly unlikely that the hydrology of wetlands and forest remnants outside of the construction footprint will be affected. However, wetland groundwater effects are assumed where wetlands straddle the footprint.

50.2.3 Edge effects[28]

Removal of forest or scrub vegetation results in an increase in edge effects for adjacent vegetation that is retained including increases in light, wind and associated desiccation of habitats, which in turn are often associated with biotic changes such as increases in pest animals, reduced habitat quality, and/or changes to vegetation structure and composition. Edge effects can extend 50m to 100m into the forest habitats.[29] Given that all areas of woody indigenous vegetation within Ō2NL Project Area are less than 50m in width at their narrowest point, all forest, scrub and treeland habitat affected by the Project are essentially already edge habitats. Therefore, the Ō2NL Project will not result in any interior areas of forest and scrub becoming edge habitat although vegetation clearance will further exacerbate existing edge effects at some locations.

[28] Edge effects relate to vegetation that is retained but adjacent to vegetation that has been removed. Edge effects can include increases in light, wind and associated desiccation of habitats, which in turn are often associated with biotic changes such as increases in pest animals, reduced habitat quality for invertebrates that prefer moist conditions, and/or changes to vegetation structure and composition

[29] Norton 2002: Edge effects in a lowland temperate New Zealand rainforest. DOC Science Internal Series 27.

50.2.4 Pest plants and/or pest animals

Construction activities can result in the arrival of new pest species to a site (for instance, through earthwork machinery acting as vectors) and the facilitation of pest establishment by providing bare surfaces for colonisation. If areas subject to earthworks are not adequately rehabilitated with topsoil and plantings, pest plants can become abundant, with adverse effects on these habitats. Pest plants on roadsides can also have an adverse effect on adjacent indigenous habitats, or exotic habitats that are beneficial to indigenous fauna (such as lizards), by acting as a source of propagules. Key pest plant species that could increase in abundance along the highway edges include pampas, radiata pine, gorse, barberry, blackberry and tutsan.

In addition, it is likely that increased numbers of predatory mammals and birds will use the new road as a corridor and this may impact on lizard populations as a result.

50.2.5 Ecological connectivity between natural areas

The potential effects on ecological connectivity primarily relate to how the change from pasture or cropping habitats to road surfaces could alter the movement of species. Most of the indigenous species that can cross areas of pasture or cropping land (that is, common mobile bird species by flying) are also likely to cross the proposed highway in a similar manner.

The potential movement for less mobile species across pasture gaps is less well understood. At times between grazing when the intervening grass may grow too long, movement of fauna between the remnants may occur. Permanent slivers of rough grassland (that is, farm track and road verges) are also likely to act as corridors for dispersal and genetic interchange between sub-populations. If these species do cross pasture between forest remnants and are prevented by the Project, small populations of some invertebrate species may be further isolated, and this could increase the risk of localised population extinction.

50.2.6 Artificial lighting

Artificial lighting can cause changes to habitat use by some species (that is, attraction to, or avoidance of, lit areas) and can also cause mortality of fauna such as flying invertebrates, if the lighting used generates hot surfaces or by attraction to the road with consequent vehicle collisions. The extent of effects from lighting on fauna species is primarily determined by the extent, type, and duration of lighting, and the vulnerability of the adjacent habitats or fauna to artificial lighting.

The Ō2NL Project avoids significant impacts on indigenous fauna from artificial lighting due to road lighting being restricted to intersections and is designed to meet the Waka Kotahi M30 Specification for Road Lighting and AS/NZS 1158.

50.2.7 Traffic-related mortality

Direct mortality of flying terrestrial invertebrates is likely to occur through collisions with vehicles travelling on the new highway. Mortality can be high for invertebrate groups crossing roads with adverse impacts on populations correlated to higher traffic volumes. Less likely, but not unknown, are the risk of lizards being killed on roads as they bask on or cross roads.

Traffic-related mortalities may occur where birds fly over the road during low light, poor weather conditions, or at night. Further, birds of prey such as kāhu and kārearea may not perceive the threat of oncoming vehicles. There is also anecdotal evidence to suggest that kererū have a daily migration route across the proposed highway,[30] which means they are vulnerable to collisions with vehicles when flying east to west from the foothills of the Tararua Range. The placement of roadside stormwater ponds may also increase the risk of bird strike of species which cannot gain sufficient altitude due to the close proximity of the road.

[30] James Lambie pers comms.

50.3 Construction effects on terrestrial ecology

50.3.1 Release and deposition of fine sediments in wetland habitats

Earthworks and/or vegetation removal upstream or directly adjacent to wetland habitats pose a risk that wetlands receive additional sediment input during construction, resulting in water quality decline, or at worst, infilling and a transition to more terrestrial vegetation. If significant sedimentation of wetlands occurs, this is likely to result in the displacement of wetland fauna species and a change in plant species composition, including increases in abundance of pest plants.

50.3.2 Disturbance of indigenous fauna

Noise and vibration, traffic and lighting during construction may all result in the temporary and ongoing disturbance of sensitive indigenous fauna. The effects are likely to be greatest where construction activities occur directly adjacent to higher value habitats that are to be retained.

Temporary disturbance from construction may reduce or prevent the use of habitats for bird nesting during the construction period and may result in changes to lizard and invertebrate behaviours (home range, movement, reproduction and foraging) and physiological state. This effect is likely to be greatest on any boundary that the construction footprint shares with indigenous habitats, and would dissipate over the first 100m of the adjoining habitat.

50.3.3 Dust

Construction activities have the potential to generate dust that could have temporary adverse effects on adjacent indigenous habitats. Heavy dust loads on foliage can reduce photosynthesis, and lead to declines in plant health, particularly if dust levels are high for prolonged periods of time.

50.3.4 Injury to, and mortality of, indigenous fauna

Vegetation removal within terrestrial and wetland habitats is likely to result in the injury and/or death of indigenous birds, lizards and invertebrates. Birds are generally most vulnerable to these effects during breeding season. Lizards are less mobile and their first response is to ‘hide’ when disturbed, therefore making themselves vulnerable to being injured or killed during clearance. This impact on lizards can be of local and/or regional significance , due to high population numbers that lizards can reach in some habitat types, although based on the lizard surveys undertaken for the Project, lizard numbers within the construction footprint are likely to be sparse.

Construction activities can lead to soil compaction, which may reduce the presence of terrestrial invertebrate habitat through potential increased run off and decreased soil porosity. This may result in direct mortality to ground dwelling invertebrates such as Lepidoptera (moths and butterflies) and Coleopetra (beetles).

50.4 Measures to avoid, remedy or mitigate adverse effects

The proposed conditions establish a range of parameters and performances standards to address adverse effects on terrestrial ecology and indigenous biodiversity values. Detailed methods and measures to achieve the standards are to be set out in an Ecology Management Plan (EMP) including detailed approaches to manage the adverse impacts of vegetation clearance, birds, lizards and terrestrial invertebrates. The EMP will also include a detailed plan for the restoration of habitats to offset and compensate for the residual adverse ecological effects.

A comprehensive range of avoidance and minimisation measures has been integrated into Project development, or is proposed (including through the proposed conditions). Key avoidance and minimisation measures include:

- the avoidance of all high value indigenous forest remnants;
- setting maximum allowable areas of wetlands and forest that may be removed;

- clear physical marking of the extent of vegetation clearance to minimise impacts on indigenous vegetation and habitats retained;
- salvage and reuse of high value vegetation or soils in adjacent areas of ecological restoration;
- remedial restoration of indigenous vegetation and wetland habitats where these cannot be avoided and are temporarily removed or modified;
- pest plant control, where appropriate, to address disturbance effects on retained adjacent areas of habitat;
- erosion and sediment and erosion control measures to minimise sedimentation;
- monitoring the settlement of construction dust on retained indigenous vegetation;
- the use of a low-noise road surface and other noise reduction methods to address potential effects on birds;
- direct transfer to mitigate effects on three indigenous-dominated wetland types (the affected wetlands just over 0.1ha area in total);
- the establishment of alternative habitats and minimising fragmentation;
- the avoidance, where possible, and alternatively management of vegetation clearance during bird breeding;
- the salvage of lizards and invertebrate species; and
- buffer planting and planting to discourage road kill and encourage bird flight over the highway.

50.5 Offsetting, and compensating for, residual effects

All residual adverse effects (those effects that remain after the avoidance, remedying or mitigating adverse effects) assessed as ‘Low’, ‘Moderate’, ‘High’, or ‘Very High’, and the loss of all significant habitats, are addressed by biodiversity offset or compensation measures. The residual effects that will be addressed by these measures include:

- all clearance of indigenous-dominant forest, scrub, and fernland vegetation of natural origin (4.33 hectares);
- all clearance of mixed indigenous-exotic and exotic-dominant scrub of natural origin (1.2 hectares);
- loss of raupō reedland (0.12 hectare), Isolepis prolifer-dominated wetlands (0.11 hectare), rautahi sedgeland wetlands (0.07ha), exotic-dominant wetlands (2.3 hectares), and mixed exotic-indigenous wetlands (0.80 hectare);
- indirect (non-clearance) effects on High value indigenous forest habitats;
- effects on birds, including pūweto, Australasian bittern, and birds of river habitats;
- effects on indigenous lizards; and
- effects on the land snails species *Wainuia urnula* and the threatened land snail species *Powelliphanta traversi*.

In addition to the offsetting to residual adverse listed above, residual effects in the following habitats will also be offset::

- all significant habitats, consistent with regional plan and policy statement direction;
- exotic dominated wetlands that are of ‘Low’ ecological value and not assessed as ‘Significant’;
- planted indigenous forest and treeland; and
- woody riparian vegetation buffering Schedule F rivers under the One Plan.

The quantum of offsetting measures have been determined by using a Biodiversity Offset Accounting Model (BOAM), which incorporates quantifiable data from the impact sites and the proposed habitat restoration and/or enhancement site. The key principles of biodiversity offsetting have been carefully applied.

If offsetting could not be verified for any habitat or species, or is not appropriate, biodiversity compensation has been applied.

The offsetting and compensation measures proposed are set out in Table 50-2.

Table 50-2 – Proposed Offsetting and Compensation

Vegetation/wetland type	Offsetting proposed	Possible offsetting locations	Minimum offset area, and/or replacement tree numbers
Māhoe-dominant forest and scrub	Revegetation planting into pasture to create high-value lowland podocarp forest (using Keeble's Bush as a reference site for benchmark values)	2.96 hectares immediately north of Arapaepae forest remnant Grazed gully faces at Property #519 If required, additional planting will be undertaken in existing pasture at Manakau Heights (within the designation)	4.1 hectare
Mixed indigenous-exotic forest and scrub, planted indigenous forest and treeland, and riparian forest, scrub and vineland	Restoration planting and riparian planting	Grazed gully faces at Property #519 (and open pasture at Manakau Heights, if required) Northern banks of Ohau River (riparian planting)	1.7 hectares (mixed indigenous-exotic forest and scrub) 0.67 hectares (planted indigenous forest) 0.68 hectares (indigenous vegetation within exotic forest and treeland) 0.42 hectares (exotic riparian forest, scrub and vineland)
Indigenous treeland	Replacement planting of specific tree species at set ratios (ranging from 10:1 to 50:1)	Arapaepae forest remnant Gully wetland at Property #519 Te Ripo O Hinemata wetland at Koputaroa (6km north of Levin)	Total of 434 trees Arapaepae: 236 trees Property #519: 99 trees Te Ripo O Hinemata: 99 trees
Open water	Creation of open water for the provision of habitat for birds and fish	Indicative site is the material supply site on the northern terrace of the Ohau River	0.48 hectares is required via application of the BOAM; the indicative site would result in creation of 7 hectares of habitat.
Raupō reedland	Direct transfer of raupō rhizomes and indigenous sedges and planting of swamp forest species	Wet gully floor of Property #519	0.25 hectares required through application of BOAM, selected site would result in 0.5 hectares of direct transfer.

Vegetation/wetland type	Offsetting proposed	Possible offsetting locations	Minimum offset area, and/or replacement tree numbers
Combined wetlands, including exotic dominated wetlands, *Isolepis prolifer*-dominated wetlands and mixed exotic wetlands	– Wetland restoration prior to commencement of construction, to achieve Net Gain of wetland condition / value; and – Rehabilitation of proposed material supply sites, to address extent.	Property #519 Te Ripo O Hinemata wetland at Koputaroa Supply sites near Waikawa Stream and Ohau River (for rehabilitation)	4.4 hectares (wetland restoration) Selected sites exceed requirement. Additional area for rehabilitation – selected site exceeds requirement
Indigenous lizards	Forested sites protected by a predator-proof fence.	One of: Waiopehu Scenic Reserve (Queen Street East); or Arapaepae Bush (Arapaepae Road/SH 57)	Minimum of 4 hectares (site to be finalised)

The final required offsetting quantum will be reconfirmed in light of the final areas of vegetation clearance, once the detailed design of the Project is confirmed.

The condition framework provides for the delivery of this offsetting, including the requirement to undertake a further evaluation to confirm that the quantum of offsetting and compensation is sufficient to achieve a net indigenous biological diversity gain. Key performance targets will be used in order to measure progress towards achieving a net indigenous biological diversity gain. Such performance targets include canopy closure and plant species diversity, and plant survival rates. A timeframe of eight years has been applied to achieve the offset these targets.

In all, with the implementation of the offsetting and compensation described above, the residual effects of the Ō2NL Project will be appropriately addressed, resulting in a net indigenous biodiversity gain for terrestrial and wetland habitats.

50.6 Summary

From the outset the corridor selection and refinement process included a clear intention to avoid high value habitats. This has resulted in all high value indigenous forest remnants being avoided by the Project with most of the Ō2NL Project area comprising exotic grassland with a small area of terrestrial habitat in, or close to, the designation being present.

While much of the habitat area within the proposed designations is retained, the Project results in the loss of terrestrial habitats of 'Low' to 'Moderate' ecological value within the Project construction footprint resulting in residual adverse effects that range from 'Very Low' to 'Moderate'. The loss of wetland habitats within the footprint of the highway results in residual effects that range from 'Low' (for exotic-dominated wetlands) to 'Very High' (for indigenous wetlands of 'High' ecological value). Further, construction and operation will have indirect effects on habitats of high ecological value, and particularly the fragmentation of some fauna populations. Most indirect effects can be addressed by mitigation actions (required by standards and embedded in management plans) so that residual effects are 'Low' to 'Moderate'. In the case of indigenous lizards, the residual effects of fragmentation will be addressed by creating a lizard management area protected by a predator-proof fence.

Residual effects are addressed through offsetting and compensation developed in collaboration with key stakeholders, to set out measures to achieve a net indigenous biological diversity gain for affected habitats and species. All offsetting and compensation implementation works will be monitored in order to ensure successful outcomes.

51 Freshwater ecology

51.1 Assessment methodology

The assessment of potential impacts of the Ō2NL Project on freshwater ecology is based on the following:

- the EIANZ Ecological Impact Assessment Guidelines (as described above in respect of Terrestrial Ecology), with effects assessed on ae catchment-by-catchment and/or stream-by-stream basis;
- site-specific surveys and site visits to identify the existing ecological values of each 'site' within the Ō2NL Project Area; and
- from each permanently flowing stream, the collection of detailed habitat data using the Stream Ecological Valuation (SEV) methodology, the sampling of freshwater macroinvertebrates, and identifying fish present in the water using environmental DNA (eDNA).

51.2 Operational effects on freshwater ecology

51.2.1 Reduction in free movement of aquatic fauna

Of the 12 native or endemic fish species present in the catchments crossed by the Ō2NL Project, only one (upland bully) does not require free access between freshwater habitats and the ocean to complete their lifecycles. Therefore, instream barriers that impede fish passage, such as culverts, can impact fish distributions and result in habitats becoming inaccessible to fish. Further, culverts can prevent the upstream-downstream movement of flighted, adult aquatic insects, potentially limiting dispersal and influencing population dynamics. The overall effect of culvert installation in permanent flowing streams in the absence of any effects management measures would be 'Moderate' to 'Low' depending on the site.

51.2.2 Stormwater discharge effects on water quality and quantity

Uncontrolled stormwater runoff from roads contain various contaminants, including heavy metals and hydrocarbons, that can have adverse effects on receiving environments. In the absence of effects management, such runoff from the Ō2NL Project could result in a "Very High" to a "Low" level of effect on water quality in permanent streams depending on the site.

51.2.3 Freshwater habitat loss and modification

The Ō2NL Project results in an indicative total of 3,108 metres of existing permanent stream length being lost with 1,261 metres of culverts being installed and at least 1,592 metres of permanently flowing open diversion channel being constructed.

For permanent culverting and reclamation of stream channels, in the absence of any effects management actions, the overall level of effect would be either 'Moderate' or 'High' depending on the site.

Spoil disposal sites are all located at least 20 metres from waterways and as a result there will be no direct adverse effects on freshwater habitats. Two of the material supply sites are located within 20 metres of water bodies, but adverse effects will be avoided and minimised through appropriate erosion and sediment control. In the longer-term, the rehabilitation of the material supply sites will include revegetation and, where conditions allow, the creation of wetland habitats resulting in a positive long-term effect.

51.2.4 Artificial lighting

Artificial lighting can confuse various biota including birds, insects, fish, reptiles and frogs, including impacts on the natural behaviour of nocturnal fish such as eel/tuna. For night flying insects, such lights can have a synergistic effect with the asphalt road surface to create what appears to be a waterway. Mayflies, caddisflies, stoneflies, and other aquatic insects have been observed treating asphalt surfaces as waterways, which can have serious implications for some species when such behaviour decreases population viability as reproductive success is diminished.

The Ō2NL Project avoids significant impacts on indigenous fauna from artificial lighting because road lighting is only located at intersections and is designed to meet the Waka Kotahi M30 Specification for Road Lighting and AS/NZS 1158. Four streams in relatively close proximity to the intersection lighting in the absence of any effect management actions, a 'Low' or 'Moderate' level of effect has been identified, depending on the site.

51.3 Construction effects on freshwater ecology

51.3.1 Disturbance of freshwater habitat

Construction of the Ō2NL Project will result in the disturbance of existing stream habitat and the unavoidable loss of flora and fauna that cannot be practically relocated away from the area of disturbance. Any existing open channels that are reclaimed (filled-in) may result in the loss of all biota present in the affected stream sections at that time. In the absence of effects management actions, the level of effect of such habitat disturbance in permanent streams is 'Very High' to 'Very Low', depending on the site.

51.3.2 Disturbance of fish migration

During construction, temporary diversions may be required at some stream crossing locations to enable culvert installation and diversion channel earthworks to be undertaken in dry conditions. Such diversions have the potential to impede the free movement of migratory fish, often creating velocity barriers. The diversion structures may need to be in place for extended periods of time, including during peak fish migration periods. In the absence of effects management actions, the level of effect of such disturbance of fish migration in permanent streams is "Moderate" to 'Very Low', depending on the site.

51.3.3 Release and deposition of fine sediments

Earthworks associated with the construction of the Project may result in sediment entering adjacent waterways. Suspended sediment can have a range of impacts on aquatic ecosystems including alteration of water chemistry increasing turbidity, increasing invertebrate drift and altering community structures. While many aquatic biota are tolerant of short-term increases in suspended sediment, the deposition of this sediment on the stream bed can have adverse effects on waterway ecosystems through altering physical habitat, altering food resources, and degrading sites used for egg laying by many aquatic species.

Sensitivity of a stream to elevated fine sediment deposition is influenced by the existing state of a waterway. Modified, soft-bottomed streams or those hard-bottomed streams that already have unnatural levels of fine sediment on their beds, are generally dominated by aquatic fauna that are tolerant of or prefer such conditions. More pristine hard-bottomed streams with minimal fine sediment coverage generally have a high proportion of aquatic fauna that are intolerant to elevated levels of fine sediment. Therefore, the potential adverse effects of fine sediment deposition varies across the streams impacted by the Ō2NL Project.

Based on modelling to support the wider assessment of potential effects on water quality, the magnitude of effect on freshwater ecology as a result of construction related sediment deposition is:

- 'High' for modelled catchment D (Stream 11);
- 'Moderate' for modelled catchments B, C, G, I, and P (which includes Streams 1, 3, 10, 17, 19, 22, 23, 25, 42.3 (pond), 42.2 (pond), 42 (pond), 43, and 41); and
- 'Low' for modelled catchments A, E, F, H, J, K, L, M, and O (which includes Streams 0, 18, 27.1, 29, 30, 31, 40, 39. 39.1 and the Ohau River, Kuku Stream, Waikawa Stream, Waiauti Stream, Manakau Stream).

The potential impact on ephemeral waterways is 'Low', recognising their connectivity to downstream permanent freshwater habitats and ability to transport fine sediment to those habitats during extended rainfall events.

51.3.4 Other water contamination from construction activities

Contamination of adjacent waterways with substances other than fine sediment can occur from fuel, oil grease and hydraulic fluids either directly from machinery mishaps or accidental spillage from machinery or from construction material. In the absence of any effects management actions, the level of effect of contamination from construction activities to permanent streams is 'Very High' to 'Low', depending on the site.

51.3.5 Water abstraction for construction purposes

The Project requires water during construction for various activities including dust suppression and moisture conditioning during earthworks and pavement construction. Storage ponds will be constructed and replenished via pumped water abstraction from the Koputaroa Stream, Ohau River, Waikawa Stream, Manakau Stream, Waiauti Stream, and Waitohu Stream.

Water abstraction can have adverse ecological impacts, if abstraction rates cause changes in aquatic habitat. Decreased stream discharge resulting from water abstraction can cause decreased water velocity, water depth, and wetted channel width; increased sedimentation of the stream bed; and changes in thermal regime and water chemistry. Such habitat effects can lead to changes in algal, macroinvertebrate, and fish communities as taxa that prefer such conditions may increase at the expense of other taxa. Fish and macroinvertebrate mortality can also occur if animals are sucked into water abstraction intakes.

In the absence of any effects management actions, the level of effect of water abstraction from the affected streams is 'High'.

51.4 Measures to avoid, remedy or mitigate adverse effects

The following sets out particular measures to avoid, remedy or mitigate adverse effects on aquatic ecosystems. It is noted that these effects are also managed by measures that address erosion and sediment control and construction methodologies. These measures are embedded through the EMP, which will include:

- fish capture and release protocols and methodologies;
- site specific guidance of fish migration times;
- an aquatic monitoring programme that collects fine sediment and macroinvertebrate community data before, during and after construction; and
- post-construction measurement and monitoring of fish passage at culverts.

51.4.1 Operational effects

51.4.1.1 Reduction in free movement of aquatic fauna

To address the potential impacts of culverts on fish passage, all culverts in permanent streams will be designed to provide fish passage using the 'stream simulation' design as standard. 'Stream simulation' design seeks to create a near-natural stream bed through the culvert so there is a seamless transition between upstream and downstream habitats in terms of channel morphology, water depths, and water velocities. Additionally, the riparian zones of streams within the designation upstream and downstream of the culverts will be fenced and planted with vegetation. This will form a closed canopy to shade the streams and soften the interface between the culverts and surrounding environment.

Ephemeral streams with permanent habitats upstream (that is farm dams and ponds) may use a flexible baffle design to facilitate fish passage at times when there is surface water flowing.

Providing for fish (and insect) passage in this manner results in a 'Net Gain' as a result of a new culvert being installed for three permanent waterway (Streams 2, 20 and 23) and, for all other waterways, the overall level of adverse effect being reduced to 'Very Low'.

51.4.1.2 Stormwater discharge effects on water quality and quantity

A comprehensive stormwater capture, conveyance, and treatment system will be implemented. As set out in relation to water quality, with that system in place the Ō2NL Project will result in a net reduction in road-related contaminants entering waterways of all the major catchments traversed by the Project (as traffic transfers from an untreated stormwater system to a treated one).

Some sub-catchments will have an increase in contaminant load, however, the risk of adverse effects is low because the concentration of contaminants in the stormwater discharges after treatment are expected to be within guideline values either at the point of discharge or after reasonable mixing.

As a result, the potential impact of stormwater discharges of freshwater ecology ranges from a 'Net Gain' to a 'Low' adverse effect, depending on the site. In terms of water quantity, the Ō2NL Project will likely have a 'Low' to 'Very Low' level of effect as alteration to catchment areas are minimised, peak discharge is managed via detention in stormwater treatment devices, and stream beds and banks will be protected from scour and erosion.

51.4.1.3 Freshwater habitat loss and modification

The permanent loss of open stream habitat through culverting and reclamation cannot be mitigated or remedied at the site of impact as that location is either filled in or enclosed in a culvert. However, the construction and planting of diversion channels (that are then fenced to exclude stock) at some locations will act to minimise the loss of open stream habitat. Nevertheless, permanent losses are unavoidable, and these are addressed through offsetting as described below.

51.4.1.4 Artificial lighting

While the impacts of artificial lighting are minimised through lighting only being proposed at intersections and through achieving Waka Kotahi specifications that limit light spill, the potential adverse impacts of artificial lighting on indigenous fauna are mitigated through riparian planting that will shade the waterways. This will reduce the impact of artificial lighting to a 'Low' or 'Very Low' level of effect at those four affected waterways. There is no effect for the other waterways.

51.4.2 Construction effects

51.4.2.1 Disturbance of freshwater habitat

To minimise loss of aquatic biota, fish capture and relocation will be undertaken in all stream sections (including online ponds/dams) that hold surface water at the time of the work. Where fish capture and relocation is undertaken, the adverse effects on freshwater habitat as a result of construction activities is assessed as being 'Low' or 'Very Low'.

In the case of the Ohau River and Waikawa Stream, which are the two 'High' ecological value waterways, there is the potential for habitat disturbance caused by the creation of dry areas to install bridge piers. For those sites, the potential adverse effects on freshwater habitat is assessed as 'Low', subject to fish being captured and relocated where any temporary channel diversions are required.

51.4.2.2 Disturbance of fish migration

In the first instance, construction activities will avoid works during periods of fish migration. Where this is not possible, in situations where there is upstream habitat available, temporary waterway diversions will allow for fish passage. By ensuring fish passage through any temporary stream diversions in permanent streams, the adverse effects have been reduced to a 'Low' to 'Very Low' level.

51.4.2.3 Release and deposition of fine sediments

The release and deposition of fine sediments and primarily managed through erosion and sediment control measures that are set out in an ESCP and accompanying Site Specific Erosion and Sediment Control Plans. The level of adverse effects of construction phase sedimentation, with erosion and sediment control measures is place is assessed as 'Moderate' for two streams (Stream 17 and Stream 19, both of which are small, modified channels with degraded instream habitat) and 'Low' or 'Very Low' for the remaining waterways.

Monitoring of fine sediments (suspended and deposited) before, during construction and post-construction in key representative waterways is included as part of an aquatic ecology monitoring programme that will

be detailed in the Freshwater Ecology Management Plan that forms part of the EMP. The duration of the monitoring programme will relate to the stabilisation of cut and fill surfaces and the undertaking of work in a particular construction zone or catchment, rather than the overall completion of the Ō2NL Project as a whole.

51.4.2.4 Other water contamination from construction activities

The contamination of adjacent waterways can be prevented via a number of effects management and mitigation methods, including vehicle maintenance and cleanliness, refuelling machinery away from waterways, storing fuels and construction liquids in appropriately bunded locations, ensuring spill kits are in close proximity to all machinery, and isolating work areas requiring the pouring of wet concrete. With the implementation of such measures, there will be a 'Low' to 'Very Low' level of effect for all waterways.

51.4.2.5 Water abstraction for construction purposes

The adverse effects of water abstraction are avoided and minimised by proposing only to take from existing available allocations and ceasing abstraction at minimum flow levels defined in the relevant Regional Plans. Therefore, any abstraction will be within the environmental limits that were derived during regional planning processes, and are therefore considered to be of a level that will not cause any significant adverse effects on freshwater ecology. The proposed instantaneous rates of abstraction are set low to provide trickle replenishment of storage ponds. At any time no more than 10% of the flow will be abstracted and abstraction rates will be scaled depending on the actual flow at the time. Therefore, proposed abstraction rates are a relatively small proportion of the flow at any time, even as water courses approach their minimum flow level. All water intake points will have screens to avoid fish being sucked into the pipes and passing through pumps.

With the implementation of these effects management actions, the level of effect of water abstraction during construction is deemed to be 'Low'.

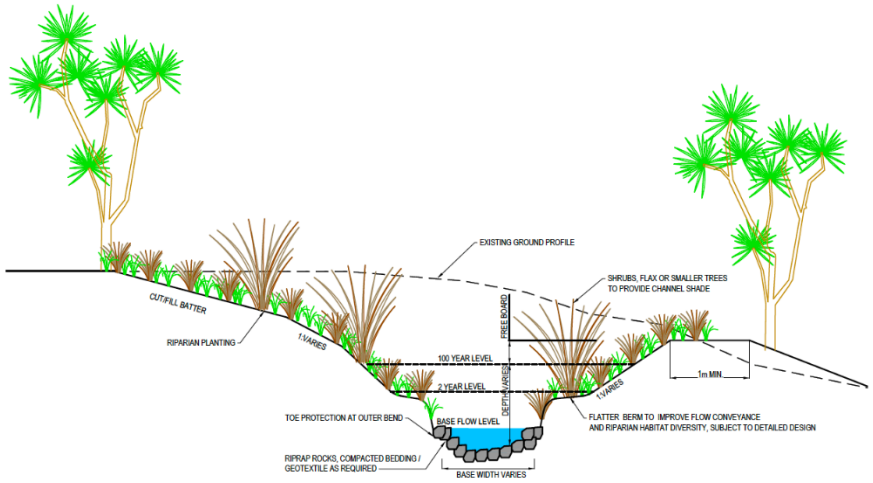
51.5 Offsetting residual effects

The residual adverse effects of freshwater habitat modification and loss are addressed through offsetting. The extent of offsetting is determined with the use of Environmental Compensation Ratios (ECRs) derived from SEV scores of impact sites and rehabilitation/restoration sites.

The main proposed freshwater ecology offsetting activity will involve creation of diversion channels within the Ō2NL Project area and stream rehabilitation and restoration via fencing and riparian planting of degraded agricultural streams within catchments impacted by the Ō2NL Project. The indicative proposed locations of stream biodiversity offsetting fencing and planting activities are concentrated in the Waiauti Stream, Waiauti Stream tributaries, Manakau Stream, Stream 27.1 and the Kuku Stream. Figure 51-1 shows an indicative cross-section of a stream diversion channel.

The total required quantum of stream offsetting is to be reconfirmed in light of the final area of existing stream habitat that will be modified/lost.

Figure 51-1 - Indicative Constructed Stream Diversion Channel Cross-Section



51.6 Summary

The Ō2NL Project has unavoidable adverse effects on freshwater ecology. Construction effects are managed through the pre-construction capture and release of fish and large macroinvertebrates; the provision of fish passage and avoidance or periods of fish migration; the management of construction machinery and vehicles near water bodies; storage of construction water with small rates of water abstraction to maintain pond levels; the implementation of a Freshwater Ecology Management Plan (as part of an EMP); and the implementation of erosion and sediment control measures that are set out in an ESCP.

Operational effects are managed through the culverts in all permanent streams providing fish passage; riparian planting and stormwater runoff from the road being conveyed through a stormwater treatment system.

The permanent loss of freshwater habitat is an unavoidable effect. Offsetting is proposed to address residual effects that are not able to be managed at the site of impact. This is to be achieved with riparian fencing and revegetation at other locations in the affected catchments so that a ‘Net Gain’ in stream functioning is achieved.

Subject to the measures set out above, it is concluded that the potential adverse effects of the Ō2NL Project on freshwater ecology are appropriately avoided, minimised, remedied, mitigated or offset.

52 Archaeology

52.1 Assessment methodology

The assessment of effects on archaeological values is focused on the potential for subsurface archaeological remains. Built heritage matters are addressed as part of the built heritage assessment. There is also some crossover into other elements of heritage that are addressed by other assessments including the CIAs in Volume V.

The assessment has been undertaken in the stages summarised in Table 52-1 .

Table 52-1 – Stages of Assessment of Impacts on Archaeological Values

Stage	Approach
Stage 1. Data definition	Identification of: • listed or scheduled historic heritage places and areas; • recorded archaeological sites; • known archaeological sites; and • potential or unknown archaeological sites. As sourced from HNZPT Heritage List/Rārangi Kōrero, scheduled by district and regional council district plans, and the New Zealand Archaeological Association (NZAA) online database.
Stage 2: Data collection	Review/observation of: • survey plans; • aerial photographs; • LiDAR derived topography; • selected historic newspapers, published books and pamphlets; • records of the Native Land Court; • engagement with iwi • geophysical survey; and • spatial data from KCDC and GWRC; and selected geotechnical test pits.
Stage 3. Values and effects scoping	A scoring matrix to assess six archaeological values and potential effects was applied as follows: 1. condition 2. rarity or uniqueness 3. contextual value 4. information potential 5. amenity value; and 6. cultural associations. A site's archaeological potential is evaluated as a combined measure of the quality of a site's spatial information and the possibility that the archaeological values will be affected. Archaeological potential is scored on a 5-point scale, from 'negligible', 'minor', 'low', 'moderate' archaeological potential to 'verified' archaeological value. A site's potential effect is scored on a similar 5-point scale from 'negligible', 'minor', 'low' and 'moderate' to 'significant' adverse effect; and assessed on the basis of a worst-case scenario. The level of actual and potential adverse effect depends on the archaeological values of the site and the nature and extent of the adverse effect.

The assessment is undertaken in a manner consistent with the following best practice guidance:

- Waka Kotahi's Historical Heritage Impact Assessment Guide for State highway projects (2015);
- The ICOMOS New Zealand Charter (2010); and
- HNZPT's Sustainable Management of Historic Heritage and Archaeological Assessment of Effects guidance.

52.2 Operational effects on archaeology

There are no New Zealand Heritage List/Rārangi Kōrero places/areas or NZAA recorded sites within the proposed designations. There are also no sites of significance to mana whenua or historic heritage values

identified in the regional or district plan schedules. There is one site (a heritage trail sign associated with historic heritage place B70) in the KCDP, but this site is located outside of the proposed designation.

The potential for ongoing adverse effects on archaeological sites during the operational lifetime of the Ō2NL Project is expected to be limited. Any archaeological remains within the Project's construction footprint will be fully recorded and removed by archaeological excavation during construction. However, archaeological sites within the area of the proposed designations may need ongoing management and protection such as notification and identification of in-situ archaeological remains during future maintenance or other works within the designations.

Excavation and reporting of any archaeological remains that may be found at potential archaeological sites or other unknown sites during operational works is generally expected to have no more than negligible or minor residual adverse effects.

In addition to any new information that may be recovered in the course of any archaeological excavations, aspects of the archaeological and wider heritage landscape will be highlighted and enhanced through the incorporation in signs, artwork and design features of the Ō2NL Project. This will include the following positive effects:

- recognition or restoration of original Māori names where possible;
- use of art or interpretative signs to highlight historic sites or landmarks; and
- the inclusion of heritage inspired design in construction and landscape features.

The SUP will improve the accessibility of the KCDC heritage trail sign at Pukehou, which is currently sited in a relatively isolated position alongside SH1.

52.3 Construction effects on archaeology

Thirteen verified archaeological sites[31] and 46 potential archaeological sites[32] have been identified within the proposed designations. The thirteen verified sites are the only sites that are certain to be affected by the Ō2NL Project.

All verified sites fall into the 'Railways, roads and tracks' category of sites. Twelve sites are 19th century roads and the other site is a former bush tramway servicing local sawmills. The total heritage value for all of these sites is low, with only low values for information potential, contextual, amenity and cultural association values. Rarity and additional historic values are nil. Potential effects on these verified sites will be addressed through the archaeological authority process, under the Heritage New Zealand Pouhere Taonga Act 2014 (and described further below). Effects to verified archaeology sites have been assessed as negligible for the following reasons:

- 19th century roads are common archaeological sites of low heritage value and only a small portion of each road will be affected;
- information that will be recovered through the excavation of the 19th century roads will be adequately captured through photography or section drawings of the road (and any associated features, such as drainage ditches) profile;
- similarly, only a small portion of the medium value sawmillers tramway (site #36) will be affected, the vast majority of this site is outside the proposed designation;
- archaeological remains of the sawmillers tramway are expected to be limited to a small number of nails or spikes, and these will be excavated, surveyed and removed for preservation; and
- public awareness and education of the presence and historic significance of the sawmillers tramway will be increased through signs and incorporation into design elements of the Ō2NL Project.

[31]Verified archaeological sites are those that meet the HNZPTA definition of an archaeological site, and that are identified to a known location and extent within the proposed designations.
[32]Potential archaeological sites are areas that have been identified where buried archaeological remains could be present.

Of the 46 potential archaeological sites, the majority have a low or medium total heritage value, but there are two sites that may have high archaeological values. These are Waiauti Stream and Pukehou.

Based on recent geophysical survey results and field observations, there is only a low and minor probability respectively that archaeological remains associated with these two sites will be found.

Seven sites of moderate archaeological potential that were identified from geophysical survey, aerial photographs or historic maps and documents are expected to be of low or medium value. There is a high likelihood that archaeological remains will be encountered at one or more of these moderate potential sites. These moderate potential archaeological sites include four 19th century houses/buildings and three geology/fauna sites potentially associated with historic Māori occupation.

Archaeological remains might be found at fifteen sites of low archaeological potential, though this is not expected to be the case. Houses and house sites of low archaeological potential may pre-date 1900, but most are expected to be of early 20th century origin.

Archaeological remains are not expected to be found at any of the 22 minor or two negligible archaeological potential sites.

Unknown sites[33] are most likely to be encountered adjacent to or in the general proximity of certain water bodies. Unknown sites may also be encountered in the vicinity of unnamed water bodies or other locations removed from water bodies, but there is no information to indicate that there is a high probability of this occurring. Effects on unknown sites encountered during construction works are likely to be more adverse than effects on sites that are identified prior to construction and for which appropriate measures are put in place.

52.4 Measures to avoid, remedy or mitigate adverse effects

While archaeological sites associated with historic colonial occupation are mostly avoided, some effects are unavoidable because a small number of historic roads or tramways are aligned perpendicular to the Project.

The adverse effects of the Ō2NL Project on archaeological sites will be primarily managed via separate applications to HNZPT for archaeological authorities to damage, modify or destroy archaeological sites. At the advice of HNZPT, two archaeological authorities will be sought:

- an authority with research strategy and management plans for all verified archaeological sites that are to be excavated or otherwise managed before construction starts; and
- a second authority with a more flexible management plan for unknown archaeological sites that are found during the highway's construction.

No mitigation will be required for the operation of the Ō2NL Project. Maintenance or upgrade works within the proposed designations will not affect archaeological sites as any sites will have been destroyed during the construction works (if present). If maintenance or upgrade works are likely to affect verified or potential archaeological sites, and the archaeological authorities received for the construction works have expired, new authorities will need to be acquired from HNZPT. Where works are unlikely to affect verified or potential archaeological sites, unintended adverse effects within the proposed designations can be mitigated to a negligible level by implementing an archaeology discovery protocol.

Conditions attached to any archaeological authorities obtained for the Ō2NL Project are expected to include (but not limited to) processes and communication protocols around construction commencing and finishing, access for Iwi Project Partners to undertake tikanga, processes to keep Iwi Project Partners informed of archaeological work throughout construction, processes around encountering archaeological evidence and kōiwi (human remains), close out and preparation of a final report to HNZPT.

[33] In considering the analysis and planning required for possible 'unknown sites', this assessment interprets the HNZPTA's section 6(a)(i) requirement that a site must be "associated with human activity" as including '*any place with a historic Māori name-association and any unnamed features of the natural environment that are generally regarded as having been focal points for past human activity*'.

52.5 Summary

Due to the route selection process, there are no sites of national archaeological significance within the proposed designations. Thirteen verified and 46 potential archaeological sites have been identified within the proposed designations. All thirteen verified sites have low heritage value and any effects of construction activities on verified sites are considered to be negligible. Similarly, any operational effects, including future operational maintenance or works, on verified sites would be negligible.

Positive effects include additional information on sites; highlighting of archaeological and wider heritage landscape through the Ō2NL Project's design. Any potential remaining effects can be appropriately managed through the archaeological authority process and the practices, procedures and communication set out in an archaeology discovery protocol. As such, it is considered that any adverse effects on archaeology are less than minor.

53 Built heritage

53.1 Assessment methodology

The methodology used to determine the built heritage environment has involved a desktop and field assessment including:

- a review of the New Zealand Heritage List/Rārangi Kōrero;
- a review of the HDP and KCDP heritage schedules;
- a literature review;
- visual inspections of all recorded and potential historic heritage within one kilometre of the proposed designations; and
- assessing the potential effects on built heritage and historic heritage values in accordance with national and international best practice and particularly with reference to the following:
  - Waka Kotahi 'Guide to Assessing Cultural Heritage Effects for State Highway Projects' dated March 2015 (Waka Kotahi Guide);
  - International Council on Monuments and Sites (ICOMOS), Charter for the Conservation of Places of Cultural Heritage Value, 2010; and
  - HNZPT's Sustainable Management of Historic Heritage Guidance (2007).

53.2 Effects on historic heritage

53.2.1 Effects on listed heritage sites

No statutorily recognised built heritage items have been identified within the proposed designations. Four listed built heritage items are within one kilometre of the proposed designations. Of those listed items, only the Manakau School and St Andrew's Church have the potential to be impacted by the Ō2NL Project (insofar as the Project may be visible from their respective grounds). The two remaining built heritage items are located a greater distance away and have no direct visual or physical impact.

The Manakau School building site is surrounded by trees, and a new administration and classroom block to the east obscures the historical school building from views of the Project. The closest point of the proposed designation to St Andrew's Church is approximately 430m and the Project could be potentially visible from church grounds. However, views will largely be obscured between the church and the designation by two middle ground houses, planting proposed round stormwater treatment, landscape works and screen planting on highway batters. In addition, the church entry faces west, away from the Ō2NL Project, and the east facing windows have stained glass preventing visibility from within the Church.

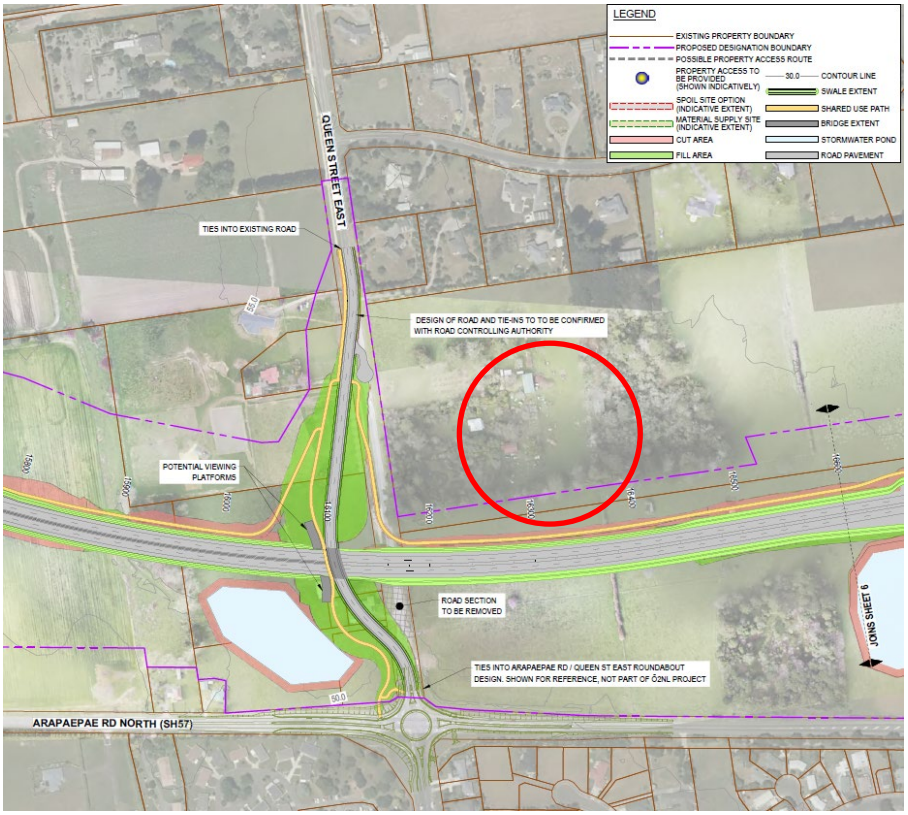
Acoustic measurements of the existing noise level versus anticipated noise levels show no change caused by the Ō2NL Project for any of the four relevant Manakau buildings.

Therefore, there is negligible, or no risk of any visual or physical impact on any listed buildings either from construction or operation of the Ō2NL Project.

53.2.2 Effects on non-listed heritage sites: 'Ashleigh'

While not 'listed' or located within the proposed designation, 'Ashleigh', homestead is located approximately 65 metres immediately to the east of the proposed designation boundary, and has been assessed as being of regional significance. Figure 53-1 shows the location of the 'Ashleigh' relative to the Ō2NL Project.

Figure 53-1 - Location of 'Ashleigh' (within the red circle)



Although the Ō2NL Project will be at ground level near 'Ashleigh', the Project will not be visible from the house because the house is surrounded by large trees and shrubs. As a result, there is no adverse visual effect on the heritage values of 'Ashleigh'. In addition, there will not be any visual impacts from the Ō2NL Project on visual catchments, vistas and sightlines within the site as the Project does not physically impinge on the site.

The house, outhouses, and other items are not visible from Queen Street East or other publicly accessible locations and this will not change with the Ō2NL Project. Queen Street East is proposed to be severed near the north-western corner of "Ashleigh" and diverted further north including a foot bridge constructed over the highway, along with a vehicle bridge over the highway that leaves Queen Street East at the north-east corner boundary of "Ashleigh" and curves back to meet a roundabout on Arapaepae Road. There will be no physical impact from the footbridge or bridge, but the closer bridge with access ramps and the severing of Queen Street will be visible from the entry gates to the house impacting the wider setting of the house.

There will be a minor acoustic change (in particular, an increase in noise levels from the construction and operation of the Project) that will affect amenity values at the house, however the proposed acoustic treatment, comprising a low-noise road surface, will reduce traffic noise. The Ō2NL Project will result in a slight increase in the future predicted sound levels around 'Ashleigh' from 56dB to 57dB, which is not considered to have any adverse effect on the built heritage values of 'Ashleigh'.

During construction there are less than minor potential effects on the heritage values of 'Ashleigh', stemming from dust, vibration and noise impacts. Dust can cause an increased need to clean the house with consequent additional wear and tear on coatings. Vibration can cause structural degradation, particularly material fatigue and foundation settlement. Construction noise would largely comprise impacts on the amenity values of the house and site.

53.3 Measures to avoid, remedy or mitigate adverse effects

While the potential adverse heritage effects of the Ō2NL Project on 'Ashleigh' are assessed as being less than minor, the following measures provide for monitoring, remediation and mitigation of potential adverse effects:

- vibration monitoring (during construction with appropriate protocols to for preventing damaging vibration);
- regular inspections for dust, with 6 monthly external washing and internal cleaning of the house and external washing of the workshop /tool shed during construction; and
- careful design to ensure that the setting of Ashleigh is not inappropriately impacted.

53.4 Summary

The assessment of effects on built heritage sites concludes:

- the Ō2NL Project will have little or no impact on statutorily identified built heritage;
- the Ō2NL Project will have a less than minor physical impact on "Ashleigh" a non-statutorily recognised building and setting that has significant heritage values; and
- while physical impacts on "Ashleigh" are less then minor, mitigation of construction effects are recommended, including vibration monitoring, dust control and perimeter planting.

54 Productive land

54.1 Assessment methodology

The assessment of potential impacts of the Project on productive land considers effects on:

- 'highly productive land' (including as defined under the NPS-HL), being land use capability (LUC) classes 1, 2 and 3; and
- 'highly versatile land', which is a subset of highly productive land LUC classes 1 and 2, and 3e1 and 3e2.

The assessment is based on the following:

- recent aerial imagery and photography to determine existing land uses; and
- the New Zealand Land Resource Inventory (NZLRI).

Two different footprints have been used as part of this analysis, based on the indicative Project design. The first is a 20 metre-wide buffer around the road corridor plus a 5 metre buffer around the spoil, material supply sites, and laydown areas. It can be assumed that this is the maximum area that is impacted by the Project. The second is the footprint of the completed road (and road reserve) plus a 5 metre buffer. It is assumed that this area is the minimum area or footprint of the Project and represents a potential final highway corridor once construction of the Project is completed and the Project is operational.

54.2 Effects on productive land

The Ō2NL Project has a potential adverse effect on productive land through the loss of the ability to use the land for production and through fragmentation of land parcels in a manner that impacts on the future productive use of those land parcels. Further, the Project may have an impact in terms of the economies of scale of existing productive uses along with the physical disruption or impediments to the operation of productive properties.

Based on the indicative Project design and applying the 'footprints' described above:

- the minimum area of privately owned highly productive land that will be lost to potential production is about 229.5 ha. Of that land, 100.3 ha is highly versatile land; and
- the maximum area of privately owned highly productive land that could be lost to potential production is about 358.7 ha. Of this, 167.4 ha is highly versatile land.

The difference between the minimum and maximum area that could be lost is about 134.3 ha and, in reality, much of this 134.3 ha (difference) area will be brought back into production following the completion of construction. The land that has been used for construction can be restored although the values associated with productive land may be diminished by the use for construction activities.

At a district level, the area of highly productive land that will no longer be available for productive use as a result of the Project is small, given there is about 43,766ha of highly productive land in Horowhenua.

At a property level, there are an estimated 135 to 140 properties potentially impacted by the Project (that is, part of their land area is within the Project corridor). The Ō2NL Project affects between 10% and 16% of the total area of the properties that are 'touched' by the corridor.

The Project will create between 57 and 71 new areas of land that are separated from the remainder of the property resulting in the potential for fragmentation. Of these new areas of land, 40 are less than one hectare, and between 19 and 28 are between 1 hectare and 8 hectares.

Without amalgamation, those new areas of physically separated land that are less than 1 ha as a result of the proposed Ō2NL Project corridor could be considered to be effectively non-productive. However, there is also the opportunity for this land to be amalgamated into existing productive units so as to minimise loss/fragmentation.

54.3 Measures to avoid, remedy or mitigate adverse effects

It is not possible to avoid the loss of productive land (including highly productive land), given the nature of the Project and the rural environment it traverses.

Any measures necessary to address subsequent effects on individual property values will be dealt with through the land acquisition process for the Project under the Public Works Act 1981. The permanent loss of productive land is minimised by the reduction of the Project works footprint following construction.

In addition, the impact of the Project on highly productive land (and the unavoidable loss of that land) can be further mitigated, and minimised, through the amalgamation of land holdings following construction. Another option could include offering farm advisors to assist affected horticulturalists or farmers in maximising the use of remaining parcels of highly productive land.

54.4 Summary

The Ō2NL Project on productive land:

- will unavoidably result in the loss of land for production as well as fragmentation of land productive land parcels;
- the area that will be lost will be small at a district level;
- at a property level (addressed further below), there are properties that are deemed to be directly affected by the proposed designations with additional areas of land created as a result of dissecting the land, but these additional properties could be amalgamated with adjacent properties to minimise any potential fragmentation and associated impacts; and
- following construction, the extent of the works (and likely the designation) will be reduced/narrowed and residual land will become available for continued, productive use in order to minimise the permanent 'loss' of productive land.

55 Economic

55.1 Introduction and assessment methodology

The Ō2NL Project is a very large project in the context of the local economy, both as a short-term stimulus to activity and for its anticipated long-term effects on the Levin town centre and for faster population growth due especially to better accessibility to Wellington.

The economic effects of the Ō2NL Project are assessed through quantitative modelling and qualitative analysis.

A 'base case' and 'scenario' approach is used to show high and low future impacts (using HDC's medium population projection as the base case), including:

- construction effects reflecting the share of activity undertaken by local and regional businesses;
- effects of foregone agricultural output; and
- effects on the Levin town centre and other local townships reflecting the potential loss of custom from passing traffic.

This assessment adopts a 30-year period from 2021 – 2051 to allow for shorter-term economic effects and longer-term economic outcomes once the main changes have flowed through the economy.

The monetised effects are expressed in present value (PV) terms applying a discount rate of 4% and is based on growth scenarios set out in demographic projections.[34]

[34] Sense Partners, 'Horowhenua Socio-Economic Projections Summary and Methods: Projections Update Report', May 2020.

The quantitative modelling includes two methods – Economic Impact Assessment (EIA) and Retail Impact Assessment (RIA), which are described as follows:

- EIA – quantifies the economic role of the Ō2NL Project as a whole in terms of Gross Domestic Product (GDP) and employment and specifically the economic activity generated during construction and the rural production that might be impacted. The Multi-Regional Input Output Model (MRIO) is used for this assessment, which produces estimates of total economic activity, taking into account indirect[35] and induced[36] activity that occurs as a result of the economic activity.
- RIA – assesses the economic effects of the Project on local centres along the Project corridor, and in particular quantifies the projected change in turnover for Levin town centre (as it is the largest centre within the Ō2NL Project area and the Project is not expected to have a significant economic effect on the other townships (as further described below)). The RIA examines the magnitude of positive contribution of the construction workforce to the Levin retail economy and the future retail demand projections from population growth scenarios and scenarios to reflect changes to town centre visitation rates. The assessment relates to retail and hospitality, but not service activities where the customer case is likely to be locally resident.

The qualitative analysis addresses other economic issues, including wider economic benefits (WEBs) of enabling residential capacity and housing affordability. This assessment provides an indication of the potential scale of benefits, which has been drawn from regional, domestic, and international case studies and information on the Ō2NL Project.

55.2 Economic effects

55.2.1 Construction economic impacts

The economic effects of construction are influenced by a number of factors including the total budget, the project timing and spatial distribution of expenditure. While the location of spending may vary, the budget and timeframe for the Ō2NL Project will result in economic activity that will have a substantial positive effect on the local economy and community.

Depending on the share of the activity that is undertaken by businesses in Horowhenua District, the expected net positive GDP impact on the Horowhenua economy from the construction phase is between $59 million (medium local economic activity) and $139 million (high local economic activity) in PV terms. This would represent an uplift in the local economy of 0.5% to 1.1% in the medium term (10 years). In addition to GDP, the activity will support employment and return income to households.

The economic effects of construction of the Ō2NL Project will be felt in the wider regions with the overall net GDP value added estimated at $1.166Bn to $1.293Bn, sustaining in the order of 11,000 to 12,400 person years of employment. Major shares of these overall impacts would accrue to the Wellington region (30% to 39% of the total) and the Manawatū-Whanganui region (14% to 22%), with most of the balance to rest of the North Island (31% to 38%). Its current role within the Wellington regional economy suggests that the Kāpiti Coast economy may see effects in terms of value added at $45-$60m, and employment of 350-500 person years.

55.2.2 Effects on population and household growth

The Ō2NL Project is projected to stimulate additional population growth in Horowhenua as the enhanced accessibility to the large Wellington economy would make Horowhenua more attractive as a place to live and work. This population growth would result in a larger District economy, with more economic activity and employment.

[35] Indirect: some businesses will need to change their activity to provide services to match the needs of construction activity on the Ō2NL project or the changes in rural activity, which is referred to as an indirect impact.
[36] Induced: incomes received by households will change as Ō2NL construction occurs and some rural business decrease in size. The changes in income will generate more demand for goods and services, which is referred to as an induced impact.

While it is difficult to estimate the extent of population growth attributable specifically to the Ō2NL Project, the medium and long-term effects on the economy would be substantial and positive. The Horowhenua District economy is currently around $1.2Bn in GDP terms, which can be expected to increase in line with future population growth.

55.2.3 Effects on town centres

The strong growth in the Horowhenua economy would mean significant potential for new retail businesses to establish and for the Levin town centre's role to expand to better serve the future Horowhenua community.

In addition, reduction in traffic volumes through the Levin town centre will result in better amenity and improved accessibility for the Horowhenua community, and a more vibrant and attractive town centre that will draw locals and visitors in.

A reduction in traffic passing through Levin as a result of the Ō2NL Project also has the potential to reduce direct access to, visibility of, and sales made by, businesses for which passing motorists are potential customers, however:

- the group most likely to reduce patronage of Levin town centre businesses are non-locals passing through Levin, and this group contributes only 6% of total spending in town centre businesses (and shopping is characterised by lower average spend per person than other consumer segments);
- conversely, a large share (79%) of Levin town centre current sales are made to consumers who reside in Horowhenua District and the patterns of these shoppers is unlikely to change substantially as a result of the Ō2NL Project; and
- similarly, people from outside Horowhenua who visit Levin as a destination (14% of the total) are also unlikely to change their shopping patterns significantly.

Two scenarios of potential impact from loss of passing trade show short term impacts of between -3.3% (if half of the passing trade is lost) and -6.1% (if all the trade is lost, that is, a worst-case scenario). The worst-case scenario effects are expected to be offset by market growth quite quickly – up to 2.7 years in a low growth future, between 1 and 2 years (medium growth future), or less than 1.5 years (high growth future). Those relatively fast recovery periods, combined with the strong underlying market growth which would see town centre sales, some 31% above current levels by 2029 (medium growth scenario), indicate that adverse effects on Levin town centre will be minor, and only temporary.

Manakau and Ohau, located south of Levin, have a small number of retail and hospitality businesses that serve the local community as well as passing SH1 traffic. A drop in sales to customers passing on SH1 is expected to be commensurate with reduction in traffic volumes, with effects reflecting outlets' dependence on passing trade. Market growth in the medium term will act to largely offset such effects, and any adverse effects are expected to be minor. The retail and hospitality sector as a whole in these locations can expect to have substantial growth as a result of population increase.

Effects on other centres in Horowhenua District or Kāpiti Coast District are expected to be very small. Foxton and Shannon continue to be located on SH1 and SH57 respectively and both are expected to be largely unaffected. In Kāpiti Coast District, the effects of trade being diverted from Ōtaki have already occurred as a consequence of the PP2Ō Project. The Ō2NL Project is not expected to increase diverted trade, although will make it faster to travel to Ōtaki from Levin, so there may be some positive economic effects for the centres in Ōtaki as a result of the Ō2NL Project.

55.2.4 Wider economic benefits

Improving the transport connections between Levin and elsewhere is expected to unlock or facilitate a range of other benefits, known as WEBs.

They arise primarily from improved accessibility for consumers and from businesses having greater ability to 'connect' across space that, in turn, results in changes to the competitive landscape. Those changes have implications for businesses' cost structures and ability to compete in different markets, and include

effects on productivity, employment, competition and regional development that can be summarised as follows:

- Productivity: The Project will result in a reduction in travel costs and travel time and will improve reliability. This, in turn, expands the market size and improves cost effectiveness. On this basis the productivity effects of the Project are positive and more than minor for the region.
- Employment: Improvements in accessibility and connectivity (including reduced travel costs) will increase employment opportunities and make it easier for people to get to work, and as such employment effects are positive and more than minor over the medium to long term.
- Competition: The Project will also enable businesses to compete over a wider geography more effectively and could lead to knowledge spill-overs (that is, the sharing of knowledge and know-how), contributing to a lift in productivity. The economic effect of expanded competition is positive and more than minor over the medium to long term.
- Regional development: Reduction in traffic in Levin will improve the character of the town centre that, in turn, could result in increased tourism. Further, the Project will enable the provision of greater residential capacity and the potential for improved housing affordability. This is exemplified by the relationship between the Ō2NL Project and the Tara-Ika Growth Area. It is anticipated that the Project will also result in housing demand and therefore stimulate construction activity. Again, effects in respect of regional development are positive and more than minor over the medium to long term.

The WEBs associated with the Project could be in the order of $500 million, which will be of significant benefit to the region.

55.2.5 Effects on agricultural and horticultural activity

The Ō2NL Project traverses rural areas and will impact a number of farming operations. Some farms will be disrupted by construction, lose productive land, and some properties may no longer be viable for current farming activities. These impacts will have a negative impact on the local economy, but this impact will be small in scale when compared to the economic benefits (including overall growth).

55.3 Measures to avoid, remedy or mitigate adverse effects

No measures are necessary to mitigate the economic effects of the construction of the Ō2NL Project because, with the exception of very minor adverse effects relating to the disruption to use of productive land, the effects of the construction and operation of the Project are positive.

The potential adverse effects on retail activity in Levin that result from a reduction in spending associated with through traffic are less than minor and will be acceptable without mitigation. However, to assist in maintaining a buoyant, vibrant Levin town centre and supporting the changed nature of that commercial environment, some mitigation measures (such as signs and landscaping at approaches to the access points that identify Levin and set out services that are available) may be of additional value.

Lastly, as above the reduction in traffic volumes through the town centre will increase the centre's amenity, make parking easier to find, encourage active modes and generally increase the attractiveness of the centre as a retail destination. That may induce locals to direct more of their retail spend to the Levin town centre, rather than leaving Levin to shop in other places.

55.4 Summary

The Ō2NL Project overall will generate positive economic effects at the local, sub-regional and regional level as a result of both the construction of the Project, and its ongoing operation. The positive effects of construction are related to the impacts of construction-related expenditure, while the operation of the Project will stimulate strong population and economic growth in the medium to long term, expanding the size of the economy and employment levels, and growing the market for goods and services that will enhance the performance of Levin town centre. WEBs associated with the Project could be in the order of $500 million – a significant benefit for the region.

Some adverse effects may be expected to arise during both the construction and implementation phases, particularly short-term effects in relation to retail spending in Levin. However, these adverse effects on the economy will be less than minor and relatively temporary, and no mitigation is required (with the exception of mitigation in respect of effects arising from disruption to agricultural and horticultural activities). However, measures such as signs and landscaping, can assist in mitigating effects that cannot be avoided and otherwise enhance the Project's positive effects.

56 Property, network utilities and infrastructure

56.1 Effects on property

The Ō2NL Project has a direct impact on property and assets located within the proposed designations. For those properties where land is required either permanently or for construction, the acquisition or lease of land will be undertaken by the Crown through the Public Works Act 1981 (PWA) process. The PWA establishes acquisition and compensation processes and as such, the acquisition of land is not considered further in the context of this assessment.

Waka Kotahi has acquired a number of properties as strategic purchases, or early negotiations based on hardship (health and/or financial) grounds. Discounting those properties as Crown owned, the Project will still have a direct impact on approximately 131 private properties over 91 property owners.

Several residences are adjoining or within 200m of the proposed designation. The effects on these properties, and their occupants, have been addressed above in relation to social impacts, traffic and transport effects, property access, productive land, noise and vibration effects and impacts on natural values (landscape, visual amenity, and terrestrial ecology).

56.2 Effects on network utilities and infrastructure

The Ō2NL Project will also have an impact on network utilities and infrastructure located within or near the proposed designations. This infrastructure includes telecommunications, electricity supply and rail infrastructure and municipal infrastructure including local roads, water supply, wastewater reticulation, and stormwater reticulation. The design and timing of reconnection of utilities effected by the Ō2NL Project will be discussed and developed in consultation with the utility owners.

Utility companies which will be impacted by the Ō2NL Project include the following:

- Greater Wellington Regional Council (datum, stormwater, flood control and drainage);
- Land Information New Zealand (datum);
- KiwiRail Holdings Limited (railway network);
- Electra (power);
- Vocus (telecommunications);
- Chorus (telecommunications);
- PowerCo (gas);
- Spark (telecommunications);
- Horowhenua District Council (water, stormwater and wastewater); and
- Kāpiti Coast District Council (water and stormwater).

Potential effects on electricity distribution, gas distribution, telecommunications and water supply networks relate to:

- continuity of supply during construction;

- maintenance access during construction;
- disruption due to necessary temporary or permanent relocation of the network/s; and
- machinery strike during construction.

These potential adverse effects are typically temporary in nature and can be managed by Waka Kotahi, in consultation with the network utility owner or operator, to:

- confirm the scope, location and timing of works to relocate network utilities and any measures necessary to provide for the identification of, safety and protection of network utilities;
- maintain permanent practical ongoing access to existing and relocated network utilities, including reasonable and emergency access during construction of the Project; and
- ensure compliance with relevant protocols and standards.

KiwiRail will also be impacted by the Ō2NL Project, particularly at the relocated Tararua Road/SH1 intersection and level crossing and where the NIMT passes underneath the proposed highway at the far northern end.

Waka Kotahi has consulted with KiwiRail in respect of the detailed design and construction practices in the vicinity of the NIMT. Further, Waka Kotahi will require KiwiRail's written consent in respect of any construction activities within the area the land subject to the NIMT designation.

Effects on local roads include disruption during construction and the need for appropriate connection or 'tie-in' at the completion of the Project. As set out above, construction traffic effects are effectively addressed by a management plan mechanism while operational, or 'tie-in' matters are addressed directly with HDC or KCDC as the asset owner.

57 Natural hazards

As noted in Part B, within the Horowhenua District the Ō2NL Project traverses streams and rivers and a 'Flood Hazard Area' identified in the HDP. There are no hazards marked on the KCDP in the area traversed by the Ō2NL Project. The rivers over which bridges are to be constructed are also identified in Schedule B of the One Plan as having 'Schedule B Value of Flood Control and Drainage'. This notation triggers the need for resource consent for works in the bed of these rivers.

In addition to the identification of flood hazards in planning documents, it is also acknowledged that the wider area may also be vulnerable to flooding and extreme weather events.

No active faults are known in the vicinity of the Ō2NL Project (according to council maps and data from IGNS), however, it is possible that off-shoots of major faults in the wider locality are present. A site-specific probabilistic seismic hazard analysis was undertaken during the design phase. This analysis provided recommendations of seismic parameters for design use.

While measures were taken to avoid natural hazards in the context of Project shaping, in terms of flood risk, extreme weather and climate change, the Ō2NL Project cannot avoid areas susceptible to flooding (given the need to traverse the east/west aligned streams and rivers).

Where effects haven't been avoided, natural hazard risks are addressed through the Project being located, designed and constructed to standards:

- that minimise damage from design seismic events;
- that apply to the design of slopes, retaining structures and stormwater management (including in future hydrological conditions), and
- that reflect an appropriate precautionary approach to the effects of flooding, extreme weather (including if exacerbated by climate change).

On this basis, and when compared to the existing state highway network, the Project is substantially more resilient to seismicity, flooding and other significant weather events related natural hazards such that the risks and impact of natural hazards is reduced.

The impact of the Ō2NL Project on operational hydrology and flooding is addressed in further detail earlier in this Part where it is confirmed that the Project ensures the continuity of flow of both water and sediment, and that downstream effects are generally limited to within 100m of the proposed highway. Mitigation measures include scour protection to mitigate erosion, and adopting standard methods and measures for construction management set out in the CEMP and the ESCP.

PART H: MANAGEMENT OF EFFECTS ON THE ENVIRONMENT

58 Overview

The following describes the measures proposed to avoid, remedy, mitigate, offset or compensate for the actual or potential effects of the Ō2NL Project on the environment, including construction effects, that have been identified in Part G.

The approach taken to identifying and refining the location of the Project (as described in Part E) has sought to avoid or minimise adverse effects to the extent practicable. This approach has been informed by advice and assessments undertaken by numerous technical specialists and extensive consultation (as described in Part F).

Where it has not been practicable to avoid adverse effects due to the operational requirements and functional requirements of the Project, the measures set out below (alongside Part G), and particularly as they are formalised in the suite of conditions that will apply to the designations and resource consents, will avoid, remedy, mitigate, offset and compensate for actual and potential adverse effects of the Ō2NL Project.

The following:

- sets out the general approach to the delivery of the Project and summarises measures to manage adverse effects;
- describes the proposed management plan framework; and
- proposes a range of conditions to be imposed on the designations and resource consents to appropriately manage adverse effects on the Project.

59 Approach to delivery of the Project

The effects of the Ō2NL Project have been assessed and understood:

- with reference to the existing environment that is described in Part B; and
- on the basis of a technically feasible road alignment accommodated within the proposed designations, as described in Part C, including relevant road design standards and specifications that are further set out in the DCR attached as Appendix Four.

Key to the delivery of the Ō2NL Project, including the management of effects, is the development and implementation of a suite of measures, including conditions, outline plans, management plans, monitoring and maintenance requirements. Collectively these measures manage effects on areas of environmental sensitivity; recognise environmental risk issues; and describe the mechanisms to avoid, remedy or mitigate, and in some instances offset or compensate for, any actual and potential effects.

Features of the approach to delivering the Project include:

- conditions that set out a range of standards or parameters within which the Project must be designed, constructed and operated;
- an overarching Construction Environmental Management Plan (CEMP) to address the way in which construction activities are undertaken;

- a series of topic specific management plans that set out a framework and methods for how standards in conditions are to be achieved;
- site specific plans to manage particular construction effects and the implementation of offsetting measures;
- on-going reporting, consultation, engagement and communication with Project Iwi Partners, landowners, stakeholders, directly affected parties and the community.

59.1 The Outline plan process

Section 176A of the RMA sets out the process that Waka Kotahi, as requiring authority, must follow to progress a project enabled by a designation. The outline plan process entails the requiring authority submitting an outline plan or plans to the council. The council then reviews and may provide input (by requesting changes) to the detailed design and construction methodology, amongst other matters. A requiring authority may submit one or more outline plans to reflect project phases or construction sequencing.

An outline plan must detail the following information, in accordance with section 176(3) of the RMA:

- the height, shape, and bulk of the public work, project, or work;
- the location on the site of the public work, project, or work;
- the likely finished contour of the site;
- the vehicular access, circulation, and the provision for parking;
- the landscaping proposed; and
- any other matters to avoid, remedy, or mitigate any adverse effects on the environment.

An outline plan (or outline plans) for the Ō2NL Project will, therefore, demonstrate and explain how the Project meets the conditions of the designations. The outline plan will also include particular information that is required by the designation conditions including the Construction Noise and Vibration Management Plan and the Construction Traffic Management Plan.

This outline plan process allows for a more comprehensive confirmation of the mitigation of any potential effects once design has progressed and a construction methodology has been finalised. The details within any outline plan will (and must) address the actual or potential effects of the construction activities and how they will be mitigated. The condition framework has been developed to support this process. Through the process of reviewing the outline plan, or outline plans, HDC and KCDC are able to request changes to any element of an outline plan. This includes the content of management plans.

59.1.1 Establishment works - waiving the requirement for an outline plan

Section 176A of the RMA provides that an outline plan need not be submitted where:

> *"(a) the proposed public work, project, or work has been otherwise approved under this Act; or*
>
> *(b) the details of the proposed public work, project, or work, as referred to in subsection (3), are incorporated into the designation; or*
>
> *(c) the territorial authority waives the requirement for an outline plan."*

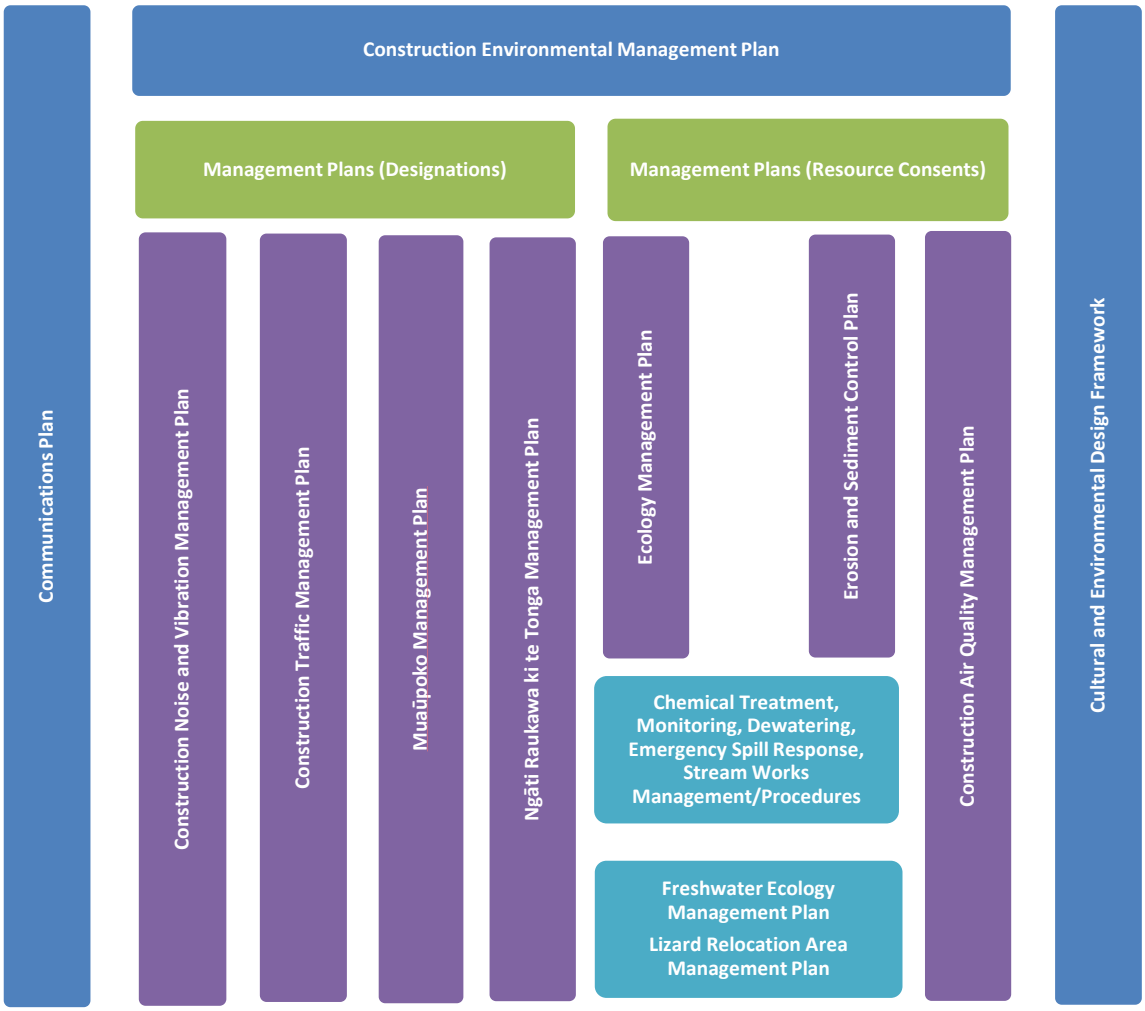
In this instance, Waka Kotahi seeks that the requirement for an outline plan is waived in respect of establishment works. Establishment works are those works that are required to be undertaken before construction activities can commence, that is, the works are necessary to enable construction. Establishment works are described in further detail as 'pre-construction activities' in Part C and defined in the proposed conditions.

Establishment works are limited in scale, have minor adverse effects and are generally permitted by the rules in the relevant District Plan. It is on this basis that Waka Kotahi seeks to waive the requirement for an outline plan for establishment works. This is confirmed in the proposed conditions in Appendix Five.

59.2 Management plans

The construction of the Ō2NL Project is supported by the development of, and implementation of, management plans that set out methods and approaches to delivery within the parameters and standards established by the suite of proposed conditions. Management plans are to be prepared in the manner set out in conditions, including in respect of the objectives, consultation and content to achieve standards or outcomes in conditions. The management plan framework is illustrated in Figure 59-1.

Figure 59-1 Management plan framework



59.2.1 Construction Environmental Management Plan

The management plans are brought together under the 'umbrella' of a broader CEMP. The CEMP is an overarching document that is prepared to assist in achieving compliance with designation and resource conditions, and to also meet Waka Kotahi's obligations under, relevant legislation; national, regional, and local policy; and Waka Kotahi environmental and social policies.

The other management plans generally fall under, and are appendices to, the CEMP.

The CEMP is to cover all anticipated construction elements and provide details of:

- environmental policy, objectives and performance standards;
- staff and contractors' responsibilities;
- training requirements for employees, sub-contractors and visitors;
- environmental incident and emergency management;
- environmental complaints management;
- compliance monitoring;
- reporting;
- environmental auditing; and
- corrective action/s.

The CEMP, and supporting plans, may require review and amendment during the life of the Ō2NL Project to reflect changes to activities, risks, mitigation measures, responsibilities and management processes. The ability to make changes to management plans is critical to continually improving the effectiveness of the management plans and the effects management measures and environmental outcomes that they deliver. The proposed conditions provide for this flexibility, including a framework to enable inconsequential amendments to be made to the management plans without the need for a further outline plan to be submitted, or for a certification process to be followed.

59.2.2 Summary of management plan content

Table 59-1 provides a general summary of the content of the management plans that are required by the proposed designation and resource consent conditions.

Table 59-1 Summary of management plan content

Management plan	Objective	Content
Communications Plan	To define and set out proactive and reactive communications protocols to keep the community and stakeholders engaged and informed about ongoing design and construction management activities.	The Communications Plan includes: • the details of an appointed project liaison person or persons; • a description of the various audiences for communication; • the methods and platforms to be used, and the programme for their implementation; • the general topics for communication; and • details of a community liaison group that is required to be established (which provides both a mechanism for the dissemination of information and for obtaining community input into the Project).
Construction Noise and Vibration Management Plan	To set out measures for the development and implementation of the 'Best Practicable Option' for the management and minimisation of noise and vibration effects	The Construction Noise and Vibration Management Plan includes: • the construction noise and vibration criteria that apply; • a summary of construction practices, management and mitigation; • standards, monitoring and reporting procedures; • identification of 'protected premises and facilities' (PPFs) where noise and vibration criteria apply, including mapped areas; • staff training and site behaviour requirements;

Management plan	Objective	Content
		• monitoring methods; and • communications procedures and contact information.
Construction Traffic Management Plan	To manage property access, construction traffic and safety for all road users associated with construction on a Project wide scale.	The Construction Traffic Management Plan includes: • the numbers, frequencies, routes and timing of traffic movements associated with construction activities; • site access routes and access points for heavy vehicles; • temporary traffic management measures, including measures to minimize heavy vehicles passing through communities on local roads; • identifying and maintaining the current access provision for pedestrians and cyclists; • provisions for ongoing access to private and adjacent properties; • management approach to loads on heavy vehicles, including covering loads of fine material, removing any material deposited or spilled on public roads and limiting or minimizing haul distances; and • approaches to maintenance and use of construction vehicles in order to limit exhaust emissions.
Muaūpoko Management Plan	To recognise and provide for the tangata whenua values of the area, and to establish approaches to avoid or mitigate impacts on those values.	The Muaūpoko Management Plan (or plans) includes: • cultural protocols and inductions; • monitoring activities; • preconstruction activities and dedication/s; • opportunities to reuse materials; and • opportunities to participate in ecological management activities.
Ngāti Raukawa ki te Tonga Management Plan	To recognise and provide for the tangata whenua values of the area, and to establish approaches to avoid or mitigate impacts on those values.	The Ngāti Raukawa ki te Tonga Management Plan (or plans) will include the following details: • cultural protocols and inductions; • monitoring activities; • preconstruction activities and dedication/s; • opportunities to reuse materials; and • opportunities to participate in ecological management activities.
Ecology Management Plan	To set out the specific procedures, methods and monitoring requirements for terrestrial fauna and flora (including avifauna) and aquatic fauna and flora during construction and operation of the Project.	The Ecology Management Plan includes: • confirmation of the ecological values and potential effects; • details of the effects management measures and monitoring required; • site staff induction procedures; • a description of consultation undertaken in the preparation of the Ecology Management Plan; • approaches to the management of vegetation removal including procedures for direct transfer of vegetation and opportunities for reuse; • details of setbacks and areas to be avoided;

Management plan	Objective	Content
		• specific approaches to managing effects on fauna, including approaches in respect of nesting birds, lizard and invertebrate salvage; • planting procedures and management including monitoring and approaches to discourage vehicle bird strike; • pre-construction survey procedures; • approaches to pest plant and pest animal management; • the location and extent of replacement and offset planting (including its protection, eco sourcing, timeframes and maintenance); • a Lizard Relocation Area Management Plan that sets out how habit for relocated lizards will be provided; • a Freshwater Ecology Management Plan that details fish recovery procedures, culvert design, approaches to stream works and stream creation; and • monitoring and reporting requirements.
Erosion and Sediment Control Plan	To set out measures to be implemented during construction to minimize erosion and the discharge of sediment within and beyond the boundaries of the Project works area.	The Erosion and Sediment Control Plan includes: • demonstrate how the requirements of the *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' June 2016 Guideline Document 2016/005 Version 2* will be met; • identify key personnel, including their roles, responsibilities, training and contact details; • a general description of the stages of, and sequencing of, works; • identify specific activities or areas that require the preparation of site specific erosion and sediment control plans; • the overarching approach to monitoring, responses and corrective actions; and • supporting documents, including a Chemical Treatment Plan, Erosion and Sediment Control Monitoring Plan, Dewater Management Procedure, Emergency Spill Response Procedure and Stream Works Procedure.
Construction Air Quality Management Plan	To outline the dust management and emission controls to minimize effects of dust and discharges of other contaminants to air.	The Construction Air Quality Management Plan includes: • methods and procedures to undertake monitoring and manage dusts as a result of construction activities; • the identification of triggers and contingency measures to address adverse effects on the sensitive receptors identified; • procedures for assessing, mitigating and remedying the effects of any odorous material that is discovered during construction; • procedures for responding to process malfunctions and accidental dust discharges; • complaints management procedures; • reference to the construction vehicle management and maintenance procedures

Management plan	Objective	Content
		outlined in the Construction Traffic Management Plan; and • methods to monitor and contingency measures to respond to effects of dust deposition at the dwelling known as 'Ashleigh', located at 1024 Queen Street East.

59.2.3 Site-specific plans

The Project construction activities are also supported by two types of site-specific plans:

- site-specific erosion and sediment control plans; and
- ecology offset site layout plans.

The purpose of these plans is to direct the implementation of the Project at a site-specific level.

For the Site-Specific Erosion and Sediment Control Plans, this includes the location and specification of erosion and sediment control devices relative to the extent of earthworks and land disturbance at a particular site and within a catchment.

The Ecology Offset Site Layout Plans will direct the way in which actions to offset effects on indigenous biodiversity is achieved by showing the location and specification for planting, fencing and any water body enhancement works.

59.3 Management and site-specific plan approval process

The management plans will be prepared in the manner set out in designation and resource consent conditions to include the information, consultation and details required by those conditions. In this way, management plans implement the controls set by conditions.

As set out above, the various management plans that are provided to the District Councils may be technically reviewed and amended through the outline plan process in section 176A of the RMA, which provides for the District Councils to request changes to outline plans.

The same approach is not available for the resource consent sought from the Regional Councils. For this reason, the resource consent conditions include a technical certification process that provides the Regional Councils with a similar opportunity to confirm that the relevant management plans fulfil the requirements set out in the conditions.

Table 59-2 sets of the approval process, relevant authority, parties to be consulted and timeframes for each of the plans required by designation and/or resource consent conditions.

Table 59-2 Plan approvals and timeframes

Management plan	Resource consent or designation condition	Approval mechanism	Consultation requirement	Relevant authority	Timeframe
Construction Environmental Management Plan (overarching)	Designation and resource consent	Outline plan (district councils); for information (regional councils;	Project Iwi Partners and the community Liaison group	District councils and regional councils	Accompanies the outline plan

Management plan	Resource consent or designation condition	Approval mechanism	Consultation requirement	Relevant authority	Timeframe
		subject to certification of plans set out below)			
Communications Plan	Designation	For information	Nil	District councils	Accompanies the outline plan
Construction Noise and Vibration Management Plan	Designation	Outline plan	Suitably qualified and experienced conservation architect[1]	District councils	Accompanies the outline plan
Construction Traffic Management Plan	Designation	Outline plan	Nil	District councils	Accompanies the outline plan
Muaūpoko Management Plan	Designation	For information	Muaūpoko Tribal Authority	District councils	Accompanies the outline plan
Ngāti Raukawa ki te Tonga Management Plan	Designation	For information	Ngāti Raukawa ki Te Tonga	District councils	Accompanies the outline plan
Ecology Management Plan	Resource consent	Technical certification	Project Iwi Partners Department of Conservation	Regional councils	Provided to the regional council at least 40 days prior to the commencement of construction activities
Erosion and sediment Control Plan	Resource consent	Technical certification	Project Iwi Partners	Regional councils	Provided to the regional council at least 40 days prior to the commencement of construction activities

[1] Relating to monitoring methods responding to effects of construction vibration at the dwelling known as 'Ashleigh' at 1024 Queen Street East.

Management plan	Resource consent or designation condition	Approval mechanism	Consultation requirement	Relevant authority	Timeframe
Construction Air Quality Management Plan	Resource consent	Technical certification	Nil	Regional councils	Provided to the regional council at least 40 days prior to the commencement of construction activities
Site-specific Erosion and Sediment Control Plans	Resource consent	Technical certification	Project Iwi Partners	Regional councils (as relevant to site)	Provided to the regional council at least 10 days prior to the commencement of construction activities
Ecology Offset Site Layout Plans	Resource consent	For information	Project Iwi Partners and relevant landowners	Regional councils (as relevant to site)	Provided to the regional council prior to the commencement of the offsetting measures described in the Ecology Offset Site Layout Plan

59.4 The Role of the Cultural and Environmental Design Framework

The CEDF (included in Appendix Three) sets out a concept design that has been developed thorough a collaboration with the Project Iwi Partners to deliver the following kaupapa tumu/core principles:

- Tread Lightly, with the Whenua
  - Me tangata te whenua (treat the land as a person)
  - Kia māori te whenua (let it be its natural self)
- Create an Enduring Legacy
  - Kia māori te whakaaro (normalise māori values)
  - Me noho tangata whenua ngā mātāpono (embed the principles in all things)
  - Tū ai te tangata, Tū ai te whenua, Tū ai te Wai (elevate the status of the people, land and water).

The CEDF and particularly these principles, provide the design parameters within which the design of the Ō2NL Project will be developed and 'look and feel' and legacy outcomes of the Project realised. A Design Audit Process forms a part of the CEDF and will be used regularly as the design of the Project develops to assess and guide the manner in which the design conforms to the CEDF and as such, provides design solutions that manage potential adverse effects. The CEDF is a "live" document and will continue to be developed to become progressively more detailed in the procurement and ultimately become a final detailed design version.

60 Summary of measures to manage adverse effects on the environment

The Ō2NL Project will result in a number of positive effects on the environment, these are set out in detail in Part G. Part G also identifies potential adverse effects of the Project, and describes a range of measures to avoid, remedy, mitigate, offset, compensate for and monitor adverse effects. These measures are summarised in Table 60-1.

Table 60-1 Measures to manage adverse effects

Topic	Effect management measure	Implementation approach
Tangata whenua values	Ongoing partnership with tangata whenua through the duration of this Project Karakia undertaken before the commencement of construction and activities and public use Site visits to provide oversight and progress across the Project Protection of taonga species	Designation conditions outline plan Resource consent condition Muaūpoko Management Plan Ngāti Raukawa ki te Tonga Management Plan CEDF Ecology Management Plan Construction Environmental Management Plan Land acquisition under the PWA
Construction noise and vibration	Construction noise and vibration limits specified along with days/times period and duration. Identification of PPFs and implementation of 'Best Practicable Option' to manage construction noise effects Limits on working hours where reasonably practical Use of appropriate equipment, equipment checks, operating requirements, training Communication with community to keep them informed of noisy/vibration causing works Monitoring Complaints management	Designation conditions Construction Noise and Vibration Management Plan Outline plan Construction Traffic Management Plan Communications Plan Construction Environmental Management Plan
Operational road-traffic noise	Lower noise road surface Noise barriers Controlled use of audio tactile profiled road markings Building modifications (where required) with reference to NZS 6806:2010 'Acoustics – road traffic noise – New and altered roads'.	Designation conditions Detailed design (barriers and road surface) and supporting design report Design, operation and maintenance contract obligations NZS 6806:2010 'Acoustics – Road traffic noise – New and altered roads'

Topic	Effect management measure	Implementation approach
	Post-construction review of low-noise road surfaces and noise barriers Timeframe and duration of monitoring and management measures	
Construction traffic	Management of site access Planned routes for heavy vehicles Ongoing vehicle access to private and adjacent properties Management of loads Provision for ongoing use of existing network.	Construction Traffic Management Plan Code of Practice for Temporary Traffic Management
Communications and engagement	Appointment of community liaison person or persons Establishment of Community Liaison Group Complaints management procedures	Designation conditions Outline plan Communications Plan
Archaeology and built heritage	Archaeology discovery protocol Project wide general archaeological authority (to be sought separately to the RMA process)	Designation conditions Resource consent conditions Future archaeological authorities under the heritage New Zealand Pouhere Taonga Act 2014 Waka Kotahi Standard P45 Accidental Archaeological Discovery Specification
Natural character	Planting to address potential natural character effects on waterways and wetlands	Designation conditions Outline plan Planting concept plans CEDF
Landscape and visual	Planting to address potential landscape and visual effects Revised visual effects assessment and Planting to address property specific adverse visual effects	Designation conditions Outline plan CEDF Landscape concept plans
Air quality	Construction air quality standards Weather stations AS/NZS 3580.14:2014 ‘Methods for sampling and analysis of ambient air Meteorological monitoring for ambient air quality monitoring applications’ Rainfall monitoring stations ‘National environmental monitoring standard rainfall recording - measurement	Regional resource consent conditions Construction Air Quality Management Plan Construction Traffic Management Plan Ecology Management Plan

Topic	Effect management measure	Implementation approach
	of rainfall data for hydrological purposes' version 2.1 (August 2017) Air quality monitoring and management of dust from construction activities and triggers for the implementation of such measures Visual dust monitoring standards	
Earthworks and land disturbance	Earthworks and land disturbance stabilisation measures Winter earthworks and land disturbance measures Detailed site investigations Contaminated soil discovery and investigation protocols 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' GD05	Resource consent conditions Erosion and Sediment Control Plan Site-specific Erosion and Sediment Control Plans Future resource consents under the resource management (national environmental standard for assessing and managing contaminants in soil to protect human health) regulations 2011, and accompanying management processes where necessary
Contaminated land	Detailed site investigations Contaminated soil discovery process Measures for control of excavation and construction involving contaminated land, monitoring contamination levels during construction and excavation works, disposal of soil unsuitable for re-use at an appropriate facility and capping / containment of contaminated soil beneath impermeable surfaces. 'Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils'	Resource consent conditions Erosion Sediment Control Plan Future resource consents under the Resource management (national environmental standard for assessing and managing contaminants in soil to protect human health) regulations 2011, and accompanying management processes where necessary Management of pre-1990 building demolition (lead and asbestos) under the health and safety at Work (Asbestos) Regulations 2016
Terrestrial ecology	Limits on maximum areas of habitat types within wetlands and forests to be removed for the construction of the Project Pre-construction surveys undertaken of 'At Risk' or 'Threatened' braided river bird species and wetland bird species Pre-construction surveys undertaken to identify, capture and relocate lizards and indigenous invertebrate species Planting of indigenous buffer planting where the Project is adjacent to particular habitats Biosecurity procedures to avoid the spread of *Didymosphenia geminata* (didymo), hornwart, and *Gambusia affinis* (mosquito fish)	Resource consent conditions Ecology Management Plan Ecology Offset Site Layout Plans Measures required by the Biosecurity Act 1993 including regional pest management plan requirements. Wildlife Act 1953 permits

Topic	Effect management measure	Implementation approach
	'At risk' or 'threatened' flora and fauna discovery protocol under the department of conservation New Zealand threat classification system Measures to offset residual adverse effects on terrestrial ecology including offset planting, replacement tree planting, wetland restoration offset, compensation for effects on lizards, offsetting performance targets, identification of sites for offset and compensation measures and offsetting oversight, implementation, review and monitoring. Measures to undertake vegetation clearance, manage lizard capture, transfer, release and monitoring and flora and fauna discovery protocols.	
Freshwater ecology	Fish removal and recovery procedures from relevant streams and wetlands prior to the commencement of works Temporary works for diversions and culverts to enable fish passage during construction of the Project Maintenance and monitoring measures to ensure the provision of fish passage through specified culverts following completion of the Project. Measures to offset residual adverse effects on freshwater ecology including the provision of new stream channels, riparian planting, performance targets, identification of sites for offset and compensation measures and offsetting oversight, implementation, review and monitoring.	Resource consent conditions Resource Management (National Environmental Standards for Freshwater) Regulations 2020 Ecology Management Plan Ecology Offset Site Layout Plans Conservation Act 1987, Wildlife Act 1953 and Fisheries Act 1996 permits, consents and authorities
Groundwater	Construction dewatering (taking of groundwater) measures around bores Construction dewatering (discharge of water) and quality of discharge water and sedimentation standards Groundwater standards relating to any relevant community water supply or bores Groundwater monitoring at bores	Resource consent conditions Summary report of groundwater monitoring
Surface water	Surface water abstraction limits (volume and rates) for relevant water bodies for the taking of surface water for construction activities.	Resource consent conditions

Topic	Effect management measure	Implementation approach
	Recording of daily water volumes abstracted and rates of water abstracted	
Erosion and sediment control	Erosion and sediment control standards and performance targets, sediment retention devices 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region' GD05 Erosion and Sediment Control Plan, including identification of key personnel, training, description of stages and sequencing of works, approach to implementation, outcomes of consultation with Iwi Project Partners, approach to monitoring and the inclusion of supporting sub-plans with measures to manage chemical treatment, monitoring, dewatering, emergency spills, stream works and hazardous substances	Resource consent conditions Erosion and Sediment Control Plan including a (Chemical Treatment Plan, Erosion Sediment Control Monitoring Plan, Dewatering Management Procedure, Emergency Spill Response Procedure, Stream Works Procedure) Site-specific Erosion and Sediment Control Plans As built plans (showing structures and treatment devices)
Operational stormwater	Operational stormwater standards 'Stormwater Treatment Standard for State Highway Infrastructure', Waka Kotahi May 2010	Resource consent conditions Stormwater management device as-built plans.
Bridges and structures over water bodies	Bridge construction and operation standards Public access restrictions	Resource consent conditions Bridge as-built plans Ecology Management Plan Erosion and Sediment Control Plan Construction Environmental Management Plan
Works in the bed of water bodies	Permanent culvert design standards, fish passage provisions Works in the bed of water bodies standards Natural character planting implementation and monitoring	Resource consent conditions Ecology Management Plan Erosion and Sediment Control Plan Planting Concept Plans Construction Environmental Management Plan Resource Management (National Environmental Standards for Freshwater) Regulations 2020
Network Utilities	Planned relocation Provide for ongoing operation	NZ Code of Practice for Utility Operators' Access to Transport Corridors Construction Environmental Management Plan

61 Proposed conditions

As described in Table 61-1, Waka Kotahi proposes conditions to be imposed on the designations and resource consents. These conditions are to respond to the adverse effects of the Project that have been identified in Part G, along with the technical assessments included in Volume IV.

Conditions for the delivery, operation and maintenance of the Ō2NL Project are underpinned by the following principles:

- all works are to be undertaken in compliance with applicable current New Zealand Standards and legislation;
- the construction and operation of the Project will avoid, remedy, mitigate, offset, or compensate for adverse effects to an appropriate level, with construction effects and operational effects being distinguished;
- in some cases an 'envelope' of effects sets the maximum adverse effect that can be caused by the Project;
- an interactive and collaborative approach has been, and will continue to be, used to develop the design and the methods to avoid, remedy or mitigate actual and potential effects;
- Waka Kotahi will maintain on-going engagement with the Project Iwi Partners, the Councils, directly affected parties, other key stakeholders and the community;
- the outline plan process, and suite of management plans, provides for the refinement of approaches to the management of adverse effects within the parameters of standards set in the conditions; and
- jurisdictions of the consent authorities are reflected with the management of effects of the Project being achieved through a combined approach where duplication is avoided, including in situations where activities are authorised through other processes and legislation.

Two sets of conditions are proposed. These are a set for the designations and a set for the resource consents. The proposed conditions are attached as Appendix Five. The specific conditions that apply to each designation and resource consent is set out in tables that list of designations and resource consents for the Project. Table 61-1 lists the topics that are addressed in each set of conditions.

Table 61-1 Topics addressed in designations and resource consents

Designation conditions	Resource consent conditions
Construction management	Construction management
Tangata Whenua values	Archaeology
Archaeology	Terrestrial ecology
Communications and engagement	Freshwater ecology
Landscape and visual	Ecology offset and compensation
Construction noise and vibration	Air quality
Construction traffic	Earthworks and land disturbance
Network utilities	Groundwater

Designation conditions	Resource consent conditions
Operational road-traffic noise	Surface water
Post-construction and on-going operation	Erosion and sediment control
	Operational stormwater
	Bridges and structures over water bodies
	Works in the beds of water bodies

PART I: STATUTORY ASSESSMENT

62 Overview

The following provides an assessment of the statutory matters that are relevant to the Ō2NL Project under the RMA. The assessment is particularly guided by the requirements of sections 104 and 104D, section 105, section 107, section 171(1) and Part 2 (being sections 5 to 8) of the RMA. Those provisions set out the matters that must be considered by a local authority when considering a resource consent and making a recommendation on a notice of requirement respectively.

The applicable planning documents, and the provisions of those planning documents that are relevant to the consideration of the NoRs and resource consents are included in full in Appendix Two. The assessment is made with reference to the preceding parts of this Volume, including:

- Part E: Consideration of Alternatives;
- Part G: Assessment of Effects on the Environment; and
- Part H: Management of Effects on the Environment.

Where necessary, the extent of relevance and weight attributed to any particular provisions is indicated in the following assessment.

63 National policy statements

63.1 National Policy Statement for Freshwater Management

Provisions identified as relevant: Objective 1, Policy 1, Policy 2, Policy 3, Policy 4, Policy 5, Policy 6, Policy 7, Policy 8, Policy 9, Policy 10, Policy 12, Policy 13, Policy 15, Clause 3.22, Clause 3.24

The NPS-FM addresses, as a matter of national significance, the management of fresh water through a framework that considers and recognises Te Mana o te Wai as an integral part of freshwater management. It is relevant when assessing the effects of the Project on the quality of fresh water, freshwater ecosystems and values associated with freshwater bodies (streams and natural wetlands).

The NPS-FM requires the management of freshwater 'gives effect to' Te Mana o te Wai (Policy 1). Te Mana o te Wai encompasses six principles, relating to the roles of tangata whenua and other New Zealanders in the management of freshwater. These principles of *Mana whakahaere, Kaitiakitanga, Manaakitanga, Governance, Stewardship, and Care and respect* inform the NPS-FM.

There is a hierarchy of obligations in Te Mana o te Wai that prioritises:

- First, the health and well-being of water bodies and freshwater ecosystems;
- Second, the health needs of people (such as drinking water); and
- Third, the ability of people and communities to provide for their social, economic and cultural well-being, now and in the future.

63.1.1 Te Mana o te Wai

The hierarchy of obligations, and the relevant NPS-FM objective and policy provisions that stem from them, have been carefully addressed by the Project (informed by the contribution of tangata whenua as project partners) as follows:

- The effects avoidance and management measures for the Project (including with regard to freshwater) have been developed in partnership with tangata whenua. This partnership will continue throughout the detailed design and construction phases of the Project and beyond into any associated longer-term monitoring activities. As a result, the Te Mana o te Wai principles of mana whakahaere, kaitiakitanga, and manaakitanga, as well as the requirement of Policy 2 of the NPS-FM that tangata whenua are actively involved in freshwater management including decision making, have been and will continue to be reflected in the Project.
- Development of the Project will allow for people and communities to provide for their health and safety and their social, economic and cultural well-being in a manner consistent with Te Mana o te Wai and Policy 15 of the NPS-FM. The health and well-being of water bodies and freshwater, in accordance with the Te Mana o te Wai obligation hierarchy and the principle of governance, has also been central to the Project's development. For example, the Project largely avoids interaction with groundwater, while the application of the effects management hierarchy in respect of freshwater ecology will at least maintain and in several locations improve the overall health and well-being of surface water bodies and their associated freshwater ecosystems.
- In accordance with Te Mana o te Wai, the Project avoids adverse effects on the health needs of people by avoiding effects on watercourses where municipal water takes are located, and on domestic water supply groundwater bores.
- Adverse effects on human health from over-allocation have also been avoided through water takes for construction effects mitigation (for example, dust control) only being sought from waterways where available allocation exists, and the use of water storage and efficiency measures during construction to limit the volume of water take required. In addition, water will only be taken once supply from alternative sources (already consented bores, re-use of water in erosion and sediment control ponds and the like) has been utilised to the fullest extent practicable. The surface water takes sought are temporary in duration and will expire at the completion of construction of the Project. This water take approach is also consistent with the requirement of NPS-FM Policy 11 that freshwater is allocated and used efficiently.

In all, the design, construction, and on-going operation of the Project is consistent with Te Mana o te Wai.

63.1.2 Wetlands and waterways: Clause 3.22 and Clause 3.24

In relation to natural wetlands, every regional council must include a policy provided in Clause 3.22(1) (or words to the same effect) in its regional plans that requires[1]:

> *"The loss of extent of natural inland wetlands is avoided, their values are protected, and their restoration is promoted, except where:*
>
> *…*
>
> *(b) the regional council is satisfied that:*
>
> *(i) the activity is necessary for the construction or upgrade of specified infrastructure; and*
>
> *(ii) the specified infrastructure will provide significant national or regional benefits; and*

[1] This clause is implemented by Policy P110 of the Proposed Natural Resources Plan for the Wellington Region (Final Appeals Version 2022). There is no equivalent implementation policy in the Horizons One Plan.

(iii) there is a functional need for the specified infrastructure in that location; and

(iv) the effects of the activity are managed through applying the effects management hierarchy."

Specified infrastructure is defined in the NPS-FM as meaning infrastructure that delivers a service operated by a lifeline utility (as defined by the Civil Defence Emergency Management Act 2002 ("CDEMA")), or regionally significant infrastructure identified as such in a regional policy statement or regional plan. The Project qualifies as specified infrastructure under both heads:

- Waka Kotahi is defined as a lifeline utility as it carries out the business of providing a road network (state highway) under Part B of Schedule 1 of the CDEMA.
- While using slightly different terms, a strategic transport/road network (including a state highway) is identified in the regional policy statements of both Horizons (as 'critical infrastructure' and 'regionally significant infrastructure') and GWRC (as 'regionally significant infrastructure').

As discussed throughout this AEE, the Project will "*provide significant national or regional benefits*", particularly in terms of transport safety and *resilience*.

The 'functional need' and 'effects management hierarchy' elements of Clause 3.22(1) are addressed below.

In relation to rivers, every regional council must include a policy provided in Clause 3.24(1) (or words to the same effect) in its regional plans that requires:[2]

"The loss of river extent and values is avoided, unless the council is satisfied:

(a) that there is a functional need for the activity in that location; and

(b) the effects of the activity are managed by applying the effects management hierarchy."

Functional need and the effects management hierarchy

In addressing effects on both natural wetlands and rivers, the NPS-FM (through Clause 3.22 and 3.24, respectively) requires avoidance of adverse effects, unless a functional need for the activity to locate in the selected location can be demonstrated. 'Functional need' is defined by the NPS-FM as the need for a proposal or activity to traverse, locate or operate in a particular environment because the activity can only occur in that environment.

Where there is a functional need for the activity to be located in the selected location, the relevant effects on wetlands and / or rivers must be addressed through the effects management hierarchy.

The appropriate application of the 'functional need' and 'effects management hierarchy' provisions was addressed by the High Court considering the proposal by Waka Kotahi to construct Te Ara o Te Ata: the Mt Messenger Bypass Project.[3]

In addressing functional need, the functional and technical characteristics of the public work for which the notice of requirement has been issued, and for which resource consents have been sought, must be taken into account.

In this case, the Project seeks to establish a functional linear infrastructure route through an environment defined by a fixed connection point at its southern end (that is, the northernmost constructed extent of PP2Ō) to a point to the north of Levin, connecting back to the existing SH1. In that regard, and with

[2] Policy 4.8.9 of the Proposed Natural Resources Plan for the Wellington Region (Final Appeals Version 2022) (inserted as a result of the NPS-FM) seeks that loss of river extent and values is avoided unless functional need can be demonstrated and the effects management hierarchy is implemented. The Horizons One Plan does not as yet contain an equivalent implementation policy.

[3] *Poutama Kaitiaki Charitable Trust v Taranaki Regional Council* [2022] NZHC 629.

reference to the definition of 'functional need' set out above, the Project has a functional need to be located and operate in the area defined by the NoRs.

Within that wider environment the route development process has taken into account a range of constraints, including the location of waterways and wetlands.

With regards to wetlands, the route has largely (recognising the functional constraints of the Project) avoided such features. However, as set out in the Terrestrial Ecology assessment in Part G of this report, some wetlands are unavoidably and adversely affected by the Project both in terms of loss of extent and value.[4]

With regards to waterways, given the north-south orientation of the Project and the generally east-west orientation of the rivers and streams in the Project area (that is, generally flowing from the Tararua Range to the east of Levin to the Tasman Sea in the west), the Project unavoidably traverses several river and stream environments. There is no practicable alternative route that would avoid affecting waterways. Approximately 3,571m of permanently flowing waterway extent and associated values will be lost (noting however that at least 892m of permanently flowing open diversion channel will be constructed).

It is therefore not practicable for the project to avoid traversing the waterways in question.

There is therefore a functional need for the Project to be constructed in its selected location in relation to natural wetlands and rivers.

As described in Part H of this report, the effects management hierarchy has been carefully and deliberately applied to the management of the effects on inland wetlands and the relevant waterways. That is explained in more detail in the Terrestrial Ecology Assessment and the Freshwater Ecology Assessment[5].

In respect of wetlands the following measures will be implemented:

- Fish removal and recovery procedures from relevant streams and wetlands prior to the commencement of works
- Limits on maximum areas of habitat types within wetlands and forests to be removed for the construction of the Project.
- Temporary works for diversions and culverts to enable fish passage during construction of the Project
- Measures to offset residual adverse effects on freshwater ecology including the provision of new stream channels, riparian planting, performance targets, identification of sites for offset and compensation measures and offsetting oversight, implementation, review and monitoring.

In respect of waterways:

- At the significant waterway crossing points at the Ohau River, Waikawa Stream, Manakau Stream, and Waiauti Stream permanent loss of extent and values has been avoided completely through the use of bridges rather than culverts;
- A full range of mitigation measures will be implemented, such as appropriate culvert design to provide for fish passage;
- The loss of stream habitat (which cannot be mitigated) will be offset through a riparian planting and fencing scheme.

[4] Noting that most of the wetlands are grazed, exotic-dominated wetlands of relatively low ecological value.
[5] see Table K19

Consistency with Clauses 3.22 and 3.24

Overall, therefore, the Project is consistent with both Clause 3.22(1)(b) and 3.24(1) of the NPS-FM, because:

- The activity (the Project) is necessary for the construction of specified infrastructure; and
- The Project will generate regional and national benefits; and
- The Project has a functional need to be located and to operate in, and traverse, the selected location; and
- The effects management hierarchy has been applied to the management of the effects of the activity (including through offsetting and compensating for the unavoidable loss of extent of natural wetland and streams).

Accordingly, on the basis of all the above, granting the consents necessary to authorise the project works within the affected wetlands and waterways would be consistent with the NPS-FM and there are no directive provisions with which the Project is inconsistent.

63.1.3 Fish passage

In relation to fish passage, every regional council must include an objective provided in Clause 3.26(1) (or words to the same effect) in its regional plans that requires[6]:

> *"The passage of fish is maintained, or is improved, by instream structures, except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats."*

Every regional council must also include policies to implement the above objective (as outlined in Clause 3.26(2)) and matters to be considered when considering an application for a consent relating to an instream structure (Clause 3.26(4)).

The objective for instream structures to maintain or improve the passage of fish is complemented by Regulations 70 and 71 of the NES-F.

Fish passage will be maintained or improved by the Project as follows:

- For permanent stream crossings that are culverted, the default design position is to follow the "stream simulation" design outlined in the New Zealand Fish Passage Guidelines for Structures up to 4 metres ("NZFPG") (NIWA/DOC, 201852). This design seeks to create a near-natural stream bed through the culvert so there is a seamless transition between upstream and downstream habitats in terms of channel morphology, water depths, and water velocities.
- To complement the "stream simulation" culvert design, the riparian zone upstream and downstream of all culverts will be planted with vegetation, that will, in time, form a closed canopy over the streams. This will act to shade the streams and soften the interface between the culverts and surrounding environment, such that the stress on fish and invertebrates passing from a totally dark culvert environment to an open channel will be minimised.
- The EMP will include procedures to measure culvert parameters post-construction against the criteria in Regulation 70 of the NES-F. All completed/constructed culverts will be assessed using the Fish Passage Assessment Tool.

[6] This clause is implemented by Objective O23 of the Proposed Natural Resources Plan for the Wellington Region (Final Appeals Version 2022). There is no equivalent implementation policy in the Horizons One Plan.

63.1.4 National objectives framework and freshwater management units

The NPS-FM establishes a National Objectives Framework ("NOF") that outlines the following steps to be taken by regional councils:

- identify freshwater management units ("FMUs") in the region and the values for each FMU;
- set environmental outcomes for each value and include them in an objective in regional plans;
- identify attributes for each value and set baseline states;
- set target attribute states, environmental flows and levels and other criteria to achieve the environmental outcomes; and
- set limits as rules and prepare action plans to achieve environmental outcomes.

Horizons and GWRC are in the process of identifying FMUs and associated values, outcomes and attributes within their respective jurisdictions which will, in turn, inform plan changes necessary to give effect to the NOF provisions in the NPS-FM. The Councils are yet to publish material that allows an assessment of the Project's consistency or otherwise with the values, attribute states and environmental outcomes that might arise from the NOF process.

Nevertheless, given the measures proposed by the Project to apply the effects management hierarchy set out in the NPS-FM, both the construction and ongoing operational discharges from the Project to water, and to land where they might enter water, will likely be consistent with the target attribute states and the desired environmental outcomes that can credibly be foreseen.

For example, the Punahau/Lake Horowhenua catchment is one of two identified areas in the country where intensive vegetable production predominates, and where diffuse nitrogen discharges are high and it can be foreseen that a desired NOF environmental outcome will be for nitrogen loss in the catchment to be reduced in the longer term, with corresponding attribute states and bottom lines. The Project will not contribute to nitrogen discharges in the catchment.

63.2 National Policy Statement on Urban Development

Provisions identified as relevant: Objective 1; Objective 4, Objective 5, Objective 6, Objective 8, Policy 1, Policy 6, Policy 9, Policy 10

The National Policy Statement on Urban Development ("NPS-UD") came into force on 20 August 2020 and was amended on 11 May 2022. Objective 1 of the NPS-UD directs that New Zealand has "well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future". Policy 2 recognises the need for Tier 1, 2, and 3 local authorities to "provide at least sufficient development capacity to meet "expected demand for housing and for business land of the short term, medium term and long term".

Policy 3 imposes additional obligations on councils in tier 1 urban environments to adopt specific provisions in their regional policy statements and district plans relating to building heights and density of urban form, although these may be modified to accommodate a "qualifying matter" under Policy 4 and clause 3.32. Policy 5 requires councils in tier 2 and tier 3 urban environments, in their regional policy statements and district plans, to enable building heights and density of urban form relative to housing and business demand, and public transport and community services accessibility.

KCDC is a tier 1 local authority, and HDC is a tier 3 local authority. KCDC publicly notified[7] Proposed Plan Change 2 on 18 August 2022 to give effect to its obligations under the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021.

[7] Submissions closed on 15 September 2022

The NPS-UD recognises that urban environments, including their amenity values, develop and change over time in response to the diverse and changing needs of people, communities, and future generations (Objective 4). Therefore, Objective 6 requires local authority decisions on urban development that affect urban environments to be:

- Integrated with infrastructure planning and funding decisions; and
- Strategic over the medium term and long terms; and
- Responsive, particularly in relation to proposals that would supply significant development capacity.

Under the NPS-UD[8], a state highway is defined as nationally significant infrastructure.

Policy 6 identifies specific provisions decision-makers must have particular regard to when making decisions that affect the urban environment, including the planned urban form anticipated by the RMA planning documents that have given effect to the NPS-UD, possible changes to an area resulting from the planned urban form, benefits of urban development, contributions towards meeting the NPS-UD's requirements to provide or realise development capacity and the likely current and future effects of climate change.

The Ō2NL Project is consistent with the NPS-UD for the following reasons:

- The majority of the strategic, transport and more localised planning strategies and plans relevant to the Project identify and reinforce the need for the Project to occur to assist in improving transport network safety and resilience, reducing congestion, facilitating coordinated urban growth, and contributing to efficient freight and public transport provision. Local authority urban development decisions in the Project area have thus been able to be integrated with infrastructure planning and funding as it is relevant to the Project (Objective 1, Objective 6, Policy 10).
- The Project will contribute to growth in the Horowhenua District through enablement of full capacity urban development of the Tara-Ika Growth Area east of Levin (and other areas identified for urban growth by HDC) by providing additional capacity on both the local and strategic roading network. It will also contribute to growth in the Kapiti Coast District through providing enhancing the resilience and connectivity of the state highway network (Objective 1, Objective 6, Policy 10).
- The functioning of the Levin town centre will be enhanced, and people's health and safety improved, by the reduction in congestion produced by inter-regional traffic (including heavy vehicles) in the town centre once the Project is operational (Objective 1, Objective 4, Policy 1, Policy 6).
- The design of the Project provides appropriate connections with the existing and future local roading network in Levin and retains the connectivity of the existing local roading network at key points (for example, maintenance of vehicular and pedestrian/cyclist connectivity along Queen Street East where it crosses the highway alignment). The SUP also provides an active transport spine along the entire route to which all adjacent communities have the potential to connect to in the future (Objective 1, Policy 1, Policy 10).
- The Project will be constructed to integrate with the existing and proposed local drainage network and will not create adverse effects in terms of up or downstream flooding potential. In some locations (for example, Koputaroa) there will be a positive effect in terms of reduced flooding potential (Objective 1, Objective 6, Policy 1, Policy 6, Policy 10).
- The Project will adapt to likely current and future effects of climate change (predominantly more frequent, higher intensity rainfall events) through the design of the Project's stormwater drainage and treatment system, and structural elements (eg culverts, bridges) such that existing and planned urban environments are not adversely affected. Significant infrastructure climate resilience benefits will also accrue from the Project given that the existing SH1 alignment traverses two flood plains, combined

[8] Part 1.4 - Interpretation

with the reduced hazard exposure of the Project alignment coupled with a 90% reduction in detour length should a significant rainfall/flood event occur (Objective 8, Policy 1).

- Key urban amenity effects, particularly noise and visual matters, will be mitigated to levels that will ensure a well-functioning urban environment now and in the future (Objective 1, Objective 4, Policy 6).
- Through the iwi partnership approach, the development of the Ō2NL Project is underpinned by, and responds to, cultural values and, in doing so, takes into account the principles of the Te Tiriti o Waitangi/Treaty of Waitangi (Objective 5, Policy 9).

For the reasons set out above, the Project is consistent with the NPS-UD, because it contributes to a well-functioning urban environment and contributes to achieving the outcomes sought by the relevant provisions of the NPS-UD.

63.3 National Policy Statement on Highly Productive Land

The National Policy Statement on Highly Productive Land ("NPS-HPL") came into force on 17 October 2022[9].

The sole objective (2.1) of the NPS-HPL is that:

"*Highly productive land is protected for use in land-based primary production, both now and for future generations*".

Highly Productive Land is defined in the NPS-HPL (clause 1.3) as:

"*land that has been mapped in accordance with clause 3.4 and is included in an operative regional policy statement as required by clause 3.5 (but see clause 3.5(7) for what is treated as highly productive land before the maps are included in an operative regional policy statement and clause 3.5(6) for when land is rezoned and therefore ceases to be highly productive land)*".

Clause 3.4 requires every regional council to, within 3 years of the commencement date of the NPS-HPL and in collaboration with relevant territorial authorities and in consultation with tangata whenua, map as highly productive land[10] any land in its region that:

(a) is in a general rural zone or rural production zone; and

(b) is predominantly LUC 1, 2, or 3 land; and

(c) forms a large and geographically cohesive area.

Clause 3.5 requires that the mapped highly productive land must be included in the relevant RPS by way of a plan change. The relevant territorial authorities must include (without using the RMA 1st schedule process) the mapping in their district plans within 6 months of the relevant RPS plan change becoming operative.

Until a regional policy statement containing maps of highly productive land in the region is operative, each relevant territorial authority and consent authority must apply the NPS-HPL as if references to highly productive land were references to land that, at the commencement date (clause 3.5(7)):

(a) is

(i) zoned general rural or rural production; and

(ii) LUC 1, 2, or 3 land; but

[9] Referred to as the Commencement Date of the NPS-HPL
[10] Noting that any land identified for future urban development must not be mapped as highly productive land

(b) is not:

(i) identified for future urban development; or

(ii) subject to a Council initiated, or an adopted, notified plan change to rezone it from general rural or rural production to urban or rural lifestyle.

The majority of the Project route traverses LUC class 1-3 land that is zoned Rural in both the Horowhenua District Plan and the Operative Kapiti-Coast District Plan. Technical Assessment N – Productive Land sets out that a minimum of 229.5ha and a maximum of 358.7ha of highly productive land will be affected by the Project. The NPS-HPL is thus applicable to the Project.

The land within the Tara-Ika Plan change area is not classed as highly productive land under the NPS-HPL, given that the Tara-Ika area has been identified for future urban development for some time and is currently in the latter stages of a plan change process to rezone the land for urban use.

The following policies from the NPS-HPL are directly relevant to the Project:

Policy 1: Highly productive land is recognised as a resource with finite characteristics and long-term values for land-based primary production.

Policy 8: Highly productive land is protected from inappropriate use and development.

Policy 9: Reverse sensitivity effects are managed so as not to constrain land-based primary production activities on highly productive land.

The Project is consistent with these policies. The finite characteristics of the highly productive land that the Project traverses will be recognised (Policy 1) through minimising the final footprint of the works. The construction and operation of the new highway will not generate reverse sensitivity effects on any primary production activities (Policy 9).

With regards to Policy 8, clause 3.9(2) of the NPS-HPL states that:

"*A use or development of highly productive land is inappropriate except where at least one of the following applies to the use or development, and the measures in subclause (3) are applied:*

…

(b) it addresses a high risk to public health and safety:

…

…

…

(h) it is for an activity by a requiring authority in relation to a designation or notice of requirement under the …

(j) it is associated with one of the following, and there is a functional or operational need for the use or development to be on the highly productive land:

(i) the maintenance, operation, upgrade, or expansion of specified infrastructure:

…

…

Clause 3.9(3) provides:

Territorial authorities must take measures to ensure that any use or development on highly productive land:

(a) minimises or mitigates any actual loss or potential cumulative loss of the availability and productive capacity of highly productive land in their district; and

(b) avoids if possible, or otherwise mitigates, any actual or potential reverse sensitivity effects on land-based primary production activities from the use or development."

The matters set out in 3.9(2)(b) and (h) are applicable to the Project given it will address the high health and safety risk to road users of the existing highway alignment, and the Project is the subject of a Notice of Requirement which once confirmed will become a designation.

The Project achieves both the limbs of clause 3.9(3) in that through the design refinement process the actual loss of highly productive land will be minimised and given the nature of the Project it will avoid reverse sensitivity effects on primary production activities. In addition the alternatives consideration process followed for the Project (as addressed later in Part E of this report) resulted in the preferred route for the Project cumulatively affecting the least amount of highly productive land of all the short listed route alternatives.

On that basis the Project does not represent inappropriate use and development of highly productive land and is consistent with Policy 8.

Overall, taking all of the above into account, the Project is consistent with the NPS-HPL.

63.4 Other national policy statements

For completeness, the remaining national policy statements that are in effect are not considered to be relevant to this Project. These are:

- National Policy Statement for Renewable Electricity Generation – the Ō2NL Project does not affect the development, operation, maintenance or upgrading of new or existing renewable electricity generation activities;
- National Policy Statement on Electricity Transmission - no national grid electricity transmission lines (above or below ground) will be impacted by the Ō2NL Project; and
- New Zealand Coastal Policy Statement – the Ō2NL Project is not located within the coastal environment, nor does it directly impact the coastal environment.

64 National environmental standards

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

The Resource Management (National Environmental Standards for Air Quality) Regulations ("NES-AQ") sets ambient air quality standards for contaminants in Schedule 1, and requires regional councils to monitor ambient air quality standards for contaminants in airsheds.

Technical Assessment C – Air Quality notes that a small part of the Project designation area is located within the gazetted Kāpiti Coast Air Quality Management Area SO 355936, although that Air Management Area is not considered a polluted airshed by GWRC and no air quality monitoring has been carried out.

The Air Quality Technical Assessment[11] concludes that:

"*The assessment of potential adverse air quality effects during the operation of the Ō2NL Project has predicted ambient concentrations of NO2, PM10 and PM2.5 from vehicle emissions from the Ō2NL highway and existing SH1 and SH57 for the opening year (2029) and the design year (2039). These predictions have been added to background concentrations to provide a cumulative effects assessment.*

[11] paras 273 and 274

The assessment shows that predicted concentrations of all pollutants assessed are less than the relevant health impact assessment guidelines and the NES-AQ values".

The NES-AQ has thus been considered and the Project is compliant with it.

64.2 Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations

The Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations (NES Drinking Water) aims to reduce the risk of contamination of drinking water sources by requiring regional councils to consider the effects of certain activities on drinking water sources when granting water permits or discharge permits.

The NES Drinking Water is relevant because a number of the waterways that are crossed by the Project are indicated in Schedule B to the One Plan as having drinking water values; that is, either municipal or individual water takes are authorised from the waterway.

One Registered Drinking Water Supply (as defined in the NES Drinking Water) abstraction point is located downstream of the locations where the Project crosses the Waikawa Stream. This supply is recorded as being for domestic and dairy/stock water purposes.

Part G of this volume concludes that, subject to the effects management methodology described, any downstream effects on water quality will be extremely minor, temporary and localised to the area of physical works.

On that basis, granting consents to the water permits and discharge permits sought for the Project is consistent with the NES Drinking Water.

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

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations ("NES-CS") has the objective of ensuring that land affected by contaminants in soil is appropriately identified and assessed when soil disturbance and/or land development activities take place. In this regard, a preliminary site investigation ("PSI") has been undertaken for the Ō2NL Project as set out in Technical Assessment I (Contaminated Land).

The PSI indicates that there are 35 potential HAIL sites within or adjacent to the area that is sought to be designated for the Project, with 28 of these HAIL sites identified as market gardens and orchards. One of the HAIL sites, which has been confirmed by anecdotal landowner evidence, is located next to the Ohau River and is a former landfill site. All of the HAIL sites are located within the Horizons region – no HAIL sites were identified either through review of available information or through reference to the GWRC Selected Land Use Register list within or close to the Project alignment.

The Project proposes to disturb the soil in and change the land use of the affected parts of the sites. As a result, the NES-CS applies to the Project.

Waka Kotahi will undertake Detailed Site Investigations including soil testing of sites traversed by the Project in subsequent design phases of the Project once land access becomes available. Informed by the Detailed Site Investigation results, Waka Kotahi will then apply (if necessary) for any resource consents at that time under the NES-CS (and the relevant Regional Plans) in order to secure those consents prior to construction.

64.4 Resource Management (National Environmental Standards for Freshwater) Regulations

The Resource Management (National Environmental Standards for Freshwater) Regulations ("NES-F") came into effect in 2020 and set out a range of regulations for when resource consents are required for activities in relation to works affecting lakes, rivers, and wetlands in order to give effect to the NPS-FM. In this case, the Project requires a number of consents under the NES-F as identified in Part D of this Volume.

64.5 Other national environmental standards

For completeness, the remaining national environmental standards that are in effect are not considered to be relevant to this Project. These are:

- National Environmental Standards for Plantation Forestry
- National Environmental Standards for Electricity Transmission Activities
- National Environmental Standards for Telecommunications Facilities
- National Environmental Standards for Marine Aquaculture; and
- National Environmental Standards for Storing Tyres Outdoors.

65 Horizons One Plan

65.1 Introduction

The Horizons One Plan ("One Plan") is the combined regional policy statement and regional plan for the Manawatū-Whanganui region. Consents for the Project are required under the provisions of the One Plan.

Part 1 of the One Plan contains the regional policy statement that sets out the regionally significant resource management issues and the objectives, policies and methods used to address these issues over Chapters 1 to 10.

Part 2 is the Regional Plan section of the One Plan and primarily contains regional rules regarding the control of the region's natural and physical resources over Chapters 11 to 19, but also contains objectives and policies designed to guide decision-making on resource consent applications.

65.2 Regional Policy Statement

65.2.1 Chapter 2: Te Ao Māori

Provisions identified as relevant: Objective 2-1, Policy 2-2 and Policy 2-4

Objective 2-1 seeks that:

- Regard be had to the mauri of natural resources to enable hapū and iwi to provide for their well-being;
- Kaitiakitanga be given particular regard; and
- The relationship of hapū and with the ancestral lands, water, sites, wāhi tapu and other taonga be recognised and provided for.

This Objective is implemented by Policy 2-2 that provides for the identification of, and protection of, wāhi tapu, wāhi tupuna and other sites of significance, while Policy 2.4 references a table of 'resource issues of significance to hapū and iwi that "must be addressed".

As explained in Part C, Waka Kotahi is progressing the Ō2NL Project in partnership with the Project iwi partners. The CEDF, developed in collaboration with the Project iwi partners, is centred upon te ao Maori, mātauranga māori, and te mana o te wai and will guide the detailed design of structures, landforms, streetscape and landscaping.

The Ō2NL CEDF is underpinned by the following core principles:

- **Tread lightly, with the whenua**
  - Me tangata te whenua (treat the land as a person)
  - Kia māori te whenua (let it be its natural self)
- **Create an enduring legacy**
  - Kia māori te whakairo (normalise māori values)
  - Me noho tangata whenua ngā mātāpono (embed the principles in all things)
  - Tū ai te tangata, tū ai te whenua, tū ai te wai (elevate the status of the people, land and water).

The development of the design will continue to be informed and shaped by ongoing collaboration with the Project Iwi Partners. This collaboration has, and will continue to, provided an understanding of tangata whenua relationships with the land, water, sites, wāhi tapu, and other taonga and associated cultural values. These relationships and values are embedded in overarching design values and principles that apply to the design of the Project.

This approach, embodying partnership and collaboration in the development of the Project and the integration of cultural values throughout, directly responds to and provides for cultural values and relationships, including through project shaping and in approaches to the management of adverse effects. This approach achieves Objective 2-1 and the associated policies.

The specific requirements of Policy 2-2 are met by the Project, because:

- the Project does not directly affect any of the areas that Policy 2-2 directs must be protected (clause (a)); and the possible disturbances of any unidentified sites of significance will be appropriately managed, through archaeology authorities to be sought under the HNZPT Act or otherwise through an interim accidental discovery protocol (clauses (c) and (d)).

The resource issues of relevance to iwi and hapū as recorded in Policy 2.4 that are relevant to the Project are addressed by the Project as follows:

(k) *Management of water quality and quantity throughout the region does not provide for the special qualities significant to māori* – best practice erosion and sediment control measures will be instituted during construction of the Project, while operational stormwater discharges will be managed by a treatment train process to ensure that any discharges to receiving waters maintain the mauri of receiving waters.

(l) *Hazardous substances and nitrate run-off need to be better managed to avoid contaminants entering water* – any hazardous substances used during construction of the Project will be managed by such measures as ensuring that refuelling is undertaken in designated areas well separated from waterways.

(m) *Lakes and streams (for example, Punahau) have suffered degradation which continues and are considered culturally unclean* – the treatment of discharges from the Project, and the overall effect of the effects hierarchy package to be instituted, will ensure no degradation of waterways occurs and in some cases waterway health is improved.

(n) *Access to and availability of clean water to exercise cultural activities such as food gathering and baptismal rituals have diminished* – the Project will not adversely affect water quality in the

waterways it crosses other than for very short periods during construction when increased turbidity in the immediate vicinity of works may be noticeable.

(g) *Water diversion from one catchment to another is culturally abhorrent* – water will be abstracted from waterways and stored in ponds for use in construction effects mitigation eg dust mitigation. In some instances the water may need to be used in a different catchment from which it was abstracted, however that would be generally during an extreme situation where a water shortage was being experienced in a particular project area.

(i) *More riparian retirement and planting is needed to protect river banks from erosion. Several iwi believe harakeke (flax) would provide the most desirable outcome* – several kilometres of riparian stream margins will be retired, fenced and planted by the Project including with the use of flax species.

(j) *Adverse effects of landuse continue to have a detrimental effect on traditional food gathering areas, native habitats and ecosystems* – the Project has through the route selection process largely avoided significant native habitats and ecosystems, and a comprehensive ecological effects mitigation, offset and compensation package will be instituted.

(l) *The removal, destruction or alteration of wahi tapu and wahi tupuna by inappropriate activities continues to have a detrimental effect on those sites and upon hapu and iwi* – the route selected for the Project does not affect any wahi tapu or wahi tupuna.

(m) *The transfer of indigenous plants from rohe to rohe is considered culturally unnatural* – all planting to be undertaken in association with the Project for effects management purposes will use eco-sourced plants, however it is possible that some plants will not be from within the rohe in which they were grown.

65.2.2 Chapter 3: Infrastructure, Energy, Waste, Hazardous Substances and Contaminated Land

Provisions identified as relevant: Objective 3-1, Objective 3-3, Policy 3-1, Policy 3-3, Policy 3-4 and Policy 3- 7

Objective 3-1 of the RPS requires that regard be had "to the benefits of infrastructure and other physical resources of regional or national importance **by recognising and providing for their establishment, operation, maintenance and upgrading**[12]".

That objective is implemented by Policies 3-1 to 3-3. In particular Policy 3-1 requires:

- territorial authorities to recognise various categories of infrastructure, including the road and rail networks as mapped in the Regional Land Transport Strategy as being physical resources of regional or national importance; and
- in relation to the establishment, operation, maintenance, or upgrading of that infrastructure and other physical resources of regional or national importance, have regard to the benefits derived from those activities.

Policy 3-2 requires adverse effects on infrastructure and other physical resources of regional or national importance to be avoided as far as reasonably practicable.

Policy 3-3 requires territorial authorities, in managing any adverse environmental effects arising from infrastructure or other physical resources of regional or national importance, to:

- allow minor adverse effects arising from the establishment of new infrastructure and physical resources of regional or national importance, and

[12] emphasis added

- avoid, remedy or mitigate more than minor adverse effects arising from the establishment of new infrastructure and other physical resources of regional or national importance.

The Ō2NL Project is "infrastructure" as defined in section 2 of the RMA. For the purposes of these RPS provisions it is infrastructure that is "of regional and national importance", because it is mapped and identified in the Horizons RLTP as a priority investment area. The Ō2NL Project is also:

- a priority project in the Manawatū-Whanganui Economic Recovery Strategy (developed as a plan for economic recovery in response to the COVID-19 pandemic).
- identified in the National Land Transport Programme (2021 – 2024) as a key project for the Manawatū-Whanganui region.
- defined as Nationally Significant Infrastructure in the NPS-UD, and Specified Infrastructure as defined in the NPS-FM and NPS-HPL.
- delivers a range of benefits including positive transport, social and economic impacts and as such achieves the RPS Objective.

Policy 3-3 establishes a framework for the management of adverse effects arising from the establishment, operation, maintenance and upgrading of infrastructure. This framework provides for minor adverse effects to be allowed, while requiring that more than minor effects to be avoided, remedied or mitigated, as per the effects management hierarchy taking into account:

- the need for the infrastructure;
- functional, operational or technical constraints that require the infrastructure to be located or designed in the manner proposed;
- whether there are any reasonably practicable alternative locations or designs; and
- whether more than minor adverse effects that cannot be adequately avoided, remedied or mitigated can be offset.

In terms of effects, the Project will result in a range of adverse effects on the environment, prior to mitigation. These effects are also presented in Part G, while the constraints and alternatives considerations are summarised in Part E and Part G. As described in Part H, more than minor effects have been carefully identified through investigations and technical assessments and will be addressed in line with the requirements of Policy 3-3.

The need for the Project to remedy the significantly adverse safety and resilience issues of the existing SH1 alignment is clearly reflected by its NZUP status and priority reference in the RLTP.

Having regard to the measures to avoid, remedy or mitigate (and offset / compensate for) adverse effects set out in Part G, the effects of the Project are able to be managed in a manner that is consistent with Policy 3-3.

Read together, Objective 3-1 and the associated policies both enable and seek to protect significant infrastructure including the Ō2NL Project. These RPS provisions weigh strongly in favour of granting the RMA authorisations for the Project: The significant benefits of the Project must be taken into account, and the adverse effects of establishing the Project are to be managed specifically in accordance with the framework set out in Policy 3-3.

Objective 3-3, and implementing Policies 3-4 and 3-7, require territorial authorities to integrate provision of infrastructure (including sustainable transport options) with strategic land use development. In this regard, the Project provides for the strategic protection of the Ō2NL route; and enables the design and development of the Project and the Tara-Ika Growth Area to be integrated.

The Project provides transport connections for the regional and more local communities in the area, including by providing for active transport modes through the provision of a SUP, which will act as a “spine” to which local connections can be developed as the relevant local active transport strategies are

progressed. On this basis the Project is consistent with the provisions that direct the integration of infrastructure with land use.

65.2.3 Chapter 4: Land

Provisions identified as relevant: Objective 4-2, Policy 4-2

These provisions generally provide for the regulation of vegetation clearance, land disturbance, forestry and cultivation activities to ensure that accelerated erosion and increased sedimentation in water bodies is avoided, as far as reasonably practicable, or otherwise mitigated or remedied.

Objective 4-2 seeks the regulation of potential causes of accelerated erosion and increased sedimentation. It also seeks to ensure sediment loads entering water bodies as a result of accelerated erosion are reduced to the extent required to be consistent with the water management objectives and policies for water quality set out in Chapter 5 of the One Plan. The ability of the Project to meet the objectives and policies of Chapter 5 is discussed below under the Chapter 5 analysis.

Policy 4-2 guides the Regional Council's and Territorial Authorities' regulation of land use activities relating to vegetation clearance, land disturbance, forestry and cultivation and the associated rules to ensure Objective 4-2 is achieved. The issues for land management of Chapter 4 are regulated by the objectives, policies and rules contained in Chapter 13 (Land Use Activities and indigenous biological diversity) which are discussed below.

65.2.4 Chapter 5: Water

Provisions identified as relevant: Objectives 5-1, 5-2, 5-3 and 5-4 and Policies 5-1, 5-2, 5-3, 5-4, 5-10, 5-22, 5-23, 5-24, 5-25 and 5-26.

Chapter 5 addresses the management of fresh water in the Region, specifically, the management of water quality, water quantity and the beds of rivers and lakes. Each is addressed in turn below.

65.2.4.1 Water Quality

Objective 5-1 and supporting Policy 5-1 require that surface waterbodies and their beds are managed in a manner which safeguards their life supporting capacity and recognises as well as provides for the water management values (hereafter referred to as values) set out in Schedule B of the One Plan.

Objective 5-2 seeks to ensure that surface water and groundwater quality is maintained or improved and, in respect of surface water quality, to support the values in Schedule B. The concept design of the Project has been deliberately developed to avoid interaction with groundwater to the fullest extent practicable. Despite this, should any groundwater be encountered during construction it will be managed carefully via standard construction practices so as to ensure that its quality is maintained.

The One Plan establishes 29 surface water management zones within the 11 parent catchments of the Manawatū-Wanganui Region. The One Plan sets water quality targets that apply throughout the region, as well as specific targets for each sub-catchment (termed 'water management sub-zone'). The water quality targets focus on managing the impacts of farming land use, setting limits for parameters such as nitrogen, phosphorus, bacteria and algal growth. There are no limits for heavy metals or hydrocarbons.

The rivers and streams within the Ō2NL Project area are located within four parent catchments: Manawatū (Mana), Ohau (Ohau), West Coast (West) and Punahau/Lake Horowhenua (Hoki). Schedule A of the One Plan identifies that the rivers, streams and waterways affected by the Ō2NL Project fall within the following water management sub-zones:

- Mana_13e (Koputaroa Stream);
- Ohau_1b (Ohau River and Kuku Stream);
- West_9a and West_9b (Waikawa Stream and Manakau Stream); and
- Hoki_1a and Hoki_1b (Lake Horowhenua and Hokio Stream catchment)

The targets for the relevant water management sub-zones are set out in Table 65-1 note that the targets for sub-zones West_9a and West_9b are the same, as are targets for sub-zones Hoki_1a and Hoki_1b).

Table 65-1 One plan schedule E surface water quality targets for relevant management sub-zones

Variable	Units	Koputaroa Mana-13e	Ōhau, Kuku Ōhau _1b	Waikawa, Manakau West_9a, West_9b,	Hokio Hoki_1a, Hoki_1b	Condition criteria
pH range		7 to 8.5	7 to 8.5	7 to 8.5	7 to 8.5	within range
pH Δ		0.5	0.5	0.5	0.5	must not change by more than
Temp. <	°C	24	22	22	24	must not exceed
Temp. Δ	°C	3	3	3	3	must not change by more than
DO	% sat.	60	70	70	60	must exceed
s $cBOD_5$		2	2	2	2	
POM	mg/L	5	5	5	5	Average when flow < median
DRP	mg/L	0.015	0.01	0.01	0.015	Annual average when <20th flow exceedance
SIN	mg/L	0.444	0.11	0.167	0.167	Annual average when <20th flow exceedance
NH4	mg/L	0.4	0.4	0.4	0.4	Average
NH4.Max	mg/L	2.1	2.1	2.1	2.1	Maximum
Clarity %Δ	%	30	30	30	30	must not be reduced by more than
Clarity >	mg/L	2.5	2.5	2.5	2.5	must exceed when river < median flow
Ecoli.Bathing	cfu/100mL	260	260	260	260	summer max. when flow < median flow
Ecoli.Year	cfu/100mL	550	550	550	550	annual max. when <20th flow exceedance
Tox. or Toxicants	%	95	95	95	95	Relevant protection level in ANZECC (2000) Table 3.4.1. For metals use dissolved fraction after hardness adjustment.
Deposited sediment	% cover	25	20	20	25	Maximum cover of fines on stream bed
MCI		100	100	100	100	
QMCI	% change	20	20	20	20	% change between upstream and downstream
Peri Chla	mg/L	200	120	120	200	Annual max. when < 20th flow exceedance
Peri. Cover Mats	% cover	60	60	60	60	
Peri. Cover Fils	% cover	30	30	30	30	
Cyano. Cover Alert	% cover	20	20	20	20	
Cyano. Cover Action	% cover	50	50	50	50	

Policy 5-2 identifies that the water quality targets cited at Schedule E must be used to inform the management of surface water quality as set out in Policies 5-3 and 5-4. Policy 5-3 applies to on-going compliance when water quality targets of Schedule E are met, while Policy 5-4 applies when those water quality targets are not met. Policy 5-5 applies when the existing water quality is unknown and is therefore not relevant; as the water quality of the catchments affected is known and reported on.

The existing water quality in the sub-catchments affected by the Project is discussed in the Water Quality Technical Assessment H. Current water quality in these catchments is variable, and largely dependent upon upstream land use, ranging from generally high (in the Ōhau River and Waikawa Stream) to poor (in the Koputaroa Stream and tributaries of the Waitohu Stream).

Water quality monitoring undertaken for the Project indicates that none of the sub-catchments meet all of the One Plan water quality targets. This is described further in the Water Quality - Technical Assessment H.

When targets are not met, Policy 5-4 requires the water quality to be managed so that it is enhanced. All operational discharges (stormwater) will be treated, which is a significant improvement from the treatment that is being provided for the existing state highway network within the Project area, including SH1 and SH57 (Arapaepae Road). On this basis, there is the potential for the Project to improve water quality in the Project catchments.

Further, the riparian planting proposed in the immediate Project catchments, as described in the Freshwater Ecology - Technical Assessment K, is likely to improve water quality and ecosystem health.

As a result of these treatment and improvement elements, it is considered that in the long term, Policy 5-4 can be met.

During construction the potential contaminants that could adversely affect water quality are sediment, hazardous substances (including concrete) and wood slash from vegetation clearance. These potential temporary effects can be minimised and mitigated with adherence to the conditions, and as reflected in the ESCP and the Hazardous Substances Procedure contained within the overall Design and Construction Report (contained in Appendix Four to Volume II) and the provisions relevant to wood slash and mulch management that will be contained in the overall CEMP for the Project.

Policy 5-6 relates to groundwater quality and is not considered relevant as there will be no discharge of contaminants to groundwater. Neither Policy 5-7, which relates to the management of land use activities, Policy 5-8 (intensive farming land use activities), nor Policy 5-11 (sewage discharge) are relevant to the Project. Policy 5-9 is also not relevant to this Project, as there are no direct point source discharges to water. Discharges to water that will occur are either ancillary to other activities (earthworks during construction) or a permitted activity (ongoing stormwater discharges where not located in a rare, threatened or at-risk habitat).

Policy 5-10 is relevant to the proposed discharges of cleanfill (spoil) to land. These discharges will not result in pathogens or other toxic substances being discharged, as the material be to be discharged is cleanfill only. There are suspected areas of potentially contaminated land within the footprint of the Ō2NL Project – these areas will be subject to detailed site investigations once land access is available to confirm or otherwise the presence of contaminants. There may also be areas of contaminated soils within the Project area which are undocumented.

If unexpected contamination is discovered during construction, a DSI will be undertaken at the area of concern. The results will determine what (if any) remediation or mitigation is required.

Policy 5-13 (Efficient use of water) is relevant due to the water take consents being sought for construction effects mitigation purposes. Waka Kotahi proposes to take water from the Ohau River and the Koputaroa, Waikawa, Manakau, Waiauti and Waitohu Streams. Water taken for the Project during construction will be stored in a series of constructed storage ponds within the designation (some of which will be used as permanent stormwater treatment ponds once the Project is operational). From those storage locations the water will be transported and used as required along the length of the Project.

The proposed take and use of the water is consistent with Policy 5-13 which requires the efficient use of water including through promotion of water storage (ie the Project will use water storage ponds), the enablement of water permit transfers (ie the Project may be able to utilise any water permits held for properties to be acquired) , and regular monitoring of water takes including by way of water metering and telemetry (ie conditions of consent will be applied requiring this).

65.2.4.2 Beds of Lakes and Rivers

Objective 5-4 (which is supported by Policies 5-22 to 5-27) seeks to ensure that the beds of rivers and lakes will be managed in a way that:

- sustains their life supporting capacity;
- provides for the instream morphological components of natural character;
- recognises and provides for the Schedule B values; and
- provides for infrastructure and flood mitigation purposes.

It goes on to require that land adjacent to the bed of reaches with a Schedule B value of 'Flood Control and Drainage' is managed in a manner which provides for flood mitigation purposes.

The Ō2NL Project involves bridges over the Waiauti, Manakau, Waikawa and Kuku Streams and the Ohau River. The Site/Reach Specific Schedule B values of ecological and water quality relevance at each of these waterways are listed in Table 65-2 below.

Table 65-2 – One plan schedule B specific values

Waterway	One plan schedule B site/reach specific value
Ohau river and Kuku Stream	Site of significance-aquatic , Trout fishery - category II Regionally Significant, Trout spawning , Domestic food supply , Flood control/drainage
Manakau stream	Domestic Food Supply, Flood Control/Drainage
Waikawa stream	Site of significance-aquatic, site of significance-riparian, amenity, water supply, domestic food supply, flood control/drainage
Waiauti stream	flood control/drainage

Policy 5-22 sets out the general management requirements for activities in, on or under the beds of rivers such that:

- The Schedule B values as required in Policies 5-23 to 5-25 are recognised and provided for (as described in the table above);
- Any significant reduction in the river/bed's ability to convey flood flows or significant impediment to the passage of floating debris are avoided;
- Effects on the stability and function of the river bed, habitat diversity, natural character and public access are avoided, remedied or mitigated; fish passage is provided for;
- The nature and extent of navigation or access for the operation/maintenance/upgrade of infrastructure and other physical resources of regional or national importance is not obstructed;
- And continued public access in accordance with Policy 6-10 is provided for.

This policy is of relevance to all of the bridge crossings and works within streams. The Project has been designed seeking to avoid, remedy and mitigate effects on the beds of rivers and lakes as far as practicable to generally achieve the above requirements.

Policy 5-23 relates to activities in sites with a Schedule B Natural State, Sites of Significance - Cultural, or Sites of Significance – Aquatic value, and as a consequence, it is relevant to the bridge crossings of the Ohau River and Waikawa Stream.

Policy 5-23(a) requires effects on these values to be avoided in the first instance. Policy 5-23(b), however, allows for the mitigation or remedy of effects where it is not practicable to avoid them in respect of infrastructure and other resources of regional and national importance, or for activities that will result in an environmental benefit. The Project is identified as being of regional and national importance, and therefore, effects do not need to be avoided, but they must be remedied or mitigated.

Regardless of the "avoidance" exemption in the policy for significant infrastructure, permanent effects on aquatic values from the crossings of the Ohau River and Waikawa Stream have been practically avoided through the selection of a bridge structure as the preferred crossing form.

Under Policy 5-23(c), the habitat and spawning requirements of identified species are to be maintained. The Freshwater Ecology - Technical Assessment K explains how the effects management hierarchy has been applied to the management of temporary construction effects at the Ohau River and Waikawa Stream crossings and other locations. As a result, the Project is consistent with the overall requirements of Policy 5-23.

Policy 5-24 is relevant to activities in rivers and their beds with a Schedule B value of 'Flood Control and Drainage' and is, therefore, relevant to all of the bridge crossings. The Policy requires the activity (that is, the bridges) to be managed in terms of flood hazard, erosion protection and adverse effects. The Hydrology and Flooding - Technical Assessment F concludes that the potential adverse effects on hydrology and flooding in the area of constructing the proposed bridges over the respective waterways will be less than minor. This is consistent with Policy 5-24(a). The Project is also consistent with Policy 5-24(b) on the basis that the design of the bridges avoids adverse effects on the instream morphological components of natural character.

Policy 5-25(a) is relevant to all other activities in rivers and their beds in respect of all other Schedule B values. It requires that significant adverse effects, in the first instance, be avoided, remedied or mitigated on the instream morphological components of natural character and the Schedule B values.

Policy 5-25(b) then goes on to provide consent applicants with the option of providing an offset. As the zone-wide Schedule B values apply to the whole Project, this policy is therefore applicable to the 39 stream diversions and 33 new culverts proposed to be constructed as part of the project. As outlined in the Freshwater Ecology - Technical Assessment F, the stream loss and modification associated with these stream diversions and new culverts can neither be avoided nor fully remedied or mitigated. As such, a comprehensive offset approach is proposed as enabled by Policy 5-25(b).

Policy 5-26 provides for activities in, on, under or over the beds of rivers and lakes that are essential or result in an environmental benefit to generally be allowed. The activities for which resource consent is sought pursuant to section 13 of the RMA are essential to enable the Project to proceed, which in turn, is considered essential given the Project's identification as a priority project under the RLTP.

65.2.5 Chapter 6: Indigenous Biological Diversity, Natural Character and Historic Heritage

65.2.5.1 Indigenous Biological Diversity

Provisions identified as relevant: Objectives 6-1 and Policies 6-2, 6-10.

Objective 6-1 and Policy 6-2 seek that significant indigenous biodiversity, particularly rare, at risk and threatened habitats, are protected and managed, and enhanced where appropriate.

The potential impacts of the Project on indigenous biological diversity have been assessed in Terrestrial Ecology - Technical Assessment J, with reference to the One Plan provisions, including identification and quantification of the types of rare, at risk and threatened habitats and species affected and the extent of the effect.

The route selection process for the Project, coupled with ongoing concept design refinements, has resulted in the Project footprint and construction buffer avoiding all direct effects (that is, clearance) on indigenous forest remnants, treeland, and scrub of High or Very High value.

Policy 6.2 directs that the Regional Council must protect significant indigenous biodiversity through regulation. The rules in Chapter 13 give effect to this Policy, and as such the Regional Plan provides for consideration of activities in these areas. Specific decision-making criteria are outlined in Chapter 13 of the One Plan and a detailed analysis of these provisions is provided below.

Technical Assessment J – Terrestrial Ecology includes a detailed assessment of the effects of the Project, and recommends measures to avoid, remedy and offset/compensate for those effects. Those recommended measures are reflected in the proposed designation and consent conditions, with more detailed methodology to be set out in the Ecology Management Plan. This is consistent with Objective 6-1.

Public access to parts of the rivers and streams (as selected in conjunction with tangata whenua as Project partners) crossed by the Project will be enhanced through the provision of the SUP, and the potential provision of new public access to and along the Waikawa River once the materials supply site adjacent to the Waikawa River bridge is exhausted and remediated. Any of the access enhancements will

be undertaken in the context of balancing the need to protect rare and threatened habitats, in a manner consistent with Policy 6-10.

65.2.5.2 Natural Character

Provisions identified as relevant: Objectives 6-2 and Policies 6-8, 6-9.

Objective 6-2 in the One Plan deals with outstanding natural features ("ONFs") and landscapes ("ONLs"), and natural character. The components of Objective 6-2 that address ONFs and ONLs are not relevant to this assessment as there are no identified ONFs or ONLs directly affected by or in proximity to the proposed designations.

Objective 6-2(b) and (c) seek to protect the natural character of amongst other matters wetlands, rivers and their margins, by ensuring that:

- The natural character of wetlands, rivers and their margins is protected from inappropriate development;
- Adverse effects on the natural character of wetlands, rivers and their margins are avoided where they would significantly diminish the attributes and qualities of areas that have high natural character, and avoided, remedied, or mitigated in all other cases; and
- Rehabilitation and restoration of the natural character of wetlands and rivers and their margins is promoted.

Policy 6-8 requires that the natural character of wetlands, rivers and their margins must be preserved and that these areas must be restored and rehabilitated where this is appropriate and practicable.

Policy 6-9 lists matters for consideration to determine whether use or development is appropriate. They include:

- compatibility with the existing level of modification;
- functional necessity and that no reasonably practicable alternative locations exist;
- appropriate form, scale, and design that is compatible with existing natural features;
- not significantly disrupting natural processes or ecosystems; and
- providing for restoration and rehabilitation where that is appropriate and practicable.

Fundamentally, significant adverse effects on natural character at a district scale have been avoided through the route selection process and the preference for a Project route to the east of Levin that avoided areas to the west that hold higher natural character values.

Landscape and Natural Character – Technical Assessment D sets out that the existing natural character for each of the main catchments traversed by the Project varies between low-moderate to high-moderate. The Ō2NL Project will, before taking into account mitigation, have adverse effects on each catchment, largely through effects on perceptions of naturalness of the rivers, streams, and wetlands. The proposed mitigation (including but not limited to wetland restoration, and riparian vegetation rehabilitation and planting[13]) will address such effects so that the current degree of natural character will be maintained in each catchment. The benefits of the proposed restoration and rehabilitation on natural character values will continue to increase over time.

On the basis of the above, the Project is consistent with the requirements of Objective 6-2 and Policies 6-8 and 6-9. Notwithstanding that, Policy 5-23(b) allows infrastructure of regional and national importance, or activities that result in an environmental benefit, to remedy or mitigate those effects where it is not

[13] as set out in the Technical Assessments for Landscape and Natural Character, Terrestrial Ecology and Freshwater Ecology

practical to avoid them. On the basis of the above, the effects of the Project on waterbodies and their margins have been avoided, remedied and mitigated as far as practicable.

65.2.5.3 Historic Heritage

Provisions identified as relevant: Objective 6-3.

Objective 6-3 requires the protection of historic heritage from activities that would significantly reduce heritage qualities.

As set out in Archaeology - Technical Assessment L, the route selection process has significantly minimised the potential for adverse effects to archaeological sites.

There are no listed historic places or areas on the New Zealand Heritage List/Rārangi Kōrero or New Zealand Archaeological Association recorded archaeological sites within the proposed designations.

While not directly affected by the NoR, the “Ashleigh” homestead has medium heritage values that in part relate to its setting. Measures are proposed to mitigate the indirect effects of the Project on the heritage values of the Ashleigh site.

The potential for works to disturb unidentified archaeological sites is appropriately managed by an Archaeological Authority that is to be sought from HNZPT and, if necessary, an interim archaeology discovery protocol.

On the basis of all the above, the Project is consistent with Objective 6-3.

65.2.6 Chapter 7: Air

Provisions identified as relevant: Objectives 7-1 and 7-2 and Policies 7-1, 7-2 and 7-3

Objectives 7-1 and 7-2 and Policies 7-1, 7-2 and 7-3, require that a standard of ambient air quality is maintained and fine particulate levels (PM10) are managed to comply with NES-AQ and regional standards set out in Policy 7-2 (the discharge must not cause any noxious, offensive or objectionable dust beyond the property boundary).

Air Quality - Technical Assessment C notes that the main discharge to air associated with the Project's construction will be dust and concludes that the dust likely to be generated from various sources during the construction phase of the Project will remain within the NES-AQ ambient air quality standards if appropriately managed. It also states that the Project can meet Policy 7-2 (Regional standards for ambient air quality) provided the recommended mitigation measures are followed and managed in accordance with the proposed CAQMP.

Likewise with regards to operational air quality the assessment shows that predicted concentrations of all pollutants assessed are less than the relevant health impact assessment guidelines[14] and the NES-AQ values, and concludes that the Ō2NL Project will improve overall air quality in the Project area as a result of improved traffic flows which correspond to reduced traffic emissions.

Policies 7-5 and 7-6 are not relevant as the Ō2NL Project is not located within a polluted airshed.

Given all the above the Ō2NL Project is consistent with the objectives and policies of Chapter 7 of the One Plan.

65.2.7 Chapter 9: Natural Hazards

Provisions identified as relevant: Objectives 9-1 and 7-2 and Policies 9-1,9-2, 9-3, 9-4 and 9-5

Objective 9-1 seeks the avoidance and mitigation of adverse effects from natural hazard events on, amongst other matters, infrastructure. The objective is supported by Policies 9-1 to 9-5 that provide clear

[14] Including the thresholds set out in the recent update of the Health and Air Pollution in New Zealand Study 2016 (“HAPINZ 3.0”)

direction regarding the avoidance of increased risk, except where certain circumstances apply, and applying a precautionary approach to the effects of climate change.

Policy 9-1 sets out the division of responsibilities between the Regional Council and Territorial Authorities for natural hazard management under the RMA. Policy 9-2 (g) states that Policy 9-2 (Development in areas prone to flooding) does not apply to critical infrastructure. Critical infrastructure includes strategic road and rail networks (as defined in the RLTP). The Ō2NL Project is in turn also identified as a priority project in the RLTP.

Of Policies 9-3 and 9-4, Policy 9-3 is considered to be more applicable as it relates to the placement of new critical infrastructure, in an area likely to be inundated by a 0.5% AEP (1 in 200 year) flood event, or in an area likely to be adversely affected by another type of natural hazard. It states that such locations are to be avoided, unless there is satisfactory evidence to show that the critical infrastructure:

- will not be adversely affected by floodwaters or another type of natural hazard;
- will not cause any adverse effects on the environment in the event of a flood or another type of natural hazard;
- is unlikely to cause a significant increase in the scale or intensity of natural hazard events; and
- cannot reasonably be located in an alternative location.

In this case the Project unavoidably traverses a number of floodplains and waterways that will be subject to inundation in a 1 in 200 year flood event. However, as explained in Hydrology - Technical Assessment F, the location of the Project has taken into account flood risk and it is in generally favourable locations to allow, in combination with the implementation of best practice hydraulic design of structures, any adverse effects of the Project on hydrology and flooding in the area to be less than minor.

Therefore, the proposed infrastructure is unlikely to be adversely affected by floodwaters, nor is it likely to cause any, or increase the intensity of, adverse effects on the environment in the event of a flood, ensuring consistency with Policies 9-3 and 9-4.

In terms of climate change, the effects of flooding have been assessed using a model adjusted for predicted climate change. Furthermore, the Project has been designed in accordance with all relevant best practice guidelines and design standards that allow for anticipated changes produced by climate change, and a precautionary approach to the effects of climate change has been adopted, ensuring consistency with Policy 9-5.

The Project will result in this section of the state highway network being less susceptible to natural hazards than the current SH1 and SH57, which aligns with the intent of Chapter 9.

65.3 Regional Plan

65.3.1 Chapter 12: General Objectives and Policies

Provisions identified as relevant: Objectives 12-1 and 12-2, Policies 12-2, 12-3, 12-4 and 12-5

Objective 12-1 requires that the regulation of activities in the region is undertaken in such a manner as to maximise certainty and avoid unnecessary costs on resource users and other parties, as well as give effect to the provisions of the RPS. Objective 12-2 relates to consent duration, review and enforcement.

These objectives are supported by Policies 12-2 to 12-12. Policies 12-3 and 12-4 relate to consent conditions and highlight the need for conditions to be measurable, comprehensible and enforceable. A comprehensive suite of conditions is proposed and provided at Appendix Six to this AEE. These conditions provide certainty in giving effect to the provisions of the RPS and impose measures (performance standards and processes) that will avoid, remedy, mitigate, offset or compensate for the effects of the Project.

Policy 12-5 addresses consent durations and states that for applications required under sections 13, 14 and 15 of the RMA, durations will generally be set to the next common catchment expiry date listed in Table 12.1.

The common catchment expiry date for the four water management zones applicable to the Project are set out as follows:

- Ohau_1b (Ohau River and Kuku Stream) - Common Expiry Date 01 July 2012
- West_9a and West_9b (Waikawa Stream and Manakau Stream) - Common Expiry Date 01 July 2014
- Hoki_1a and Hoki_1b (Lake Horowhenua and Hokio Stream catchment) - Common Expiry Date 01 July 2014
- Mana_13e (Koputaroa Stream) - No Common Expiry Date stated

Policy 12-5(b) however, clarifies that consents granted within three years prior to the relevant common catchment expiry date may be granted with a duration aligned with the second common expiry date (that is the number of years up to the next expiry date plus 10 years). On that basis, an expiry date of at least 2032 could be sought for all construction related resource consents for the Project. However, construction of the project is expected to take 4 – 5 years, and an expiry date of 10 years is considered appropriate on all construction period resource consents sought.

For the resource consents sought pursuant to section 13 of the RMA (i.e. structures in beds of streams and rivers) and Rule 13-9, Rule 17-3, Rule 17-15, and Rule 17-23 the maximum duration of 35 years is sought as provided for pursuant to section 123 of the RMA. A maximum duration of 35 years is also sought for all other operational resource consents as set out in Part D of this report pursuant to sections 14 and 15 of the RMA.

The maximum duration is appropriate for these resource consents as once they are implemented, they will remain in place for the life of the Project. Policy 12-6 relates to consent reviews, and Policy 12-6(c) suggests a review in parallel with a common catchment expiry date. Reviews are provided for in the condition set contained in Appendix E. This does not preclude a review of conditions in other circumstances as provided for under section 128 of the RMA.

The Project covers both multiple activities and multiple sites, and accordingly the application combines activities and sites under a single application package which is considered appropriate under Policy 12-7. Additionally, the conditions proposed have been prepared in an integrated fashion and allow for the management of the Project's environmental effects as a whole. It is considered that the comprehensive conditions suite proposed, including reviews and durations, is consistent with the relevant objectives and policies in Chapter 12.

65.3.2 Chapter 13: Land use activities and certain activities in rare habitats, threatened habitats and at-risk habitats

65.3.2.1 Land use activities

Provisions identified as relevant: Objectives 13-1, Policies 13-1 and 13-2

Objective 13-1 and Policy 13-1 require the regulation of vegetation clearance and land disturbance outside areas of significant indigenous vegetation. The regulation seeks to ensure that accelerated erosion and any associated effects, such as increased sedimentation within waterbodies or damage to people, buildings or infrastructure, are avoided where appropriate or remedied or mitigated.

An Erosion and Sediment Control assessment and associated draft ESCP has been prepared as part of the wider DCR (see Appendix Four of the DCR) to appropriately manage the effects of the proposed construction works. Policy 13-2 sets out the matters for decision making including the requirement to consider the appropriateness of establishing infrastructure of regional or national importance including achieving integrated management through consent conditions.

Part G of this AEE sets out how effects of vegetation clearance and land disturbance will be managed across the Project area such that they are consistent with the relevant provisions.

65.3.2.2 Indigenous biological diversity
Provisions identified as relevant: Objectives 13-3, Policies 13-1 and 13-3, 13-4, 13-5

Objective 13-2 and Policy 13-3 seek to protect areas of significant indigenous vegetation and significant habitats of indigenous fauna or to maintain indigenous biological diversity, including enhancement where appropriate.

Schedule F sets out the classification of habitat type through a regional lens (Table F.1 of the One Plan) and then criteria to apply to those habitat types (set out in Table F.2(a)) to determine if they qualify as rare habitats, threatened habitats or at-risk habitats (in accordance with Policy 13-5).

In that regard, Schedule F habitats are identified within Terrestrial Ecology - Technical Assessment F and the associated maps and drawings in Volume III.

A range of resource consents are sought for the Project including land use consent, water permit and a discharge permit for activities within these habitats. The Terrestrial Ecology - Technical Assessment F concludes that the Project will result in a range of residual adverse effects on habitats identified as significant in the One Plan, after avoidance and minimisation measures are accounted for.

The assessment has been undertaken in accordance with Policy 13-5 which states that "the potential adverse effect of an activity on the rare habitats, at risk habitat and threatened habitats must be determined by the degree to which the proposed activity will diminish the characteristics (comprising representativeness, rarity and distinctiveness, ecological context) for each habitat while also having regard to any additional ecological values".

Policy 13-4(b) stipulates a hierarchical approach to any more than minor adverse effects (in accordance with Policy 13-5). They are to be avoided in the first instance, and where they cannot be reasonably avoided, they are to be remedied or mitigated at the location where the effect occurs. Where this cannot be achieved, Policy 13-4(b)(iii) requires that the effects are offset to result in a net indigenous biological diversity gain.

Policy 13-4(d) sets out how offset is to be achieved including:

i) provide for a net indigenous biological diversity gain within the same habitat type, or

where that habitat is not an area of significant indigenous vegetation or a significant habitat of indigenous fauna, provide for that gain in a rare habitat or threatened habitat type;

i. use of methodology appropriate and commensurate to the scale and intensity of the residual adverse effect;
ii. generally be in the same ecologically relevant location as the effect;
iii. not be allowed where inappropriate for the ecosystem or habitat type;
iv. be able to be achieved and then maintained successfully in the long term; and
i. vi) achieve conservation outcomes above and beyond that which would have been achieved if offset were not required.

Therefore, in order to grant consent for the activities in areas of significance in accordance with Policy 13-4(b) the decision maker must be satisfied that where "more than minor" adverse effects cannot be avoided or mitigated at the point of the adverse effect, then an offset to result in a net indigenous biological gain must be able to be achieved and maintained.

Terrestrial Ecology - Technical Assessment J explains that:

- a modelling approach has been used to address the residual adverse terrestrial ecological effects of the Project that cannot be avoided or minimised; and
- all residual adverse effects assessed as Low, Moderate, High, or Very High will be addressed by biodiversity offset or compensation measures, including effects on all significant habitats identified in the One Plan; and
- none of the adverse residual effects of the Project are beyond the limits of offsetting; and

- none of the habitats affected are irreplaceable, and adverse effects can be addressed by restoration actions within a reasonable timeframe (i.e less than 25 years), and
- a Net Gain is achievable for all affected habitat types.

Thus, through adoption of the key biodiversity offsetting principles as set out in the Terrestrial Ecology Assessment, Policy 13-4(b) is achieved.

The offsetting proposed goes beyond what is required to be offset under the One Plan provisions (Policy 13-5) given that it has been calculated to offset all adverse effects and not solely those habitats identified under Schedule F. As such, the offsetting proposed achieves an overall net gain. In addition to the offset proposed, compensation measures are also proposed as discussed in Terrestrial Ecology - Technical Assessment J.

The offset and compensation proposed (to be undertaken in accordance with the EMP) demonstrates that residual ecological effects are able to be appropriately managed and a net overall biodiversity gain is able to be achieved and can be maintained. Accordingly, Policy 13-4(d) is able to be met and is not an impediment to consent being granted.

In any event, it is noted that the Project will allow for the construction of nationally significant infrastructure and therefore RPS Policy 3-3 and the support it provides the Project has an over-arching influence on indigenous biodiversity matters.

65.3.3 Chapter 14: Discharge to land and water

Provisions identified as relevant: Objectives 14-1, Policies 14-1, 14-2, 14-3, 14-4, 14-8 and 14-9

Objective 14-1 seeks the management of discharges onto or into land or water in a manner that safeguards the life supporting capacity of water, provides for the values and management objectives in Schedule B of the One Plan and seeks to avoid, remedy or mitigate adverse effects on surface water or groundwater in regard to discharge onto or into land.

Policies 14-1 and 14-2 set out a range of matters which the Regional Council must consider when making decisions on resource consent applications, including the objectives of Chapter 5 and associated Policies 5-1 to 5-5 and Policy 5-9, which have been addressed in Section 65.2.4.1above.

Policy 14-3 directs the Regional Council to have regard to industry-based standards (including guidelines and codes of practice), recognising that such standards generally represent current best practice, and that they may accept compliance with those standards as being adequate to avoid, remedy or mitigate adverse effects to the extent that those standards address the matters in Policies 14-1, 14-2, 14-4 and 14-5.

Policy 14-4 seeks the consideration of opportunities to use alternative options or a combination of methods for the discharge of contaminants into water, or onto or in land to mitigate adverse effects.

Policy 14-8 confirms the monitoring requirements for discharges to water and Policy 14-9 sets out the decision-making requirements in respect of the NPS-FM. Policy 14-9 requires the Regional Council, when considering an application for a discharge, to have regard to the extent to which the discharge would avoid contamination that would have adverse effects (particularly where it would have a more than minor adverse effect) on freshwater, ecosystems and the health of people and communities (through secondary contact with freshwater).

The resource consents being sought under Chapter 14 (Rule 14-21), relate to the ‘discharge’ of imported material (engineered fill) for road construction. Although engineered fill falls within the definition of ‘cleanfill material’ in the One Plan, the use of imported material for road construction does not fall within the definition of ‘cleanfill’.

As a result, and on a precautionary basis, a resource consent is being sought pursuant to Rule 14-30 as a discretionary activity for the discharge of contaminants to land or to water associated with the placement of imported cleanfill material. Where filling (including the disposal of excess cut material (spoil)) to land occurs using material sourced from the same site (that is, the material is not imported) it is

considered that this falls within the One Plan definition of 'land disturbance' and consent for this activity, where required, is sought under the rules in Chapter 13. Should contaminated soil be encountered during construction an Accidental Discovery protocol will be adhered to, to ensure there are no (further) discharges of contaminants to the environment.

Once the Project is operational, there will be increased impervious areas, affecting stormwater runoff. The Project proposes a treatment train approach using a range of stormwater management devices and, based on Water Quality - Technical Assessment H, the Project's stormwater discharges (once operational) are permitted under Rule 14-18 and can, therefore, meet the objectives and policies of Chapter 14. Where the discharges of sediment are ancillary to earthworks, this is covered by the land disturbance rules in Chapter 13. However, resource consents for the Project are being sought for the discharge of stormwater once operational and the discharge of sediment during construction where these discharges are within Schedule F habitats.

Sediment run-off from earthworks areas will be managed via an overarching best practice ESC framework methodology that uses a hierarchy of measures (see the Erosion and Sediment Control report appended to the DCR, and Water Quality - Technical Assessment H) to avoid and minimise adverse effects on water quality. The objectives and policies of Chapter 5 of the One Plan have been assessed and the Project is considered to be consistent with those provisions, which seek to ensure that adverse effects on water quality are appropriately managed.

65.3.4 Chapter 15: Discharges to air

Provisions identified as relevant: Objective 15-1, Policy 15-2

Objective 15-1 seeks the management of air quality in a manner that maintains or enhances air quality to safeguard human health, meets regional and national standards, is not detrimental to amenity values, and manages fine particle levels. Policy 15-2 sets out a range of matters which the Regional Council must have regard to when making decisions on resource consent applications. Resource consent is being sought for air discharge on a precautionary basis only to cater for emergency conditions, as the discharge of dust during construction will under normal operating conditions comply with the permitted activity standards of Rule 15-16.

Provided the dust control measures are implemented in accordance with the Construction Air Quality Management Plan, dust emissions will be mitigated to avoid offensive and objectionable levels of dust being received at the closest residential receivers beyond the designation boundaries. Nor will the discharge result in offensive or objectionable odour, dust, smoke or water vapour at the boundary of any sensitive area as defined in Policy 15-2(d). On this basis, the management of air discharges associated with the Project is consistent with the objectives and policies of Chapter 15.

65.3.5 Chapter 16: Takes, uses and diversions of water and bores

Provisions identified as relevant: Objective 5-3, Objective 16-1, Policies 5-12, 5-14, 16-1, 16-2 and 16-3

Objective 16-1 requires that takes and diversions of water be regulated in a manner that recognises and provides for the values and management objectives in Schedule B and provides for the relevant provisions of Chapter 5. The relevant Schedule B values and management objectives for the Project have been identified and discussed in earlier sections above and are therefore, not repeated here. These values are recognised and provided for through the mechanisms described in Chapter 5 of the RPS and considered above.

Policy 16-1 directs decision-making for the taking, use and diversion of surface water and groundwater and seeks to avoid any adverse effects on other lawful activities, in particular surface water takes or groundwater bores. Policy 16-1(b) goes on to provide for the non-consumptive use of water including the use and recycling of water. Where groundwater is encountered during land disturbance activities for the Project, dewatering is likely to be required. While the groundwater levels in the Project area are well understood, and the encountering of groundwater unlikely, exact dewatering volumes cannot be estimated and could exceed the permitted volume of 50m3/day.

Resource consent is, therefore, being sought as a precaution pursuant to Rule 16-9 for dewatering associated with the Project's land disturbance activities. As these are incidental groundwater takes for the purposes of construction and are unlikely to be large volumes over a long period of time (thus affecting surface water bodies), Policies 16-2, 16-4, 16-6, and 16-7 to 16-9 are not considered relevant to the Project.

Regarding Policy 16-5 (Effects of groundwater takes on other groundwater takes), existing consented groundwater bores surrounding the Project have been identified. Considering the location of these bores, the required dewatering for the Project's construction will not create an adverse effect on other lawful activities. In respect of resource consents for diversions and drainage of water, Policy 16-3 requires the Regional Council to manage effects on rare, threatened or at-risk habitats, in accordance with Chapter 6 and the relevant objectives and policies of Chapter 13 and on the natural character of water bodies (also in accordance with Chapter 6).

The Project involves the construction of permanent diversion channels and stream diversion works to maintain flows through or around the alignment and associated works areas. While drainage is a permitted activity pursuant to Rule 16-11, resource consent is being sought pursuant to Rule 16-12 for all stream diversions (approximately 1,892m in total) which are required as part of the Project. In addition, the Project requires stream diversions and other works located within Schedule F habitats and therefore, resource consent pursuant to Rule 13-9 is required. The relevant Chapter 13 matters are discussed in the Indigenous Biodiversity discussion above.

All efforts to avoid and minimise effects from the required stream diversions have been explored, as have measure to address residual effects which are described in Freshwater Ecology - Technical Assessment K. As stream loss cannot be avoided or fully mitigated, stream creation (through diversions), and riparian restoration and enhancement is proposed to offset the identified residual effects. This approach is in accordance with Policy 5-25 of Chapter 5 of the RPS.

Policies 16-1 and 16-3 also require consideration of those relevant objectives and policies of Chapters 2, 3, 5, 6, 9 and 12. These other Chapter 16 matters have been discussed in the preceding sections and the Project is consistent with the relevant provisions of these chapters as well as the policies of Chapter 13.

The Project seeks short duration consent (ie for a duration to cover the construction period of the Project) from Horizons to take water from the Koputaroa Stream, Ohau River, Waikawa, Manakau and Waiauti Streams in a manner that does not exceed minimum flows and maximum core allocations in those waterways (apart from where supplementary takes will occur at times of high flows), primarily for the purpose of mitigating construction effects.

Water storage devices will be constructed and used throughout the project area to ensure that the relatively low volumes of surface water taken will be stored and used efficiently. Additionally, water take will be maximised within consented limits at times of high flows in the relevant waterways. Other sources of water for effects mitigation purposes will also be employed to the fullest extent practicable on land that is occupied by the Project, notably roof rainwater collection and using water from existing bores and other industrial activities currently being undertaken. As a result the takes sought represent a reasonable and justifiable allocation of the water as required by the relevant objectives and policies set out above .

On the basis of all the above, the Project is consistent with the objectives and relevant policies of Chapter 16.

65.3.6 Chapter 17: Activities in artificial watercourses, beds of rivers and lakes, and damming

Provisions identified as relevant: Objective 17-1, Policy 17-1

Objective 17-1 directs the regulation of structures and activities in artificial watercourses, the bed of rivers and lakes, and damming to occur in a manner that safeguards life supporting capacity and recognises and provides for the Schedule B values and those relevant Chapter 5 objectives and policies. Policy 17-1 guides consent decision making for such activities to have regard to best management practices, to avoid any adverse effects on other lawful activities, and have regard to the objectives and policies of Chapters 2, 3, 5, 6, 9 and 12 as well as the matters in Policy 14-9 which relate to the NPS-FM. The ability of the

Project to meet the objectives and policies of Chapters 2, 3, 5, 6, 9 and 12 and the matters in Policy 14-9 have been discussed in the preceding sub-sections and are not repeated here.

As described earlier in this report the Project traverses several streams and waterways. Bridge structures are proposed at the major waterway crossings while culverts will be used in other locations. The effects of the bridges and culverts relevant to consideration under Objective 17-1 and Policy 17-1 have variously been assessed in Hydrology and Flooding - Technical Assessment F, Technical Water Quality - Assessment H, Terrestrial Ecology - Technical Assessment J and Freshwater Ecology - Technical Assessment K .

65.3.6.1 Bridges

Potential temporary effects resulting from construction works associated with all of the bridge crossings will be mitigated by implementing the ESCP (in particular the Stream Works Procedure contained in the ESCP) and the Fish Recovery Protocol contained in the EMP. Consequently, adverse effects on the life supporting capacity of the waterways at all crossing locations are minimised.

Recognising their hydraulic characteristics, all of the waterways crossed by bridges hold Schedule B values for (amongst other things) Flood Control and Drainage. As a result, the concept design of all of the bridges addresses the potential for river bank and bed scour and provides scour protection, as well accommodating anticipated climate change influences.

Specific consideration of each bridge structure and crossing location is provided in Hydrology and Flooding - Technical Assessment F. The bridges will ensure consistency with Objective 17-1 as follows:

65.3.6.2 Ohau River Bridge

The modelled crossing of the Ohau River comprises one main bridge (175m top span) and, providing for the flood control value, a smaller (35m top span) flood relief bridge within the northern part of the floodplain. Given the width of the Ohau River channel the main bridge requires four sets of twin piers to be located within the river channel.

The Ohau River has high energy and a large gravel bedload during floods so there is some potential for the river to meander over the next 100 years. This context is recognised and provided for through deep piles for the bridge piers and abutments, plus deep-seated scour protection. The presence of the bridge will not impede the passage of sediment and provides reasonable space for the river to migrate within its floodplain.

65.3.6.3 Kuku Stream Bridge

The Kuku Stream Bridge is modelled as a single span structure that will replace an existing culvert that is substantially undersized for the design flood event in the stream. The new bridge for the highway will be capable of passing the design flood event without restriction thus avoiding adverse effects on the flood control values of the stream.

65.3.6.4 Waikawa Stream Bridge

The Waikawa Stream is an actively mobile stream with a total floodplain width formed by the stream's meandering and braiding of around 400m, with the most active part of the floodplain (inundated in the 1:10 AEP event) being around 110m wide. In the location where the Project crosses the stream the main channel is around 25m wide, and moved over 45m northwards in the period between 2005 and 2017. A 10m wide tributary of the stream carries flood flows from the northern part of the Waikawa Stream floodplain.

The width of the floodplain means that that the main Waikawa Stream bridge has a modelled top span of 140m (with an effective span at floodplain level less than this due to the modelled use of spill through abutments) supported by three sets of twin piers, while the tributary is modelled to pass flood flows through a triple box culvert.

The location of the crossing of the stream, and the modelled location of the bridge, avoids the most active floodplain area. Additionally, the spill-through abutment on the southern bank has been specifically positioned to align with the existing steep riverbank to avoid introducing additional turbulence during flood events.

Overall, the location and modelled design of the Waikawa Stream crossing structures ensure that the flood control role of the stream is recognised and provided for through ensuring no meaningful difference in flood levels in the modelled event from the existing scenario, and achieving a reduction in overall flood velocity on the floodplain.

65.3.6.5 Manakau Stream Bridge

The modelled design of this crossing spans both the stream and the existing road. Manakau Stream is currently constrained by South Manakau Road and an existing 9m wide bridge (to be retained) immediately downstream of the proposed Project crossing point. In larger flood events a small amount of floodwater affects the road. The presence of the Project's crossing is not modelled to change the depth or duration of flooding over the existing road in larger flood events, nor any meaningful change in peak flood velocities.

65.3.6.6 Waiauti Stream Bridge

The Waiauti is a small meandering stream with a wide (250m) floodplain. The modelled Project crossing involves a wide embankment and a relatively short single span bridge. Flood performance is modelled to be maintained through constructed replacement meanders and detailed design of scour protection.

65.3.6.7 Culverts

As discussed earlier in this report, fish passage in culverts has been provided for wherever practical and necessary and the design of culverts has been informed by potential ecological effects, ensuring that adverse effects on freshwater ecology are minimised, and the life-supporting capacity of the relevant waterway is safeguarded. Consequently, the Project is consistent with Objective 17-1.

In regard to Policy 17-1, all activities, including the construction of the aforementioned structures, will be undertaken in accordance with best management practices, which have been assessed and proposed within the supporting technical assessments and management plans. While other matters of Policy 17-1 have been discussed in other sections above, the Project is considered to be consistent with Chapters 2, 3, 5, 6, 9 and 12 and Policy 14-9. On this basis, the Project is consistent with the objective and relevant policies of Chapter 17.

65.4 Summary of One Plan

Although the Project is likely to result in a range of adverse effects, overall, the Project is consistent with the objectives and policies of the One Plan.

The effects associated with the construction of the Project, such as those relating to sediment, earthworks, dust, water diversions, and works in a waterbody or stream bed, are temporary in nature.

These effects will be managed and mitigated through a range of management plans and proposed conditions. Furthermore, in terms of operation, the Project has largely avoided potential long-term adverse effects, such as on stormwater runoff, flooding, other natural hazards, and water quality through the design of the Project and associated control measures, such as stormwater treatment.

None of the catchments traversed by the Project have high natural character, with the majority falling into the low-medium natural character range. In that regard, the natural character mitigation to be employed will maintain the current degree of natural character in each catchment in the short term, while the benefits of the proposed restoration and rehabilitation on natural character values will continue to increase over time. On that basis the Project is consistent with the applicable One Plan provisions, particularly Objective 6-2(b).

The Project results in the loss of streams (through stream diversion). However, Policy 5-23(b) allows infrastructure of regional and national importance, or activities that result in an environmental benefit, to remedy or mitigate those effects where it is not practical to avoid them. On the basis of the above, the effects of the Project on waterbodies and their margins have been avoided, remedied and mitigated as far as practicable. The effects of stream loss are being offset as described in Freshwater Ecology - Technical Assessment K.

Activities within Schedule F (rare and threatened) habitats are a non-complying activity. Policy 13-4(b) allows for the granting of the consent if the decision maker is satisfied that "more than minor" adverse effects that cannot be avoided are mitigated at the point of the adverse effect, or offset to result in a net indigenous biological gain is proposed. Terrestrial Ecology - Technical Assessment J details the proposed mitigation measures, and how residual effects will be offset so that net gain will be achieved and accordance with Policy 13-4(d).

The Project is of regional and national importance, which is consistent with Chapter 3 as it involves the construction and operation of critical infrastructure as identified in the RLTP. As a result of this, the provisions in the One Plan seek that regard be had to the extensive range of benefits the Project provides, particularly in relation to positive transport, social and economic impacts. Under Chapter 3 and Chapter 5, the One Plan includes provisions which allow regionally and nationally important infrastructure to remedy or mitigate those effects where avoidance is not practicable.

Overall, as discussed throughout the above sections, the potential adverse effects of the Project are avoided, remedied or mitigated in a manner that is consistent with the relevant objectives and policies of the One Plan. Where there are residual adverse effects which cannot be avoided, remedied or mitigated, (in terms of effects on terrestrial and freshwater ecology), these are offset to a net gain in accordance with Policy 13-4(b).

Consequently, the Project is consistent with the objectives and policies of the One Plan.

66 GWRC Regional Policy Statement

The Greater Wellington Regional Policy Statement was made operative on 24 April 2013.

66.1 Chapter 3.1: Air quality

Provisions identified as relevant: Objective 1, Objective 2

These objectives require that discharges of odour, dust and smoke to air do not adversely affect amenity values or people's wellbeing, and that unacceptable levels of fine particulate matter are avoided in order to protect human health. As set out in Air Quality - Technical Assessment C the mitigation measures proposed will ensure that none of these emissions will occur to levels that will generate nuisance effects beyond the boundaries of the designation. As such, the Project is consistent with these objectives.

66.2 Chapter 3.3: Energy, infrastructure, and waste

Provisions identified as relevant: Objective 10, Policy 39, Policy 57

Objective 10 requires that the social, economic, cultural and environmental benefits of regionally significant infrastructure are recognised and protected.

Policy 39(a) requires decision-makers to have particular regard to those benefits when assessing a Notice of Requirement or resource consent applications, while Policy 39(b) requires particular regard to be had to protecting regionally significant infrastructure from incompatible subdivision, use and development occurring under, over, or adjacent to the infrastructure.

Policy 57 requires that, in making progress towards achieving the key outcomes of the Wellington Regional Land Transport Strategy, the following matters shall be given particular regard when considering a Notice of Requirement or application for resource consent:

(a) whether traffic generated by the proposed development can be accommodated within the existing transport network and the impacts on the efficiency, reliability or safety of the network;
(b) connectivity with, or provision of access to, public services or activities, key centres of employment activity or retail activity, open spaces or recreational areas;
(c) whether there is good access to the strategic public transport network;

(d) provision of safe and attractive environments for walking and cycling; and
(e) whether new, or upgrades to existing, transport network infrastructure have been appropriately recognised and provided for.

These provisions strongly support the RMA authorisations for the Project. Granting the authorisations would appropriately recognise the significant benefits that the Project will generate (as set out earlier in this report and in Section 71 that follows) in a manner consistent with Objective 10 and Policy 39(a).

The Project is also consistent with key components of Policy 57, particularly given the safety, efficiency and reliability improvements it will create and its provision of the SUP as a safe and attractive environment for walkers and cyclists to link with the SUP provided on the PP2Ō project. Further, approval of the designation and consents required for the Project in the GWRC area would appropriately recognise and provide for the Project.

Confirming the designation for the Project will be particularly consistent with Policy 39(b) given the control on land use within the designation that can be exerted by Waka Kotahi (as the Requiring Authority) pursuant to s176 of the RMA.

66.3 Chapter 3.4: Freshwater

Provisions identified as relevant: Objective 12, Objective 13, Objective 14, Policy 40, Policy 41, Policy 42, Policy 43, Policy 44, Policy 45

Objectives 12 and 13 together require that the region's rivers, lakes and wetlands support healthy functioning ecosystems, and that the quantity and quality of fresh water:

(a) meet the range of uses and values for which water is required;
(b) safeguard the life supporting capacity of water bodies; and
(c) meet the reasonably foreseeable needs of future generations.

Policies 40-43 give effect to Objectives 12 and 13 and seek to ensure that water quality, flows and water levels and aquatic habitats of surface water bodies are managed for the purpose of safeguarding aquatic ecosystem health (Policy 40), earthworks and vegetation disturbance are minimised to minimise erosion and silt and sediment runoff (Policy 41), stormwater runoff is reduced through implementation of a range of measures (Policy 42), and aquatic ecological functions are protected through having particular regard to a wide range of protection measures (Policy 43).

The Project is consistent with these provisions for the following reasons:

i) The health of aquatic ecosystems in the Project area will be maintained during construction and improved over the long term improved, as set out in Freshwater Ecology - Technical Assessment K (noting that there are no significant waterways crossed by the Project in the GWRC area);and

ii) Best practice erosion and sediment control measures will be employed to minimise silt and sediment discharges to the fullest extent practicable; and

iii) A best practice treatment train approach will be implemented to reduce and treat stormwater runoff from the Project; and

iv) Riparian margin function will be enhanced through reinstatement of riparian habitat, natural flows and fish passage through new culverts will be maintained, and where native wetland plants and habitat is unavoidably affected a comprehensive offset package is implemented to achieve a net gain of ecological function.

Objective 14 and its attendant policies 44 and 45 cumulatively require that water available for use and development is allocated and used efficiently, and that the volume of water sought by any particular application is reasonable and justifiable. The Project is consistent with these provisions as the volume of water sought for construction effects management has been carefully calculated to be the minimum practicably required, and a range of water efficiency measures will be implemented (eg water storage in ponds to minimise volume taken with consented limits).

66.4 Chapter 3.5: Historic heritage

Provisions identified as relevant: Objective 15, Policy 46

These provisions seek to protect historic heritage from inappropriate modification, use and development. There are no items of historic heritage directly affected by the Project. The nearest heritage item to the Project is the Ashleigh homestead that fronts Queen Street to the east of Levin. Built Heritage - Technical Assessment M addresses the effect of the Project on the homestead and concludes that any adverse effects on the homestead will be primarily during construction and will be less than minor. On that basis the Project is consistent with Objective 15 and Policy 46 (noting that Ashleigh is outside the GWRC area in any event).

66.5 Chapter 3.6: Indigenous ecosystems

Provisions identified as relevant: Objective 16, Policy 47

These provisions seek to ensure that a range of ecosystem health matters are given particular regard to in assessing Notices of Requirement and consent applications, to ensure that indigenous ecosystems and habitats with significant biodiversity values are maintained and restored to a healthy functioning state. The Project through the route selection process has largely avoided areas of significant biodiversity value, which is consistent with the intent of Objective 16 and Policy 47.

Within the GWRC area, the principal indigenous ecological effect is where the Project unavoidably directly affects a valley floor wetland that lies approximately 500 metres to the southwest of more extensive, high value wetland habitats in the Paruauku Swamp - also known as O te Pua (Pukehou Swamp).

The ecological effects on the valley floor wetland have been assessed in Terrestrial Ecology - Technical Assessment J, and also assesses the potential for the effect of the loss of the valley floor wetland to also adversely affect the Paruauku Swamp. The assessment concludes that there will be no cumulative or indirect effect on Paruaku Swamp, and that effects on the valley floor wetland can be appropriately addressed. With the various mitigation, offset and restoration measures to be implemented in the overall ecological effects management package for the Project, an overall net gain in indigenous biodiversity in the Project area, including for wetlands, will be achieved.

As a result, although the Project directly affects wetland habitat, it remains in an overall sense consistent with Objective 16 and Policy 47 (and is consistent with the wetland provisions in the NPS-FM as discussed above).

66.6 Chapter 3.7: Landscape

Provisions identified as relevant: Objective 18

This Objective requires that the region's special amenity landscapes are identified and those landscape values that contribute to amenity and the quality of the environment are maintained or enhanced. Within the GWRC area, the Kapiti Coast District Plan notes Pukehou hill as a 'special amenity landscape' and lists some of its values. The highway skirts the base of the hill but does not encroach into the identified feature. On that basis, the Project is consistent with the Objective.

66.7 Chapter 3.8: Natural hazards

Provisions identified as relevant: Objective 19, Objective 20, Objective 21, Policy 51, Policy 52

Objective 19 and Policy 51 require that risks and consequences to people, communities, their businesses, property and infrastructure from natural hazards and climate change effects are reduced. Objective 21 is that communities are more resilient to natural hazards, including the impacts of climate change. Consistent with these provisions, once operational the highway will provide an alternative and more resilient lifeline transportation route for the communities in the area at times of natural hazard events which will reduce the current total reliance on the existing SH1.

The principal natural hazard that could affect the Project are more frequent and severe flood events bought on by climate change induced extreme rainfall events. The Project has recognised and provided for this natural hazard risk through ensuring that all structures over and within waterways, stream diversions, and stormwater and sediment retention ponds are designed in accordance with relevant standards that include allowance for climate change.

Further, the concept design of the Project in the vicinity of South Manakau Road allows for the highway to be grade separated over the local road to ensure the flooding risk from the adjacent heavily meandered Waiauiti Stream is recognised and provided for.

Objective 20 and Policy 52 require that mitigation measures, structural works and other activities do not increase the risk and consequences of natural hazard events. Hydrology and Flooding - Technical Assessment F assesses the potential for the Project and its various structures and waterway crossings to exacerbate flood effects, and concludes that the effect of the Project on hydrology and flooding will be less than minor.

The Project is therefore consistent with the relevant natural hazards objectives and policies.

66.8 Chapter 3.10: Resource management with tangata whenua

Provisions identified as relevant: Objective 25, Objective 26, Objective 27, Objective 28

Tangata whenua have been partners with Waka Kotahi throughout the development of the Project. As a result, the Project has been developed in a manner consistent with these Objectives for the following reasons:

- The Project will form part of the physical resources within the Wellington region, and the partnership with tangata whenua means that kaitiakitanga has been integrated into its development (Objective 25); and
- The health and life-supporting capacity of the overall freshwater resources affected by the Project are maintained and in some cases enhanced, which in turn sustains the mauri of that resource (Objective 26) and its ability to be used for mahinga kai and customary purposes (Objective 27)
- The cultural relationship of Māori with their ancestral lands, water, sites, wāhi tapu and other taonga in the Project area has been maintained (Objective 28).

66.9 Chapter 3.11: Soils and minerals

Provisions identified as relevant: Objective 29, Objective 30, Policy 59

Objective 29 is that land management practices do not accelerate soil erosion. The erosion and sediment control procedures and measures to be implemented on the Project will ensure consistency with this objective.

Objective 30 is that those desirable physical, chemical and biological characteristics of soils that enable them to retain their ecosystem function and range of uses are maintained, while Policy 59 requires that, when considering Notices of Requirement and resource consent applications particular regard be given to safeguarding productive capability on Class I and II land. In this regard, the Project does not affect Class I and II soils in the Greater Wellington region.

66.10 Plan Change 1

Plan Change 1 to the Regional Policy Statement for the Wellington Region ("RPS PC1") was publicly notified on 19 August 2022. Submissions closed on 14 October 2022.

The key topics addressed in RPS PC1 are:

- Lack of urban development capacity and implementation of the National Policy Statement on Urban Development (NPS-UD) and Wellington Regional Growth Framework

- Degradation of freshwater and partial implementation of the National Policy Statement for Freshwater Management (NPS-FM)
- Loss and degradation of indigenous biodiversity including regional policy to implement central government strategy and draft RMA national policy direction
- The impacts of climate change including regional policy to complement central government policy direction.

Given that RPS PC1 is in the early stages of the RMA Schedule 1 process, and could thus be subject to significant change, little statutory weight can be given to its provisions at this time. Nevertheless, an assessment of the relationship of the Project to relevant "as-notified" RPS PC1 provisions is set out as follows:

Chapter 3.1A Climate Change *- Provisions identified as relevant: Objective CC.1,*

Objective CC.1 articulates a vision for a climate resilient region, including where climate change adaptation is an integral part of (amongst other things) well-planned infrastructure. Given the climate change adaptation measures included in the concept design of the Project (as set out previously and later in this report), the Project is consistent with Objective CC.1.

Chapter 3.3 Energy, Infrastructure and Waste *- Provisions identified as relevant: Policy 7, Policy 39, Policy 57,*

These policies have been addressed earlier in this report – no changes are proposed to these provisions by RPS PC1.

Chapter 3.4 Freshwater *- Provisions identified as relevant: Objective 12, Policy 15, Policy 40, Policy 41, Policy 44*

The amendments to Objective 12 and Policy 44 insert reference to Te Mana o te Wai. Section 63.1.1 of this report contains an assessment of the Project against Te Mana o te Wai provisions of the NPS-FM, and concludes that the Project is consistent with those provisions. As a result the Project is also consistent with Objective 12 and Policy 44 of RPS PC1. For the reasons set out earlier in this report the Project is also consistent with Policy 40 and Policy 41, that respectively seek to protect and enhance the health and well-being of water bodies and freshwater ecosystems, and control the effects of earthworks and vegetation clearance.

Chapter 3.6 Indigenous Ecosystems *- Provisions identified as relevant: Objective 16*

RPS PC1 seeks to amend Objective 16 (the operative version of which is already addressed earlier in this report in section 5.5) to require protection, enhancement and restoration of significant ecosystem functions and services and/or biodiversity values. The assessment in section 66.5 equally applies to Objective 16 of RPS PC1.

67 Proposed Natural Resources Plan for the Wellington Region (appeals version – final 2022)

67.1 Introduction

Decisions on the proposed Natural Resources Plan (PNRP) were publicly notified on 31 July 2019, and the period for filing appeals with the Environment Court on the Decisions version of the PNRP closed on 18 September 2019.

The current version of the PNRP is the 'Appeals Version – final 2022'. This shows all changes to the provisions since the Decisions Version as a result of consent orders, clause 16 amendments and/or additions/changes required by a national direction[15].

The Wellington Regional Council adopted the Regional Coastal Plan part of the PNRP under clause 18 of the First Schedule to the RMA on 25 August 2022 and has referred that part to the Minister of Conservation under clause 19 of the First Schedule to the RMA for any amendments by the Minister and then approval.

Once the Wellington Regional Council receives the Ministers approval, Council will then approve the part of the PNRP that is not the Regional Coastal Plan under clause 17 of the First Schedule to the RMA and set the date it will become operative under clause 20 of the First Schedule to the RMA.

Appendix 1 to this report sets out the relevant objectives and policies in verbatim, with provisions that are under appeal underlined or stuck through. The assessment set out below should thus be carefully read in conjunction with the verbatim provisions in Appendix 1.

Only a small portion of the overall Project (roughly 6km) is located within the GWRC area. That part of the Project includes no significant waterway crossings or hazard areas, nor any areas of outstanding natural character. As a result, the range of objectives and policies that are relevant to assessment of the Project is reduced when compared to the Horizons One Plan assessment set out above.

67.2 Ki uta ki Tai: mountains to the sea

Provisions identified as relevant: Objective O1, Objective O2, Objective O3, Objective O4, Policy P2, Policy P3

These objectives cumulatively require air, land and freshwater bodies to be managed as an integrated whole and for the mauri and intrinsic values of freshwater to be recognised and sustained. Given the multi-disciplinary manner in which the Project has been developed, and the integrated set of technical effects assessments that have informed the Project and its effects management measures (including with regards to freshwater ecology and water quality) the Project is consistent with these objectives.

Policy P3 promotes a precautionary approach to decision making where insufficient information exists. In this case a precautionary approach is not necessary in terms of decision making on the Project. This is because while some of the potential adverse effects are significant without application of effects management measures, the investigations undertaken as part of the development of the Project have ensured there is a significant amount of reliable and certain information available upon which to assess its effects.

Policy P2 requires an integrated assessment of the effects of activities where they span jurisdictional boundaries. The Project is consistent with this provision given the pre and post lodgement engagement that has occurred with all the relevant authorities, the integrated approach adopted to the assessment of the effects of the Project, and as evidenced by the coordinated processing of the Notices of Requirement and resource consent applications.

67.3 Beneficial use and development

Provisions identified as relevant: Objective O5, Objective O6, Objective O9, Objective O10, Policy P6, Policy P7, Policy P11, Policy P13, Policy P15

Collectively, these provisions seek to recognise and enable development that has benefits to the wider environment.

[15] All Objective and Policy reference numbers recorded in this section are taken from the PNRP Final Appeals Version 2022 Cross Reference table available on the GWRC website as at 12 October 2022

The Project is consistent with, and strongly supported by, these provisions for the following reasons:

- it can be constructed and operated in a manner that ensures sufficient freshwater of a suitable quality will remain available for the health needs of people and the reasonable needs of livestock (Objective O5)
- granting consents to the necessary water takes, discharges and diversions would recognise the social, economic, cultural and environmental benefits of the take and use of the water (Objective O6, Policy P6)
- beneficial planting and fencing of riparian margins will be undertaken as part of the effects offset package (Policy P7)
- granting consent to the overall suite of activities sought to enable the construction and operation of the Project would recognise the social, economic, cultural and environmental benefits of the Project as regionally significant infrastructure (Objective O9, Policy P6, Policy P11, Policy P13)
- its construction and operation will enable the transportation needs of present and future generations to be met in an appropriate place, as identified through the route selection process (Objective O10)
- confirmation of the designation for the Project will allow it to be protected against incompatible adjacent use and development that might otherwise generate reverse sensitivity effects (Policy P15)

67.4 Māori relationships

Provisions identified as relevant: Objective O12, Objective O13, Policy P18, Policy P20, Policy P21

These provisions require that the relationships of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga are recognised and provided for, and that kaitikitanga is recognised and mana whenua actively participate in planning and decision-making processes with regards to the use and development of natural and physical resources. The cultural relationship of Māori with air, land and water shall be recognised and the adverse effects on this relationship and their values shall be minimised, and the mauri of fresh and coastal waters is sustained and enhanced.

Tangata whenua are partners in the Project with Waka Kotahi, and have had a central role in the development of the Project including route selection, concept design, and effects management. On that basis the Project is consistent with the objectives and policy referenced above.

67.5 Natural character, form and function

Provisions identified as relevant: Objective O14, Policy 23, Policy P24

Objective O17 is that the natural character of the coastal marine area, natural wetlands, and rivers, lakes and their margins is preserved and protected from inappropriate use and development. Clause (e) of Policy P24 requires that outside of the coastal environment, adverse effects of activities on the natural character of wetlands, lakes and rivers and their margins are avoided, remedied or mitigated.

The Project unavoidably directly affects a small part of a gully floor wetland in the GWRC area, however the loss will be mitigated through direct transfer of wetland plants and species and through the implementation of natural character planting. On that basis the Project is consistent with Objective O17 and Policy P24.

Policy 23 requires identification and mapping of Outstanding Natural Features and Landscapes. There are no such features or landscapes in the part of the GWRC area affected by the Project.

67.6 Natural hazards

Provisions identified as relevant: Objective O15, Objective O16, Policy P25, Policy P26, Policy P27, Policy P28

The Project is consistent with these provisions for the following reasons:

- in the GWRC area it has avoided being located in a high hazard area (Objective O15, Objective O16, Policy P25);
- the earthworks associated with the Project will not increase residual flood hazard risk in other areas, nor create adverse effects on natural processes (Objective O15, Policy P26);
- to the extent relevant to the part of the Project within the GWRC area, hard hazard engineering measures (such as scour protection around culverts) have only been used where necessary to protect the Project as new regionally significant infrastructure (Policy P27);
- particular regard has been had to climate change through the use of design standards in the concept design of drainage and stormwater measures that include a factor of safety for climate change induced rainfall events (Policy P28).

The Project will significantly reduce the susceptibility of the state highway network to natural hazards (particularly flooding).

67.7 Water quality

Provisions identified as relevant: Objective O17, Objective O18

These objectives require that the quality of groundwater and water in surface water bodies is maintained or improved in order to meet contact recreation standards and be suitable for Māori customary use.

The entire Waitohu Stream catchment (predominantly pasture covered) is within the GWRC area. The Project crosses several small tributaries of the Waitohu Stream that will need to be culverted under the highway. Treated stormwater from the highway will also be discharged to these tributaries.

The main stem of the Waitohu Stream at the nearest monitoring site to the Project has low water clarity (0.93m), very high E.coli, and moderately high nitrogen and phosphorous concentrations. These levels may be reflective of the predominantly pastoral nature of the catchment, and will also be influenced by the fact that stormwater runoff from the existing State Highway 1 alignment is not subject to any treatment.

The Project will transfer traffic from the existing SH1 alignment to the new highway which will incorporate extensive stormwater treatment. As a result, an improvement in water quality in the Waitohu Stream and its tributaries is likely, which is consistent with Objective O17 and O18.

67.8 Biodiversity, aquatic ecosystem health and mahinga kai

Provisions identified as relevant: Objective O19, Objective O21, Objective O22, Objective O23, Policy P30, Policy P31, Policy P32, Policy P33, Policy P34, Policy P35, Policy P110, Policy P109

Objective O28 is to maintain or increase the extent of natural wetlands, to protect their values and to restore their condition. Policy P34 which seeks similar outcomes for natural wetlands. The Project unavoidably directly affects a gully floor wetland in the GWRC area, and so does not maintain or protect that particular wetland.

However, as discussed in detail in Terrestrial Ecology - Technical Assessment J, a fulsome mitigation and offsetting scheme is proposed in respect of all affected wetlands, which will achieve an overall net gain in wetland values. That includes mitigation via the direct transfer of wetland plants and species (which will occur in the affected gully floor wetland) in a manner consistent with PNRP objectives and policies. As discussed below, that is consistent with Policies P31, P37 and P110 that, in like manner to the equivalent provisions in the Horizons One Plan, collectively import the “exceptions” provisions built in to the NPS-FM for specified and regionally/nationally significant infrastructure that can demonstrate a functional need to locate in a wetland or river environment.

The Project is consistent with the remaining objectives and policies for the following reasons:

- the Project, as addressed in Technical Assessment F – Hydrology and Flooding, Technical Assessment G – Hydrogeology and Groundwater, Technical Assessment H – Water Quality and Technical Assessment K – Freshwater Ecology, will maintain water quality, flows, water levels and

aquatic habitats in a manner that maintains biodiversity, aquatic ecosystem health and mahinga kai, and achieves the objective of Table 3.4 (Objective O19 and Policy P30);

- riparian habitats and margins will be restored in various locations within the catchments affected by the Project (Objective O21, Policy P30, Policy P109);
- the design of all instream structures and diversions will allow for best practice fish passage measures, including for koura, to be implemented (Objective 23, Policy P32 and Policy P33);
- restoration of natural wetlands will occur elsewhere in the Project area, which is consistent with Policy P35 that encourages and supports such restoration.

Policy P31 sets out the effects management hierarchy for activities that risk causing adverse effects on the values of a habitat listed in Schedule F of the PNRP. The Waitohu Stream and its tributaries, and the valley floor wetland that are affected by the Project are a listed habitat in Schedule F. As such, the first preference of the hierarchy is to avoid the habitat. If, as in the case of the Project, avoidance or minimisation is not practicable then the effects can be remedied. Where effects cannot be remedied then biodiversity offsetting can be provided.

However, the application of the effects mitigation hierarchy set out in Policy P31 can only occur if the exceptions in Policy P110 apply to the activity. Policy P110 in turn requires avoidance of the loss of extent and values of the beds of lakes and rivers and natural wetlands, except where (in relation to natural wetlands) specified infrastructure is involved and:

1. the activity, including any reclamation and drainage, is necessary for the construction or upgrade of specified infrastructure, and
2. the specified infrastructure will provide significant national or regional benefits, and
3. there is a functional need for the specified infrastructure in that location.

These exceptions mirror the requirements of the NPS-FM. As set out earlier in the analysis of the Project against the requirements of the NPS-FM (see section 63.1.2) the Project falls squarely within the definition of specified infrastructure and meets all of the exception requirements and thus qualifies for application of the effects management hierarchy. Terrestrial Ecology - Technical Assessment J and Freshwater Ecology – Technical Assessment K explain in depth how the effects management hierarchy is being applied to the Project to achieve positive ecological outcomes.

67.9 Sites with significant values

Provisions identified as relevant: Objective O25, Objective O28, Policy P37

Objective O25 and Objective O28 require that outstanding water bodies and their significant values, along with ecosystems and habitats with significant indigenous biodiversity values, are protected and restored.

In seeking that the adverse effects of use and development on outstanding Schedule A waterbodies and their values are avoided, Policy P37 imports the “exceptions” requirements of the NPS-FM.

The analysis set out immediately above and at section 66.3 above in terms of water quality effects in the Waitohu Stream and its tributaries is therefore equally applicable to the assessment of these objectives and policies. As a result, the Project is consistent with Objective O25, Objective O28 and Policy P37.

67.10 Air quality

Provisions identified as relevant: Objective O30, Objective O32, Policy P55, Policy P58

Objective O30 requires that ambient air quality is maintained or improved to the acceptable category or better in Schedule L1 (ambient air), while Objective O32 requires that adverse effects of odour, smoke and dust on amenity values and people’s well-being are minimised. Policy P55 requires that ambient air quality shall be managed to protect human health and safety, while Policy P58 requires that air quality amenity in urban, rural and the coastal marine areas shall be managed to minimise offensive or objectionable odour, smoke and dust, particulate matter, fumes, ash and visible emissions.

Given the findings of Air Quality - Technical Assessment C that the potential dust emissions from the Project during construction can be managed to minimise adverse effects on sensitive receivers, and that once operational the Project will improve ambient air quality, the Project is consistent with the air quality objectives and policies set out above.

67.11 Soils and land use

Provisions identified as relevant: Objective O33, Objective O34

Objective O33 requires that soils are healthy and retain a range of uses, and that accelerated soil erosion is reduced, while Objective O34 requires that adverse effects on soil and water from land use activities are minimised. The Project as a land use activity is consistent with this objective in terms of its effects on both water and soil. In terms of soil, while some will be removed in order for the Project to be constructed, the extent of the loss has been minimised to the extent practicable. Any disturbed soil will however be reused in creating bunds for visual and noise mitigation purposes. Soil erosion associated with the Project will be reduced through the implementation of Erosion and Sediment Control measures.

67.12 Discharges to land and water

Provisions identified as relevant: Objective O36, Objective O37, Policy P69, Policy P100

Objectives O36 and O37 require that runoff or leaching of contaminants to water from discharges to land, and the amount of sediment-laden runoff entering water, are minimised. Policy P69 promotes discharge of contaminants to land over direct discharges to water, particularly where there are adverse effects on aquatic ecosystem health and mahinga kai, or contact recreation and Māori customary use. Policy P100 requires that the adverse effects of the discharge of hazardous substances to land, fresh water, including groundwater, coastal water or air shall be avoided, or mitigated or remedied where avoidance is not practicable.

All stormwater from the Project that is to be discharged to waterways will first be treated through a series of land-based devices to achieve a high standard of discharge quality. Likewise, the implementation of best practice erosion and sediment control measures will ensure that sediment discharges to water are avoided to the fullest extent practicable and where they do occur are managed within acceptable standards. Discharges of hazardous substances will be avoided through the implementation of best practice measures such as bunding of fuel storage areas and refuelling areas, and the use of appropriate contaminant interception and retention devices.

As a result, the Project is consistent with the objectives and policies set out above.

67.13 Contaminated land

Provisions identified as relevant: Objective O41, Objective O42

Objective O41 requires that the environment is protected from the adverse effects of discharges of hazardous substances and the creation of contaminated land is avoided, while Objective O42 requires that contaminated land is identified and the discharges of contaminants are managed to protect the environment. The Project is consistent with these provisions in that it will incorporate measures to avoid hazardous substances being discharged, and detailed site investigations will be undertaken once land access is available to determine whether or not contaminants are present on sites affected by the Project and to what levels. Any necessary consents will be sought at that time and the applications will need to be able to demonstrate that appropriate management of contaminated material is being undertaken.

67.14 Water allocation

Provisions identified as relevant: Objective O43, Objective O44, Policy P117, Policy P119, Policy P121, Policy P122, Policy P124, Policy P125, Policy P129

The Project seeks short duration consent to take water from the Waitohu Stream in the Greater Wellington region at levels that do not exceed minimum flows and maximum (and supplementary) allocations, primarily for the purpose of mitigating construction effects. As a result the takes sought represent an efficient allocation and use of the water as required by Objectives O43 and O44.

The Project is consistent with the relevant policies for the following reasons:

- it can be dependably assessed that the temporary water take sought will not create adverse effects on the life-supporting capacity of the stream (Policy P117)
- when flows or water levels in the Waitohu Stream approach minimum flow or minimum water levels the water take shall be reduced accordingly (Policy P119)
- the volume of water sought does not exceed the core allocation for the Waitohu Stream (Policy P121)
- the water take sought is not competing in terms of priority with other takes for community or group drinking water supply purposes (Policy P122)
- in addition to core allocation, supplementary allocation is sought of up to 10% of the total amount of flow in the Waitohu Stream at the point of abstraction (Policy P124)
- the take and use of the water is reasonable and will be used efficiently, as evidenced in part through the implementation of water storage facilities throughout the Project area and the short duration and relatively small volume sought to be taken from the Waitohu Stream (Policy P125)
- variable stream flows are accommodated within the parameters sought for the water take (Policy P129).

67.15 Summary of proposed Natural Resources Plan

The part of the Project that is located within the GWRC area is relatively small, and contains no significant waterway crossings or hazard areas.

Granting consent to the overall suite of activities sought to enable the construction and operation of the Project would be consistent with the overall intent of the beneficial use and development provisions of the PNRP as it would recognise the social, economic, cultural and environmental benefits of the Project as regionally significant infrastructure and enable the transportation needs of present and future generations to be met in an appropriate place (as identified through the route selection process).The majority of the effects associated with the construction of the Project, such as those relating to sediment, earthworks, dust, and the placement of culverts in tributaries are temporary in nature. These effects will be managed and mitigated through a range of management plans and proposed conditions. Furthermore, in terms of operation, the Project has avoided potential long-term adverse effects, such as on stormwater runoff, flooding, other natural hazards, and water quality through the design of the Project and associated control measures, such as stormwater treatment.

In terms of ecology effects, the Project falls squarely within the definition of specified infrastructure, meets all of the exception requirements listed in the policies set out above and thus qualifies for application of the effects management hierarchy. Terrestrial Ecology - Technical Assessment J explains in depth how the effects management hierarchy is being applied to the Project to achieve positive ecological outcomes.

The Waitohu Stream catchment traversed by the Project does not have high natural character. The mitigation to be employed will maintain the current degree of natural character in the short term while in the longer term the benefits of the proposed restoration and rehabilitation on natural character values will continue to increase over time.

Thus, in terms of the objectives and policies that seek to avoid, remedy, mitigate or offset the potential adverse effects from the type of activities set out above, the Project is consistent with the PNRP.

On the basis of all the above, the Project is consistent with the objectives and policies of the PNRP.

68 District plans

Section 171(1)(a)(iv) of the RMA provides that particular regard must be had to the relevant provisions of a plan or proposed plan when considering a NOR, while under section 104(1)(b)(vi) of the RMA regard must be had to the relevant provisions of a plan or proposed plan when considering an application for a resource consent.

In this case the following Operative and Proposed District Plans and Plan Changes are applicable:

- Operative Horowhenua District Plan ("HDP")
- Proposed Plan Change 4 (Tara-Ika Growth Area) to the Horowhenua District Plan ("PC4")
- Operative Kapiti Coast District Plan ("KCDP")

Appendix Two sets out the relevant objectives and policies from each of the above plans in full.

An assessment of the Project's relationship to the relevant objectives and policies is provided below. The assessment is arranged by topic to avoid repetition. Because only a small part of the Project is located in the Kapiti Coast District with a limited range of land use matters relevant, some topic areas (eg historic heritage) are not relevant to the Kapiti Coast District Plan. In those instances no KCDP provisions are listed as none are relevant.

The relevant objectives and policies of PC 4 are addressed separately at the end of this section.

68.1 Tangata whenua

Provisions identified as relevant:

HDP: Objective 1.1.1, Objective 1.2.1, Objective 1.3.1, Policy 1.2.3, Policy 1.2.4, Policy 1.2.5, Policy 1.3.3, Policy 1.3.5

KCDP: Objective DO-01, Objective DO-07, Policy ECO-P5

These provisions seek that tangata whenua can exert kaitiakitanga through involvement in decisions that affect the natural and physical environment, and that tāngata whenua historic heritage, including wāhi tapu and other places and areas significant to Māori are recognised and protected. The partnership with tangata whenua for the Project has and will continue to ensure consistency with these provisions, through allowing a full expression of kaitiakitanga in all phases of the Project - ranging from constraints identification and alternatives considerations, through to eventual input to the detailed design and cultural supervision of construction.

68.2 Archaeology, heritage and wāhi tapu

Provisions identified as relevant:

HDP: Objective 1.3.1, Objective 13.2.1, Policy 1.3.3, Policy 1.3.5, Policy 2.1.9, Policy 13.2.5

KCDP: Objective DO-01, Objective DO-07, Policy ECO-P5, Policy SASM-P1, Policy HH-P7

These provisions seek to protect areas and sites of cultural significance, wāhi tapu, wāhi tūpuna and other taonga from the adverse effects of inappropriate subdivision, use, and development and recognise and protect the values of heritage buildings and recorded and unrecorded archaeological sites. Consistent with these provisions the route selection process for the Project has largely avoided adverse effects on recorded archaeology, heritage and wāhi tapu.

There are no historic heritage features directly affected by the Project in either the Horowhenua District or the Kāpiti Coast District. In the Horowhenua District there are five heritage buildings (four listed in the Horowhenua District Plan and one not listed) within one kilometre of the Project – there are no heritage buildings within that distance in the Kāpiti Coast District.

The Ashleigh Homestead and grounds on Queen Street in Levin is the nearest to the Project (65m from the homestead to the nearest edge of the proposed designation) and is one of the original settler homes in the Horowhenua District.

Objective 13.2.1 of the Horowhenua District Plan seeks to protect significant historic heritage that reflects the culture and history of the Horowhenua District from inappropriate subdivision, use and development. In the case of the Ashleigh Homestead, Built Heritage - Technical Assessment M concludes that the potential adverse effects on the homestead are largely confined to the construction phase of the Project (dust, noise, and vibration), and can be mitigated to less than minor levels. Potential adverse effects on all other noted heritage buildings in the Horowhenua District are avoided.

There are no listed historic places or areas on the New Zealand Heritage List/Rārangi Kōrero or New Zealand Archaeological Association recorded archaeological sites within the proposed designation extent. Recorded tangata whenua sites of significance have been avoided by the Project, and a protocol will apply to any accidental discoveries. Archaeology - Technical Assessment L concludes that "*the Ō2NL Project will have only negligible effects on the known archaeological landscape with the potential for mostly negligible or minor effects on unknown archaeological sites*".

On the basis of all the above, the Project is consistent with the relevant provisions set out above.

68.3 Rural productivity and soils

Provisions identified as relevant:

HDP: Objective 2.2.1, Policy 2.2.5, Policy 2.2.7, Policy 2.2.9

KCDP: Objective DO-06, RPROZ-P10, RPROZ-P11

These provisions cumulatively seek to:

- safeguard the life supporting capacity of soils to enable a wide range of primary production activities and provide a resource for future generations while recognising the finite nature of the versatile land resource; and
- minimise and where possible avoid fragmentation of the versatile rural land resource for purposes not directly related to maintaining or enhancing the primary productive potential of the rural land resource; and
- minimise and where possible avoid land use and development which has the potential to inhibit the efficient use and development of versatile land for primary production.

The Project traverses areas of Class I and II highly productive land (all in the Horowhenua District), and results in a loss of those soils directly affected by the Project footprint. The area of highly productive soil lost is 298ha, set against the amount of highly productive soils in the Horowhenua District of 43,766 ha, meaning a 0.68% loss. While this quantum of loss is considered insignificant, on a strict / absolutist reading the Project is nevertheless inconsistent with the objective of safeguarding the life supporting capacity of the soil to recognise its finite characteristics (HDP Objective 2.2.1).

However, this inconsistency is tempered by the fact that the proposed designation follows the short-listed route option identified in the route selection process that best minimises impacts on versatile soils and inhibition of the use of the land for primary production, and the Project footprint (ie the constructed work within the designation for the project) will be minimised as far as practicable at the detailed design stage to reduce impact on the soil resource.

As discussed above, the Project is consistent with the provisions of the very recent NPS-HPL. The HDP and KCDP provisions predate the NPS-HPL; it is appropriate to place more emphasis on the NPS-HPL provisions than the district plan provisions when assessing the Project in respect of rural productivity and soils.

68.4 Rural character and amenity

Provisions identified as relevant:

HDP: Objective 2.4.1, Policy 2.4.13, Policy 2.4.17, Policy 2.4.18

KCDP: Objective DO-011, Policy RPROZ-P2, Policy EW-P1, Policy Noise- P3

Both of the objectives referenced above for the respective rural zones seek to enable primary production activities, and to manage the effects of activities to maintain and enhance rural character and amenity.

In terms of amenity the HDP policies focus specifically on maintaining overall day and night time noise conditions that are compatible with the rural environment (HDP Policy 2.4.17), while the KCDP focuses on remedying or mitigating the adverse effects on rural character values from earthworks activities (including extractive industries). The KCDP also seeks to retain the general sense of openness and the natural landforms of the Rural Zone.

The Project unavoidably introduces a significant manmade element to the Rural Zone(s) where one did not previously exist. On the other hand, many residents living near the existing SH1 and SH57 will see reduced noise levels. The Rural Zones of both districts contain roads, highways, electricity distribution and transmission lines and a range of other built infrastructure. In that regard the Project will not represent an unusual element in the rural landscape, albeit it will be of a larger scale than any infrastructure in the existing landscape.

Further analysis of landscape and natural character matters is provided in section 7.6 below.

Noise - Technical Assessment B assesses the potential operational and construction phase effects of the Project on nearby sensitive receptors, in accordance with NZS 6806. Part G of this report sets out the results of the noise assessment in detail, the summary of which is set out below:

- "*Operational road traffic noise levels from the Ō2NL Project will be reasonable in the context of a large infrastructure project (guided by criteria from NZS 6806 and the WHO criteria), and will result in an improved noise environment for a large number of people currently exposed to road traffic noise from the existing State highways;*
- *The Ō2NL Project will have operational adverse effects on other people who are located within certain locations and within close proximity to the proposed designation, and who currently enjoy a quiet rural lifestyle;*
- *Any temporary noise and vibration from construction activities, including construction traffic, can be appropriately mitigated and managed by relevant management plans; and*
- *With appropriate mitigation and management processes, the residual effects are considered to be reasonable for a project of this nature and scale*."

On the basis of the above, the operational noise impact of the Project is consistent with HDP Policy 2.4.17. However, the rural zone in any district is a working environment and the noise levels experienced in the zone will vary accordingly depending on the time of year and the activities occurring. Construction noise from the Project is temporary and can be managed through best practice methods and procedures.

Further, the noise assessment undertaken, and the mitigation measures to be put in place by the Project to minimise noise at sensitive receptors is entirely consistent with KCDP Policy Noise -P3 that requires the design and development of new transport networks to ensure that the adverse effects of transport on the inhabitants of existing residential buildings and noise sensitive activities are minimised or mitigated.

HDP Policy 2.4.13 seeks to avoid, remedy or mitigate adverse effects on residential properties or road safety produced by lighting or glare from any source. The Project will include lighting around interchanges and at the tie in points with the existing state highway network. This lighting will be designed and installed to relevant highway lighting design standards which will ensure consistency with Policy 2.4.13.

HDP Policy 2.4.18 seeks to ensure that effects of increased traffic or changed traffic type or change to road access do not compromise the safe and efficient operation of any road or adversely affect the safe and convenient movement of people on public roads. This policy is relevant because the Project will result in permanent alterations to traffic flows on local roads in the Project area and will permanently change the manner in which some properties gain access to and use the local road network. The changes will be fundamentally positive, and directly aligned with the policy, as discussed in detail in Transport - Technical Assessment A. There will be some limited areas where access and travel times will be adversely affected to a minor extent.

The Project will, during construction, result in some local roads that currently carry low traffic volumes being used as access routes by heavy construction vehicles and other construction related traffic. Transport - Technical Assessment A assesses that these impacts will not be significant, and will be appropriately managed through a Construction Traffic Management Plan.

68.5 Ecology and biodiversity

Provisions identified as relevant:

HDP: Objective 3.2.1, Policy 3.1.6, Policy 3.2.2, Policy 3.2.3

KCDP: Objective DO-02, Policy NE-P1, Policy NE-P3, Policy ECO-P2, Policy ECO-P3, Policy ECO-P4

The HDP Objective referenced above seeks to protect the areas of significant indigenous vegetation and significant habitats of indigenous fauna. The Project is consistent with this objective given that it has avoided such significant areas in the Horowhenua District. As a result, it also consistent with Policy 3.2.2 which requires the avoidance, remedy or mitigation of adverse effects of significant indigenous vegetation and significant habitats.

The Project finds support from Policy 3.2.3 which encourages land use and development that maintains and enhances indigenous biological diversity through the protection and enhancement of areas of significant indigenous vegetation and significant habitats of indigenous fauna, and from Policy 3.1.6 that requires regard to be had to regard to any positive effects associated with landscape and biodiversity restoration. These outcomes will be achieved by the comprehensive ecological mitigation and offset/compensation package to be implemented as part of the Project, as set out in the Terrestrial Ecology – Technical Assessment J and Freshwater Ecology – Technical Assessment K.

Within the Kapiti Coast District, a small part (approximately 2000m^2) of a natural gully floor wetland is directly affected by the highway construction. KCDP Objective DO-02 referenced above seeks that indigenous biological diversity and ecological resilience is improved through:

a) protecting areas of significant indigenous vegetation and significant habitats of indigenous fauna;
b) encouraging restoration of the ecological integrity of indigenous ecosystems;
c) enhancing the health of terrestrial and aquatic ecosystems; and
d) enhancing the mauri of waterbodies.

While there will be a degree of adverse effect on that natural wetland (noting that it is not an ecological site listed as significant in Schedule 1 of the KCDP, but for the purposes of this assessment has been regarded as significant due to the effect of the GWRC Proposed Natural Resources Plan definition of significance which captures all wetlands), the Project remains consistent with clause (a) of the objective, in that the habitat and vegetation of the wetland will subject to mitigation through direct transfer of vegetation from the affected part of the wetland to mitigation sites. The Project as a whole is consistent with the remainder of the matters set out in the objective, as the ecological mitigation and offset package will achieve each of the matters.

The offset package and its component activities, and its objective to achieve at least a no net biodiversity loss attributable to the Project, is also consistent with the intent of KCDP policies NE-P1, NE-P3, ECO-P2, ECO-P3, and ECO-P4.

68.6 Landscapes and natural character

Provisions identified as relevant:

HDP: Objective 3.1.1, Objective 3.3.1, Policy 3.1.3, Policy 3.1.6, Policy 3.1.7, Policy 3.3.3, Policy 3.3.4, Policy 3.3.5, Policy 2.1.2

KCDP: Objective DO-09, Policy NE-P1, Policy NFL-P2

These provisions seek to protect Outstanding Natural Landscapes, and Special Amenity Landscapes, from inappropriate subdivision, use and development. In an overall sense the Project is consistent with these provisions because the route selection process has largely avoided affecting any areas classed as an Outstanding Natural Feature or Landscape, or any High Amenity Landscapes. The exception is the Manakau Downlands Landscape Domain in the Horowhenua District that is noted as having High Landscape Amenity (addressed further in Landscape, Visual and Natural Character - Technical Assessment D to this report).

Due to the waterways being crossed by the Project in the Horowhenua District, Objective 3.3.1 which seeks to protect the natural character of lakes, rivers and other water bodies and their margins, from inappropriate use, and development is also relevant. Policies 3.3.3 – 3.4.5 that stem from Objective 3.3.1 elaborate further and cumulatively require:

i. management of the design, location and scale of subdivision and/or land development and use adjoining lakes, rivers, wetlands and other water bodies so they retain their special values and natural character

ii. that the adverse effects on the natural character and special values of lakes, rivers, wetlands and other water bodies are avoided or mitigated through establishing setbacks for activities and buildings that may cause adverse effects

iii. that subdivision, use and development protects the natural character of lakes, rivers, wetlands and other water bodies and maintain and enhance their special values by having regard to the following matters in assessing proposals:

- Extent to which natural processes, elements and patterns that determine the area's natural character are sustained, and/or restored and rehabilitated;
- Degree of change to landform and relief;
- Degree of protection of vegetation cover and patterns, including use of a buffer;
- Compatibility with existing level of modification to the environment;
- functional necessity to be located in or near the water body and no reasonably practicable alternative locations exist;
- Ability to mitigate any potential adverse effects of subdivision, use, and development; and
- Provision of public amenity and access to land acquired by Council for reserve purposes.

Of relevance to the above provisions regarding waterways, Landscape, Visual and Natural Character - Technical Assessment D explains that:

> *"The selection of an eastern route also substantially avoids potential adverse natural character effects by avoiding areas with significant natural character values in the western part of the districts. The river, streams and wetlands crossed by the highway range between low-moderate and moderate-high natural character value. I consider the natural character in each of the six main river or stream catchments will be maintained having regard to existing natural character, the modified context, the functional need for the highway to cross the water bodies, the consequentially unavoidable effects of the highway on perceptions of naturalness in the vicinity at such locations, and measures proposed to rehabilitate and restore the natural characteristics and*

> *qualities. The proposed measures will continue to increase the natural character of the main streams over time* ".

The proposed landscape and natural character mitigation measures, including those also relied on by different disciplines, are bought together and co-ordinated through the CEDF. The draft CEDF is provided in Appendix Three to this report.

Landscape, Visual and Natural Character - Technical Assessment D concludes that:

> "*..the potential adverse landscape, visual, and natural character effects have been avoided to a substantial degree by the selection of the proposed route. Measures proposed to address the unavoidable remaining adverse effects, coordinated into a whole-of-landscape approach through the CEDF, will effectively mitigate such effects and contribute some positive landscape outcomes. I consider this to represent a best practice approach to integrating a new highway into the landscape* ."

As a result, the Project is consistent with all of the HDP and KCDP objectives and policies referenced above with regards to the natural character of rivers and other water bodies and their margins.

The positive outcomes that will be produced by the landscape and natural character treatments and planting must be had regard to under HDP Policy 3.1.6.

68.7 Natural hazards

Provisions identified as relevant:

HDP: Objective 8.1.1, Objective 8.2.1, Policy 8.1.4, Policy 8.1.5, Policy 8.1.6, Policy 8.1.7, Policy 8.1.8, Policy 8.1.9, Policy 8.1.13, Policy 8.2.2, Policy 8.2.3

KCDP: Objective DO-05, Policy NH -P2, Policy NH-P3, Policy NH-P4, Policy NH-FLOOD-P12

The relevant HDP provisions seek that adverse effects of natural hazards on people, property, the environment and the well-being of communities are avoided or mitigated, and that development that does not significantly worsen the risk of occurrence or the severity of natural hazards by generally avoiding the placement of critical infrastructure in hazards areas unless there is a functional necessity for the infrastructure to locate in that area.

The KCDP provisions seek to ensure the safety and resilience of people and communities by avoiding exposure to increased levels of risk from natural hazards, and for a precautionary approach to be undertaken where there is uncertainty about the potential effects and where the effects are potentially significantly adverse.

The Project unavoidably traverses a number of floodplains and waterways in the Horowhenua District that will be subject to inundation in a 1 in 200 year (0.5% AEP) flood event. However, as explained in Hydrology and Flooding - Technical Assessment F, the location of the proposed designations in combination with the implementation of best practice hydraulic design of structures, means that the Project itself is unlikely to be adversely affected by floodwaters or other natural hazards. There will be no discernible increases in flood levels or cumulative effects passed downstream of structures, while any adverse effects generated upstream of structures and culverts will be less than minor.

In terms of climate change, the effects of flooding have been assessed using a model adjusted for predicted climate change, as further explained in Hydrology and Flooding - Technical Assessment F. Furthermore, the Project has been designed in accordance with all relevant best practice guidelines, and a precautionary approach to the effects of climate change has been adopted.

The Project will provide a state highway and overall roading network that is significantly more resilient to natural hazard risks and climate change impacts than the existing network.

Overall the Project is consistent with the natural hazard objectives and policies referenced above.

68.8 Contaminated land

Provisions identified as relevant:

HDP: Objective 9.2.1, Policy 9.2.3, Policy 9.2.4, Policy 9.2.5

HDP Objective 9.2.1 seeks to avoid, or mitigate the risk of adverse effects from the subdivision, use, redevelopment or remediation of contaminated and potentially contaminated land on human health and the environment, while Policy 9.2.3 requires development sites that have a history of land use that could have resulted in contamination of the soil to undertake a preliminary site investigation to confirm whether further investigation, remediation or management is required, to ensure that the land is suitable for the intended exposure to humans and the environment. Policies 9.2.4 and 9.2.5 seek to ensure that when land that is contaminated is redeveloped that management measures are put in place to ensure that the land is remediated to a standard consistent with its proposed end use.

Consistent with the above provisions a Preliminary Site Investigation has been undertaken along the route of the proposed designations. Only one site recorded on the HAIL register is directly affected by the Project. A Detailed Site Investigation of that site, and any others that may subsequently be deemed necessary if more information comes to hand as part of the land acquisition process, will be undertaken to support the obtaining of consents under the NES-CS during the detailed design phase of the Project. As a result the Project is consistent with the objectives and policies listed above.

As no land directly affected by the Project that is potentially contaminated has been identified in the Kapiti Coast District, the contaminated land provisions of the KCDP are not relevant.

68.9 Infrastructure, access and transport

Provisions identified as relevant:

HDP: Objective 10.1.1, Objective 10.2.1, Objective 10.3.1, Policy 10.1.3, Policy 10.1.4, Policy 10.1.6., Policy 10.1.7, Policy 10.1.8, Policy 10.1.5, Policy 10.1.4, Policy 10.1.13, Policy 10.2.2, Policy 10.2.3, Policy 10.3.12

KCDP: Objective DO-013, Objective DO-014, Policy INF-PNU-P16, Policy INF-GEN-P1, Policy INF-GEN-P2, Policy INF-GEN-P3, Policy INF-GEN-P4, Policy INF-GEN-P9, Policy INF-MENU-P18, Policy TR-P4

Once the new highway is open, a significant decrease in the number of death and serious injury crashes on the existing state highway network in the area will occur, along with a similarly significant decrease in the number of crash related closures on the state highway network. Travel times will decrease and opportunities for people to use alternative travel modes will be enhanced.

Given the above, the Project is consistent with and strongly supported by all of these Objectives and Policies for the following reasons:

- confirming the designations and resource consents for the Project will recognise its national, regional and local benefits (KCDP Objective DO-013 and Policy INF-GEN-P1);
- it will enhance the ability of the land transport network to efficiently and safely move people and goods to meet current and future needs, while enhancing resilience of the transport network (HDP Objective 10.1.1,Policy 10.1.5 and Policy 10.1.13, KCDP Objective DO-013 and DO-014);
- safe and convenient road access for the community will be created (HDP Policy 10.1.3 and KCDP Objective DO-014);
- it will provide for a land transport network that is safe, convenient and efficient, and which avoids, remedies or mitigates adverse effects to maintain the health and safety of people and communities, and the amenity and character of the environment (HDP Objective 10.2.1 and KCDP Policy TR-P4);
- designation of the route for the Project, with all of its enduring safety and efficiency benefits, will allow for it to be protected from the adverse effects of land use activities, subdivision and development (HDP Objective 10.3.1) and will signal to subdivision and land use that adjoin the designations in the

future that such activity needs to take measures to protect itself from the effects of the Project (HDP Policy 10.3.12, KCDP Policy INF-GEN-P2);

- it has avoided, remedied, mitigated or (where mitigation is impracticable) offset any adverse effects on the natural and physical resources, sensitive areas, and amenity and landscape values of the Districts (HDP Policy 10.2.2, KCDP Policy INF-Gen-P4 and P9), and will ensure the mauri of natural systems will be maintained and enhanced (KCDP Policy INF-Gen-P3);
- stormwater will be managed via a best practice treatment train approach to avoid adverse effects both during construction and operation of the Project (KCDP Policy Inf-Menu-P18);
- it has been designed to meet or exceed all applicable design standards, including safety, geometrics, drainage, lighting, noise, landscaping and signage (HDP Policy 10.1.6 and Policy 10.1.7);
- the provision of the SUP, and its integration with compatible existing and future walking and cycling links, will support the opportunity for people to use non-vehicular transportation modes (HDP Policy 10.1.4);
- lighting of the highway and the SUP will be provided where it passes through urban areas (HDP Policy 10.1.8);
- the content of the assessment criteria set out in Policy INF-PNU-P16 of the KCDP have been addressed through the various technical reports for the Project and the Project is generally consistent with those assessment criteria.

68.10 Network utilities

Provisions identified as relevant:

HDP: Objective 12.1.1, Policy 12.1.2, Policy 12.1.3, Policy 12.1.4, Policy 12.1.5, Policy 12.1.6, Policy 12.1.8

KCDP: Objective DO-013, Policy INF-GEN-P1

These provisions cumulatively seek to ensure that the establishment, maintenance and upgrading of essential network utilities is enabled, while also requiring the adverse effects of network utilities to be avoided, remedied or mitigated and the health and safety of the community to be safeguarded. These provisions are relevant to the Project because the Project is in itself a network utility (given that Waka Kotahi is a network utility operator as defined by the RMA) and because there are other network utilities present in the Project area.

The Project is consistent with these provisions because:

- it largely avoids adverse effects on existing network utilities, and will effectively manage any construction related effects on those other network utilities through liaison with the relevant network utility operator(s); and
- confirming the Notices of Requirement and granting the consents sought for the Project will enable the establishment and operation of the new highway as an essential network utility, which will improve the health and safety of road users compared to the current situation; and
- the actual and potential adverse effects of the Project will be avoided, remedied or mitigated and where they cannot be mitigated will be offset and compensated for.

68.11 Community and economy

Provisions identified as relevant:

KCDP: Objective DO-015, Objective DO-017,

The Project will generate positive economic effects, especially through its long-term stimulus to growth, as well as during the construction phase. This is consistent with Objective DO-015. The SUP and its

linkage to the SUP that is part of the PP2Ō expressway will allow for greater opportunity for community activity and access to open spaces in a manner consistent with Objective DO-017.

68.12 Public access to waterbodies

Provisions identified as relevant:

HDP: Objective 4.2.1

Objective 4.2.1 of the HDP requires the maintenance and enhancement of public access to and along the coast, rivers, lakes and streams, at appropriate locations while preserving the natural character, cultural values and other values of these water bodies and their margins, and where the need for the protection of sites and areas of significance to Tangata Whenua is taken into account.

The Project is consistent with this Objective as the SUP will allow for enhanced public access across the waterbodies, which will contribute to people's appreciation of their natural qualities and values. In places there may be opportunity for public access to the waterbodies themselves to be created as legacy outcomes from the Project depending on final design and land acquisition outcomes.

68.13 Cross boundary issues

Provisions identified as relevant:

HDP: Objective 14.1.1, Policy 14.1.2

These HDP provisions seek to ensure that resource management issues that cross District boundaries are addressed in an integrated manner through co-operation with adjoining authorities.

While there are no objectives and policies in the KCDP that specifically address cross-boundary issues, the KCDP does (pursuant to Section 75(2)(f) of the RMA) state the process that will be used to deal with issues that cross territorial boundaries.

The Project is consistent with the relevant provisions in both District Plans given the pre and post lodgement engagement that has occurred with all the relevant authorities, the integrated approach adopted to the assessment of the effects of the Project, and as evidenced by the coordinated processing of the Notices of Requirement and resource consent applications.

68.14 HDP PC 4 (Tara-Ika)

HDC decisions on PC 4 were publicly notified on 04 July 2022. Appeals have been lodged in respect of the Council's decision on PC4, on a range of matters. PC4 cannot yet be given full weight in the statutory assessment of the Project. The provisions addressed below are the Council decision versions of the PC4 provisions.

PC 4 is predicated upon a Structure Plan (HDP Ref SP013) for the Tara-Ika growth area. The Structure Plan sets various zonings that apply in Tara-Ika, as well as Primary Features such as Arterial Road routes and Secondary Features such as local roads and reserves. Of relevance to the Project is that the Tara-Ika Structure Plan shows a "Ōtaki to North Levin Corridor" in the same location as the route on which designation is sought for the Project.

Provisions identified as relevant:

Objective 6A.1, Objective 6A.2, Objective 6A.3, Policy 6A.1.1, Policy 6A.1.3, Policy 6A.1.10, Policy 6A.2.2, Policy 6A.2.3, Policy 6A.3.1, Policy 6A.3.2

The Project is consistent with all of these Objectives and Policies for the following reasons:

- the route for the Project is consistent with the corridor for the Project shown on the Tara-Ika Structure Plan (Objective 6A.1 and Policy 6A1.1).
- confirming the designation and granting the resource consents will contribute to creating a well-connected, safe and efficient transport network for all modes at Tara-Ika, including through providing

appropriate connections to the Project from the Tara-Ika primary roading network and to the SUP from the Tara-Ika walking/cycleway network (Objective 6A.1, Policy 6A.1.1).

- development of the Project has been undertaken in partnership with tangata whenua (including Muaūpoko) and thus acknowledges and incorporates Muaūpoko values, including in proposed accidental discovery protocols to be observed during construction works (Policy 6A.1.3).
- confirming the designation and granting the resource consents will, in conjunction with the equivalent authorisations sought concurrently by HDC for the Tara-Ika east-west arterial where it crosses the Project, allow efficient and coordinated provision of the transport and stormwater network in Tara-Ika where those networks interact with the Project (Objective 6A.2, Policy 6A2.2, Policy 6A2.3).
- groundwater effects are largely avoided, stormwater management and treatment methods to be implemented allow for the likely effects of climate change, and will be able to be integrated with stormwater management measures implemented for development in Tara-Ika to ensure there are no adverse effects on downstream environments and ecosystems (Objective 6A.3, Policy 6A3.1, Policy 6A3.2).
- stormwater management and treatment methods have been developed in partnership with Muaūpoko as kaitiaki, and in way that recognises and provides for te mana o te wai (Policy 6A3.3).

69 Other relevant plans and strategies

There are a number of other localised plans and strategies that are relevant to the Project as summarised in Table 69-1 below.

Table 69-1 – Other relevant plans and strategies

Plan/strategy	Consideration
Taitoko/Levin town centre plan (2018)	The Town centre plan notes that while the advent of the "State Highway Bypass" will remove some potential for business patronage in the town centre from state highway traffic, this is balanced with the opportunities that removal of state highway traffic (particularly heavy vehicles) from the town centre will have in terms of redesigning Oxford Street to create a more pedestrian and cyclist friendly town centre with the potential for use of low impact stormwater design measures.
Horowhenua growth strategy 2040	This strategy notes that the project is significant for growth in the District, both for how Levin might develop and for Ohau and Manakau. The Project will create opportunities for further development in the District. The Strategy also identifies potential for cycling to serve as a mode of transport (as opposed to a form of recreation) in the District. The Project will contribute to the potential for this mode shift to be realised through provision of the SUP.
Horowhenua integrated transport strategy (2020)	The Ō2NL project is listed as a key development Priority in the HITS. As a result the HITS sets out that Council will proactively engage with Waka Kotahi and support the Ōtaki to North of Levin Project which will improve north-south access through the Horowhenua District, and present a significant opportunity to regenerate the Levin Town Centre.

Plan/strategy	Consideration
Horowhenua infrastructure strategy 2021-2051	This strategy notes that the Ō2NL Project once opened will generate significant changes to traffic demand across the local road network, meaning that Council needs to undertake a staged programme of local network upgrades between 2021 and 2029 when the Ō2NL project is programmed to open.
Horowhenua long term plan 2021-2041	The Long Term Plan recognises the Ō2NL Project by funding the roading improvements identified in the Horowhenua Infrastructure Strategy that arise from the Ō2NL project.
Kapiti Coast cycleways, walkways and bridleways strategy (2009)	While this Strategy is dated, the Project is consistent with it through provision of the SUP which will link to the SUP on the Peka Peka to Ōtaki project.
Te tupu pai/growing well – Kapiti Coast growth strategy (2022)	One of the objectives of Te tupu pai/growing well is to develop Ōtaki as the northern centre of the Kapiti Coast District. In combination with the Peka Peka to Ōtaki project, the project will contribute toward achieving this objective by providing better access to and from Ōtaki.

70 Transport-related plans and policies

70.1 Government Policy Statement on Land Transport 2021

The Government Policy Statement on Land Transport 2021 (GPS) sets priorities, objectives, long, medium and short-term results, and ranges of funding for activity classes to guide decision makers on where and how to prioritise investment.

The GPS 2021 has four strategic priorities:

- safety – New Zealand roads will be made substantially safer;
- better travel options - improve people's transport choices in getting to places where they live, work and play;
- improved freight connections – to support economic development;
- climate Change - transforming to a low carbon transport system that supports emissions reductions aligned with national commitments, while improving safety and inclusive access.

In this case the Project has NZUP funding and as a result is delivered separately from the GPS. NZUP funding recognises that the Project will contribute not only to transport but also wider outcomes. Nevertheless, the Project is generally aligned with the GPS 2021 priorities for the following reasons:

(i) The number of deaths and serious injuries experienced on the existing SH1 alignment will be significantly reduced once the project is operational, and users of the project will be able to travel on a highway designed to the latest safety standards, thus creating a significant safety benefit to road users.

(ii) Transport choices will be facilitated by the Project through the maintenance of connections to the local road network, provision of the SUP (which in turn links to the SUP already provided by the M2PP and PP2O projects), and the improvement in

performance of the overall roading network, which in turn will create better opportunities for bus services to be provided to serve the area.

(iii) It will provide a safe, efficient and resilient route for road freight transport both within the region and for inter-regional movements (for example, south to the Cook Straight Ferries), which will support economic activity.

(iv) It will contribute to mode shift in Levin through provision of the SUP, and infrastructure necessary to give full effect to the Tara-Ika growth area which will allow for a greater proportion of people resident in the urban area to live in closer proximity to where they work, live and play.

(v) a reduction in embodied emissions resulting from construction is being pursued.

70.2 National Land Transport Programme (NLTP)

The NLTP gives effect to the strategic direction and funding allocations in the GPS 2021. It sets out an investment programme to deliver on the government's four strategic priorities in the GPS 2021 as set out above.

The NLTP notes that the provision of the Project (NZUP funded) will provide a safer and more resilient route, support growth in Levin, and support reliable freight connections.

Funding for state highway safety improvements to compliment the implementation of the project is confirmed in the NLTP as one of the key projects for the Manawatū-Whanganui Region.

70.3 Horizons Regional Land Transport Plan 2021-2031 (RLTP)

The Horizons RLTP is the primary document guiding integrated land transport planning and investment within the Manawatū-Whanganui Region. It sets out the strategic direction for land transport in the region over the next 10 years and describes what the region seeks to achieve in order to contribute to an effective, efficient and safe land transport system. In addition to outlining the strategic direction for the region, the Plan also outlines the activities proposed to deliver the strategic direction.

The Project is identified in the Horizons RLTP as a priority investment area, and a priority project in the Manawatu-Whanganui Economic Recovery Strategy (developed as a plan for economic recovery in response to the COVID-19 pandemic).

Because the Project is NZUP funded it does not appear as a funded project in the RLTP, however $3 million of funding for local road upgrades to enable the implementation of the Project is confirmed in the RLTP as the number 2 regional priority.

70.4 Wellington Regional Land Transport Plan

The WRLTP contains no direct reference to the Project (which is mostly located outside the GWRC region). Nevertheless, the Project is a continuation of the wider Wellington Northern Corridor improvements, and as such is consistent with the WRLTP investment priorities of travel choice, strategic access, safety, and resilience.

70.5 Summary against transport related plans and policies

Confirmation of the notices of requirement and resource consents sought for the project would be entirely consistent with all of the transport related plans and policies set out above.

71 Summary of relevant planning documents

The transport strategies and plans relevant to the Project identify and reinforce the need for the project to occur to assist in improving safety and resilience, facilitating coordinated urban growth, and ensuring efficient freight movements. To that end, the Project is consistent with the Government Policy Statement on Land Transport (GPS) 2021, the National Land Transport Programme, the Horizons RLTP (where it is identified as a priority investment area, and a priority project in the Manawatu-Whanganui Economic Recovery Strategy developed as a plan for economic recovery in response to the COVID-19 pandemic) and the Greater Wellington RLTP.

The requirement to recognise the national, regional and local benefits of the Project in making decisions on the Notices of Requirement and resource consent applications is embedded in the One Plan (RPS and Regional Plan provisions), the GWRC RPS and the GWRC Natural Resources Plan, and both the Horowhenua and Kapiti Coast District Plans. Those provisions lend very strong support to the Project.

The Project generates a range of adverse effects, many of which are associated with the construction of the Project, such as those relating to sediment, earthworks, noise, dust, water diversions, and works in a waterbody or stream bed, and as a result are temporary in nature. The relevant regional and district plans are consistent in seeking that these types of effects are avoided where practicable, or otherwise remedied, mitigated, and in some cases offset. These temporary construction effects will be managed and mitigated through a range of management measures (to be required by conditions and detailed through Management Plans). As a result, the Project is consistent with the relevant objectives and policies of all the relevant policy statements and plans.

Furthermore, in terms of operational effects, the Project has largely avoided a range of potential long-term adverse effects, such as on stormwater runoff, flooding, other natural hazards, and water quality through the design of the Project and associated control measures, such as stormwater treatment.

Given the natural environment that the Project traverses, characterised by a number of waterways and associated floodplains to be crossed, one of the key potential effects of the Project is on freshwater and terrestrial ecological values. In that regard, the route selection and consideration of alternatives process resulted in the route for the Project largely avoiding areas of significant terrestrial vegetation and ensuring waterway crossing points are at optimal locations. Nevertheless, a small number of natural wetlands are directly affected by the Project and extensive instream works (culverts and diversions) are required.

Clause 3.22b of the NPS-FM allows for adverse effects on natural wetlands to be authorised where the relevant regional council is satisfied that the specific exceptions in the policy are met. The Project meets the exceptions requirement of the NPS-FM policy, and of the key Horizons One Plan and GWRC Natural Resources Plan objectives and policies that import the exceptions of the NPS-FM, as follows:

- the activity that affects the wetlands is necessary for the construction of the project that meets the definition of specified infrastructure; and
- the project will generate regional and national benefits; and
- there is a functional need for the project to be located and operate in, and traverse, the affected wetland environments; and
- the effects management hierarchy has been applied to the management of the effects of the activity (as set out in more detail in Terrestrial Ecology - Technical Assessment J)). A key component of the proposed effects management package is offsetting the unavoidable loss of extent and value of natural wetland with measures that enhance the quality and extent of wetland environments elsewhere in the project area.

The NPS-FM seeks that loss of river extent and values is avoided unless functional need can be demonstrated and the effects management hierarchy is implemented. Those requirements have been met, as described above and in Freshwater Ecology – Technical Assessment K.

The Project is consistent with the natural wetland and rivers provisions of the NPS-FM.

In terms of other components of the NPS-FM, the Project:

- gives effect to the obligation hierarchy of Te Mana o te Wai through the partnership with tangata whenua, the route selection process, the concept design and the application of the effects management hierachy; and
- will maintain and enhance fish passage through the use of best practice design of instream structures and diversions; and
- will not generate discharges of the type that will contribute to adverse water quality in the relevant catchments and thus be potentially inconsistent with future outcomes sought for the Freshwater Management Units the project traverses.

On the basis of all the above, granting the consents necessary to authorise the project works within the affected wetlands and waterways would be consistent with the NPS-FM and the respective regional and district policy and provisions.

In terms of the NPS-UD, the Project will contribute to a well-functioning urban environment through (amongst other things) enabling full urban development of the Tara-Ika Growth Area at Levin (and other areas identified for urban growth by HDC) by providing additional capacity on both the local and strategic roading network, and ensuring that key urban amenity effects, particularly operational highway noise and visual matters, will be mitigated to minor levels.

The Project is strongly aligned with the relevant district plan provisions. The only exception, on an absolutist / strict reading, is that the Project is inconsistent with the relevant objectives and policies of the Horowhenua District Plan in terms of its effect on highly versatile soils, which the District Plan seeks to retain for productive use. However, the Project is consistent with the very recent NPS-HPL, which should take precedence over the HDP provisions. Furthermore, any effects on productive soils must (as directed by other objectives and policies in the District Plans and in relevant higher order RMA plans and policy statements) be viewed in light of the benefits that the Project will produce.

Finally, any inconsistency with District Plan policies on a confined matter must be considered in light of the objective and policy framework for significant infrastructure as set out in the Horizons RPS, particularly Policy 3-3 that directs that the significant benefits of the Ō2NL Project must be taken into account, and the adverse effects of establishing the Ō2NL Project are to be managed specifically in accordance with the framework set out in Policy 3-3.

72 Statutory considerations relevant to the proposed designations

Waka Kotahi/NZ Transport Agency holds requiring authority status pursuant to section 167 of the RMA. Section 168 of the RMA provides the power for a requiring authority to issue a Notice of Requirement for designation to the Territorial Local Authority having jurisdiction for the area within which the designation is sought. Accordingly, Waka Kotahi has issued a Notice of Requirement for the Project to both HDC and Kapiti Coast District Council.

Section 171 of the RMA applies to the Notices of Requirement issued by Waka Kotahi.

Pursuant to section 171(1) of the RMA, when considering a requirement, a territorial authority must, subject to Part 2 of the RMA, consider the effects on the environment of allowing the requirement, having particular regard to:

"(a) any relevant provisions of:

(i) a national policy statement:

(ii) a New Zealand coastal policy statement:

(iii) a regional policy statement or proposed regional policy statement:

(iv) a plan or proposed plan; and

(b) whether adequate consideration has been given to alternative sites, routes, or methods of undertaking the work; if-

(i) the requiring authority does not have an interest in the land sufficient for undertaking the work; or

(ii) it is likely that the work will have a significant adverse effect on the environment; and

(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought; and

(d) any other matter the territorial authority considers reasonably necessary in order to make a decision on the requirement."

Part I of this report addresses the relevant policy statements and plans as required by section 171(a).

The remaining s171 matters are addressed in the following sections of this report.

72.1 Adequate consideration of alternatives (section 171(1)(b))

Section 171(1)(b) requires the territorial authority, when considering a NoR, to have particular regard to whether adequate consideration has been given to alternative sites, routes and methods for undertaking the work (where the requiring authority does not have an interest in the land sufficient for undertaking the work, or the work is likely to have a significant adverse effect on the environment).

This entails the territorial authority considering whether a requiring authority has given adequate (and not arbitrary or cursory) consideration to alternatives. The inquiry focuses on the process followed to consider alternatives, rather than the outcome; in particular, the RMA does not require the 'best' or 'most preferred' option (if any) to be selected.

The process by which Waka Kotahi has considered alternative sites, routes and methods for the Project is explained in Part E of this report and has involved:

- identifying a broad range of alternative route corridors to be assessed, both to the west and to the east of Levin
- implementing a consistent and replicable MCA process with inputs from tangata whenua, stakeholders and technical specialists which considered a long list of alternative corridors, then a short list derived from the long list MCA, and a range of sub-options for various intersection/interchange forms (eg Queen Street East)
- selecting a preferred route corridor and developing a proposed designation within that corridor, involving further analysis using increasingly comprehensive information
- as part of this systematic consideration, assessing effects on landowners, social and other environmental effects, key RMA considerations and relevant statutory planning instruments, alignment with Project objectives, and strategic considerations such as integration with planned urban landuse.

The alternatives consideration process was robust, comprehensive and iterative, and included significant engagement with stakeholders and assessments undertaken by independent technical experts.

As such the process clearly meets the relevant statutory test in section 171(1)(b).

72.2 Reasonably necessary to achieve objectives (section 171(1)(c))

Section 171(1)(c) of the RMA provides that when considering a NoR a territorial authority must have particular regard to "whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought".

In the context of section 171(1)(c), 'reasonably necessary' is to be understood as requiring something less than 'absolutely necessary' or essential. It is also important to note that, as a requiring authority, Waka Kotahi is able to establish its own priorities and objectives in relation to the state highway network.

The Ō2NL Project objectives respond directly to the well identified safety and resilience problems associated with the existing SH1 alignment, and also recognise the setting of the Project in an area experiencing urban growth and development. The Ō2NL Project objectives are:

- to enhance safety of travel on the state highway network.
- to enhance the resilience of the state highway network.
- to provide appropriate connections that integrate the state highway and local road network to serve urban areas.
- to enable mode choice for journeys between local communities by providing a north-south cycling and walking facility.
- to support inter-regional and intra-regional growth and productivity through improved movement of people and freight on the state highway network.

Once operational, the Project is expected to save approximately 25-30 DSIs per 5-year period following its opening. This is primarily achieved by attracting through traffic off substandard sections of the existing SH1 and SH57 and shifting them to a high quality, median divided road.

In terms of resilience, the number of crash related closures on the state highway network is expected to drop by over 50% with the opening of the new highway. The Project will provide a significantly shorter new highway route, constructed to a high standard including in terms of addressing natural hazard risk. The old highway will be retained as an alternative route, adding redundancy to and increasing the resilience of the network.

The above factors, along with the provision of appropriately designed connections to the local road network, will improve the movement of people and freight on the state highway network.

The SUP will provide a north-south walking and cycling facility along the full length of the Project.

Based on the above, the work is clearly necessary to meet the Project objectives.

The use of designations to provide for the Ō2NL Project is considered reasonably necessary to achieve Waka Kotahi's objectives on the basis that a designation:

- protects the land from development that might prevent or hinder the construction and operation of the Project; and
- provides certainty that the Ō2NL Project can be maintained and operated efficiently in the future; and
- provides certainty to the community in relation to the nature of the work and the location of the Ō2NL Project.

72.3 Other matters (section 171(1)(d))

Section 171(1)(d) of the RMA provides that, when considering a NoR, a territorial authority must have particular regard to "*any other matter the territorial authority considers reasonably necessary in order to make a recommendation on the requirement*". 'Other matters' that may be identified as relevant are typically other statutes (such as those identified in Part D) and non-RMA planning documents.

Those matters that might be considered to fall within section 171(1)(d) are described briefly in Table 72-1 below and at section 69 of this report (with regard to local government plans and policies).

Table 72-1 – Other relevant matters

Other matter	Consideration
Other statutes	
Land transport management Act 2003	The project is consistent with Waka Kotahi's legislative purpose and the purpose of the LTMA as the Project provides an effective, efficient and safe state highway route from Ōtaki to north of Levin.
Government roading powers Act 1989	The giving of the notices of requirement and lodgement of the resource consent applications for the project are consistent with the powers of the government under this Act.
Railways Act 2005	The purpose of the Railways Act 2005 is to promote the safety of rail operations and manage the rail corridor. The Act is relevant because the main highway component of the Project crosses the NIMT and ancillary part of the Project works requires the closure of an existing level crossing at Tararua Road in Levin and the establishment of a new crossing in the vicinity. The Project is consistent with the Act as the NIMT is designated in favour of KiwiRail and Waka Kotahi will need to gain approval from Kiwirail as incumbent requiring authority under s177 of the RMA for the Project works affecting the NIMT. This will ensure that all new crossings of the NIMT constructed as part of the Project will be safe and efficient.
Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA)	While no known or recorded archaeological sites will be damaged or destroyed during construction of the Project, it is anticipated that unidentified sites may be within the footprint of the works for which designation and resource consents are sought. For this reason, Waka Kotahi will be separately seeking an Authority under section 44(a) of the HNZPTA.
Reserves Act 1977	The project directly affects two parcels of land gazetted under the Reserves Act 1977 – both in the vicinity of the Ohau River crossing point. One of the parcels has reference on its historical title to Crown reservations for marginal strips under s 58 of the Land Act 1948, while the other is a "hydro" parcel - that is, a Crown owned parcel without appellation or title located in the former location of the main channel of the Ohau River. As such, neither parcel is the subject of any Reserve Management Plans that need to be had regard to, and any implications of the status of the parcels will be resolved through the land acquisition and legalisation process.
Wildlife Act 1953	The project has effects on areas of ecological value and the Wildlife Act is, therefore, relevant such that the Project will require an authorisation(s) given by the Director-General of Conservation under section 53 of the Wildlife Act for the

Other matter	Consideration
	disturbance of any protected wildlife. It is anticipated that any such authorisation will require management plan(s) similar to the EMP required by the proposed designation and consent conditions.
The Freshwater Fisheries Regulations 1983	These regulations under Section 48A of the Conservation Act 1987, require that fish passage be provided for freshwater and sports fish. The regulations give the Director-General of Conservation a decision-making role in relation to fish passage when facilities such as new or modified culverts, dams, weirs and diversions on natural waterways are proposed. The Department of Conservation uses the RMA processes to comment on the effects of instream structures and activities. Where it is satisfied that appropriate conditions relating to fish passage have been proposed, any additional permission under the FFE is at its discretion. The design philosophy for the Project is that fish passage is provided except for some culverts on ephemeral flow paths where no fish are present, and no viable habitat exists upstream.

72.4 Positive effects on the environment to offset or compensate for adverse effects (section 171(1B))

As described in Part G, and as set out in Terrestrial Ecology - Technical Assessment J, a comprehensive offset and compensation package is proposed to address residual adverse effects on terrestrial and wetland ecology values. That package will result in an overall terrestrial and wetland biodiversity gain.

Freshwater Ecology - Technical Assessment K explains that the residual adverse effects of the Project on freshwater ecology (permanent habitat loss and modification) will be offset where they are not able to be managed at the site of impact. This is to be achieved with riparian fencing and revegetation at other locations in the affected catchments. This will result in (at worst) no net loss in freshwater ecology function across the Project, and a net gain in some instances (eg where new culverts to be installed by the Project replace older culverts that currently form a barrier to fish passage).

72.5 Outline plans (section 176A)

This section requires that an outline plan of the Project must be submitted by Waka Kotahi to HDC and KCDC to allow each Council to request changes prior to the works commencing.

S176A(2) sets out the situations when an Outline Plan need not be submitted, as follows:

(a) the proposed public work, project, or work has been otherwise approved under this Act; or
(b) the details of the proposed public work, project, or work, as referred to in subsection (3), are incorporated into the designation; or
(c) the territorial authority waives the requirement for an outline plan

Clause (a) and (b) above are not applicable as a detailed design for the Project is not yet available. Clause (c) is relevant to the extent that Waka Kotahi seeks an Outline Plan waiver for establishment works as discussed previously in Part H of this report..

Waka Kotahi will provide an outline plan or plans to HDC and KCDC prior to commencement of construction works as required by s176A.

73 Statutory considerations relevant to the applications for resource consents

The matters to which a consent authority may, must and must not have regard in its consideration of an application for resource consent are stipulated under section 104. That consideration is subject to the provisions in Part 2, and other relevant matters for consideration are set out in sections 104D, 105, 107 and 108 of the RMA.

Sections 123 and 125 relate to consent durations and lapse periods.

The following sub-sections consider the Project against this RMA framework.

73.1 Particular restrictions for non-complying activities (section 104D)

Section 104D is relevant to assessment of the resource consent applications given the bundling approach taken to determining the overall non-complying status.

In determining an application for a non-complying activity, the decision maker must first consider whether one of the two tests under section 104D of the RMA can be met. In summary, an application for a non-complying activity can only be granted if:

- the adverse effects of the activity on the environment will be minor (section 104D(1)(a));
- or
- the application is for an activity that will not be contrary to the objectives and policies of relevant plans and proposed plans (section 104D(1)(b)).

Part G of this report includes an assessment of actual and potential effects on the environment that is supported by a number of technical assessments and reports included in Volume IV. Those assessments demonstrate that some of the adverse effects of the Project are more than minor. On that basis, the Project does not pass the section 104D(1)(a) effects gateway test.

In order to pass the second gateway test under section 104D(1)(b), the Project must demonstrate that it is not contrary to the objectives and policies of relevant plans or proposed plans.

Considering the application in respect of section 104D(1)(b) is a test of whether the application is "contrary" to relevant objectives and policies following a balanced assessment of the objectives and policies of a plan as a whole. The word "contrary" is understood as meaning opposed in nature, different, or opposite to. An absence of support is not sufficient to meet the test of "contrary" and therefore, an activity need not be consistent with every objective or policy.

This report assesses the relationship of the Project to the relevant objectives and policies of the following:

- Horizon's One Plan (Regional Policy Statement and Regional Plan),
- GWRC Regional Policy Statement,'
- GWRC Proposed Natural Resources Plan ("PNRP"),
- Horowhenua District Plan ("HDP"), and
- Kapiti Coast District Council District Plan ("KCDC DP").

The assessment of the proposal against the objectives and policies of the relevant plans set out in Part I of this report finds the proposal to be consistent with the vast majority of the relevant objectives and policies in all of the plans assessed.

Therefore, the applications pass the section 104D(1)(b) "objectives and policy" test.

73.2 Actual and potential effects on the environment (section 104(1)(a))

The actual and potential effects associated with allowing the activities for which resource consents are sought have been described and assessed in Part G of this report.

The environmental effects associated with the activities to be authorised by resource consent (earthworks, clearance of vegetation that is ecologically significant, stream diversions, culvert placement and stream infilling, wetland disturbance), and various discharges (during construction and operation)) are all able to be appropriately managed through the mitigation (and in some cases offset/compensation) measures set out in Part G and in the suite of technical assessments, and as reflected in the proposed consent conditions.

These activities are required in order to enable the Project, and as such the effects of allowing these activities include the significant positive effects associated with the Project as a whole.

The adverse effects of allowing the activities are appropriately managed, as described in Section H, by:

- avoiding effects, where practicable, through the design refinement that has occurred and by imposing standards and 'effects envelopes' in proposed conditions of consent;
- remedying and mitigating effects that are not avoided, including through the implementation of a range of management measures described in Part G and those embedded in proposed conditions of consent; and
- offsetting or compensating for residual adverse effects and other ecological values that cannot reasonably be avoided, remedied or mitigated to result in a net indigenous biological diversity gain for terrestrial ecology values and at least a no net loss of freshwater ecology function.

73.3 Proposed offset or compensation measures (section 104(1)(ab))

The range of proposed measures to offset and compensate for residual effects on freshwater, terrestrial and wetland ecology values, are described earlier in this report and are not repeated here.

73.4 Provisions of the relevant standards, regulations, policies and plans (section 104(1)(b))

The provisions of relevant standards, policies and plans are set out in Appendix D and are assessed in this report. The activities for which resource consent is sought are consistent with the relevant objectives and policies in these documents, provided the adverse effects are appropriately managed.

By way of summary, the Project is:

- consistent with the NPS-FM. the principles of Te Mana o te Wai have been given effect to, the exceptions criteria authorising the application of the effects management hierarchy to activities directly affecting natural wetlands and waterways are met (including the establishment of a functional need for the Project which has national, regional and local benefits to locate in those environments), and required levels of fish passage is achieved in all instream structures;
- consistent with the NPS-UD in that it will assist in creating a well-functioning urban environment in the Tara-Ika Growth Area in Levin and will create a benefit for the Levin Town Centre, and will assist in Otaki's development as the northern centre of the Kapiti Coast District;
- fundamental to the achievement of the NLTP and in particular the Manawatu-Whanganui RLTP as well as achieving the key GPS strategic priorities of safety and resilience alongside improving people's transport choices;
- consistent with One Plan and PNRP objectives and policies as it is able to avoid, remedy or mitigate actual and potential adverse effects on the environment; and is able to offset residual adverse effects on indigenous biological diversity; qualifies for the application of effects management hierarchy

through meeting relevant criteria; and granting approval to the required consents would recognise the national, regional, and local benefits the Project will generate; and

- consistent with the vast majority of the relevant objectives and policies of the HDP and the KCDP.

73.5 Other matters (section 104(1)(c))

A summary of 'Other Matters' is set out above and is not repeated here.

73.6 Matters relevant to certain applications (section 105)

Section 105(1) of the RMA requires that, for discharge permits that would contravene section 15, the decision maker must also have regard to:

- The nature of the discharge and sensitivity of the receiving environment;
- The applicant's reasons for the proposed choice; and
- Any possible alternative methods of discharge, including discharge into any other receiving environment.

The Project requires discharge permits for discharges to land and surface water for both construction (cleanfill and sediment) and operation (stormwater) and therefore section 105(1) applies.

73.6.1 The nature of the discharges and the sensitivity of the receiving environment

Discharges will occur both during construction and operation of the Project. The Project requires consent for the follow discharges:

- Discharge of sediment (in Schedule F habitats in the Horizons One Plan);
- Discharges of fill; and
- Discharge of operational stormwater (in Schedule F habitats in the Horizons One Plan).

The sensitivity of the receiving environment is addressed in the technical assessments provided in Volume IV and summarised in Part B of this report. The nature of the discharges and other matters to which regard must be had under section 105, for each of the resource consents sought under section 15, are discussed in turn below.

73.6.1.1 Discharge of cleanfill

Where filling (including the disposal of excess cut material) occurs using material sourced from the same site (that is, the material is not imported) it is considered that this falls within the definition of 'cleanfill material' in the One Plan. The locations of cleanfill disposal sites for the Project was the subject of a specific alternatives consideration detailed in the Spoil Site Selection Report (appended to the Design and Construction Report provided as Appendix Four). At the conclusion of this selection process, four cleanfill disposal sites are proposed and identified as avoiding significant adverse ecological, natural character and cultural effects.

In terms of the placement of engineered fill (i.e. the location of the Project), Part E summarises broader processes for assessing alternative routes for the Project and ultimately selecting the preferred route due to the avoidance and reduction of environmental effects it achieves.

73.6.1.2 Sediment discharges during construction

Discharges of sediment during construction for most of the Project are ancillary to the land use consents sought (or permitted activities) for land disturbance and vegetation clearance. Where the land disturbance and vegetation clearance occur within Schedule F habitats, however, a separate discharge consent pursuant to section 15 and Rule 13-9 is required.

The nature of the discharge of sediment during construction is described in Water Quality - Technical Assessment H, and also set out in the DCR in Appendix Four to this report. Discharges of sediment laden

water are a necessary part of the construction process. While sediment discharges to Schedule F habitats will be minimal, they are not avoidable given the location of the Project.

As set out in Water Quality - Technical Assessment H and the ESC Technical Report appended to the DCR, best practice ESC management measures will be undertaken at all times. Particular care to minimise construction impacts on Schedule F (and other ecosystem types of significance as set out in Terrestrial Ecology - Technical Assessment J and Freshwater Ecology - Technical Assessment K), will be undertaken, as will be addressed in the EMP and through SSESCPs. As summarised in – Water Quality - Technical Assessment H, it is considered that the effects of sediment discharges during construction on the receiving environment can be minimised and mitigated with best practice ESCP and the SSESCPs.

Due to the location of the Project, it is not practical to discharge to an alternative receiving environment. As the proposed ESC measures are already in accordance with best practice, there are no feasible alternative discharge methods.

73.6.1.3 Operational stormwater discharges

For most of the Project, the discharge of stormwater once the Project is operational is a permitted activity. However, within a Schedule F habitat, the discharge of stormwater from six cut off drains and one treatment device (Wetland 03) requires resource consent.

As described in the Stormwater Management Design report (provided as Appendix 4.2 to the DCR), the Project is expected to have a minimal residual effect on the receiving environment. Stormwater from the new impervious areas will be diverted to the proposed treatment devices prior to it being discharged. This is a significant improvement from the treatment that is currently being provided over the existing state highway network within the Project area.

Water Quality - Technical Assessment H considers the BPO in respect of stormwater quality and quantity matters (locations, devices and sizing and taking account of available space and location relative to sensitive ecological areas) for the entire Project. In summary, the devices chosen for the Project:

- reflect cultural values (as understood), which have guided device selection and performance standards;
- minimise earthworks and associated construction / Project footprint;
- provide effective water quality treatment through their sizing to accommodate flow or volume control;
- consider access and maintenance requirements; and
- wetland and wetland swales are the preferred means for stormwater management as they are most suitable for the treatment of larger catchment areas where they can provide peak flow control, flow attenuation and flood protection.

While there are practicable alternatives available for the discharges into the respective receiving environments, given the drivers outlined above, they are either not preferred or not appropriate (eg piped systems which result in greater earthworks volumes and increased maintenance).

73.6.2 Summary

The nature of the discharges, reason for the proposed choice and alternative methods for all discharge consents sought pursuant to section 15 of the RMA have been considered and are described in Part G of this AEE.

The placement of engineered fill (ie the location of the Project) was investigated extensively during the route selection process, and the preferred alignment was ultimately adopted due to the avoidance and reduction of environmental effects it achieves. The placement of cleanfill ('spoil sites') is identified as avoiding significant adverse ecological, natural character and cultural effects.

In relation to construction discharges of sediment, the proposed ESC measures contained in the DCR (Appendix Four) are in accordance with best practice. Once operational, stormwater quality and quantity is to be managed via treatment devices which have been selected and designed in accordance with BPO,

and which will achieve a better water quality environment than currently exists due to the lack of treatment available from the existing highways in the Project area.

Overall then, it is considered appropriate for the applications for discharge permits to be granted, having regard to the matters in section 105.

73.7 Restrictions on granting of certain discharge permits (section 107)

Section 107 restricts the ability of a consent authority to grant a discharge permit if the discharge gives rise to certain effects. The Water Quality - Technical Assessment H (as summarised in Section 7.29 of this Report) describes the works that result in discharges (and for which discharge permits are sought). Section 7.29 and the accompanying technical reports describe the nature and effects of these discharges and conclude that these discharges will generally not give rise to the effects in the receiving waters set out in section 107(c) to (g) of the RMA (subject to appropriate construction management measures being implemented).

That said, if such effects were to arise, a discharge permit may still be granted because the circumstances in section 107 of the RMA apply as follows:

- The discharges will be short term (or temporary) and any effects will occur at limited times, though not necessary consistently, over the duration of construction;
- Measures will be put in place to manage and minimise discharges during construction; and
- There will be no ongoing adverse effects once construction has been completed.

As outlined in Water Quality - Technical Assessment H, the operational stormwater discharges will result in a positive effect on the receiving environment as the Project will treat all new impervious areas associated with the Project. This is a significant improvement from the treatment that is currently being provided over the existing state highway network within the Project area.

74 RMA Part 2 assessment

The purpose of the RMA, in section 5(2), is to promote the sustainable management of natural and physical resources. In achieving this purpose, competing resource values and benefits and the adverse effects generated by a proposed activity often need to be balanced and an overall judgement made about whether sustainable management is achieved. Assessing the NoRs and suite of applications for resource consents for this Project requires a consideration of the national, regional and local benefits that might accrue and the more localised potential adverse effects that the Project may have on the environment.

74.1 Section 5 – Purpose and principles

In terms of section 5 of the RMA, the Project will enable people and communities to provide for their health and safety, and their social, economic and cultural wellbeing for the following reasons:

- Death and serious injury crashes on the existing state highways in the Project area are modelled to reduce by approximately 25-30 incidents per 5-year period following the Project's opening, and the number of crash related closures on the state highway network is expected to drop by over 50% with the opening of the new highway.
- The provision of the SUP will enable opportunities for a shift to more active transport modes
- Economic benefits will be generated from increased economic activity during construction and the operational benefits of certainty and productivity from the increased resilience of the transport network

- Social benefits will accrue from connectivity, the reduced consequences of crashes and injuries, and facilitation of urban growth in Levin.

74.2 Section 6 – Matters of national importance

The Project recognises and provides for the matters within section 6 of the RMA. In particular, the Project responds as follows:

- the Project provides for the preservation of the natural character of streams and their margins by careful route selection to ensure appropriate crossing locations, and confining the stream crossing and associated disruption to an effects envelope. Likewise, the route selection process has avoided all but one natural wetland. Planting and associated restoration will ensure that overall levels of natural character will be preserved, and in some locations enhanced (section 6(a)).
- the Project avoids directly affecting any Outstanding Natural Features or Landscapes (section 6(b)).
- the Project largely avoids directly affecting any areas of significant indigenous vegetation or significant habitats of indigenous fauna. Where such effects do occur, they will be appropriately mitigated, offset or compensated for (section 6(c)).
- apart from during the construction period, the Project will at least maintain and in some instances potentially enhance public access to or along the margins of rivers (section 6(d)).
- the Waka Kotahi partnership with tangata whenua on all aspects of the Project has recognised and provided for the relationship of tangata whenua and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga (section 6(e)).
- The Project avoids any direct effect on scheduled heritage sites (section 6(f)).
- The Project does not infringe or impact on any recognised customary rights (section 6(g)).
- The potentially significant risks from natural hazards (flood events) are appropriately managed through the location and design of the Project and the creation of a feasible and much more resilient alternative route to the existing SH1 (section 6(h)).

74.3 Section 7 – Other matters

The Ō2NL Project has had particular regard to, and appropriately responded to, the matters in section 7 of the RMA, and in particular:

- Tangata whenua have been able to exercise their kaitiakitanga through the partnership with Waka Kotahi on all aspects of the Project, including the independent preparation of cultural impact assessments (section 7(a)).
- The ethic of stewardship has been recognised in the engagement with and participation of community groups who have a specific interest in and exercise stewardship over particular resources (section 7(aa)).
- The Project represents an efficient development of the state highway network, which is a physical resource of national, regional and local importance (section 7(b)).
- The route selection and designation refinement process for the Project, has sought to avoid adverse effects on existing amenity values. While there will be impacts on amenity values for some residents, in other localities amenity values will be enhanced as a result of the Project through reduction in traffic volumes on the existing SH1 (section 7(c)).
- The Project largely avoids direct effects on significant ecosystems and, where such effects do occur, effects are managed through mitigation, offset and compensation measure to ensure the Project results in at least a no net loss, and potentially a net gain, of biodiversity values (section 7(d)).
- The route selection and designation refinement process, and the consideration of the effects on the environment of confirming the NoRs and the granting of resource consents, has been informed by a

range of expert effects assessments, with a view to achieving an outcome that avoids and minimises adverse environmental effects to the extent practicable. While the Project results in a permanent change to the existing environment, this iterative evaluation process has minimised the impact of the Project while achieving the Project objectives and a range of benefits (section 7(f)).

- In terms of finite characteristics, the Project has avoided outstanding landscapes and natural features, heritage items, and recorded archaeological sites. Further, the transportation network is a physical resource that, in its current form, has a finite characteristic in terms of its capacity to absorb traffic volumes. That capacity has largely been reached as evidenced by a worsening safety and efficiency record and increasing levels of congestion. This, in turn, restricts the ability of the network to absorb any future traffic demand from planned urban development within the Project area, and from increases in inter-regional traffic movements produced by regional economic growth. Construction of the Project will therefore allow the finite capacity of the transportation network to be enhanced. However, the Project unavoidably impacts a very small area (in a region-wide sense) of high-quality soils which by their definition have a finite characteristic (section 7(g)).
- The principal effect that climate change will have on the Project is through an increase in intensity and/or duration of rainfall events. This has been addressed through factoring climate change into the concept design of bridge and instream structures and stormwater control and treatment measures to be implemented both during construction and on an enduring basis (section 7(i)).

74.4 Section 8 – Treaty of Waitangi (Te Tiriti o Waitangi)

Waka Kotahi, as a Crown entity, has a commitment to a partnership-based approach with tangata whenua that reflects the principles of the Te Tiriti o Waitangi/Treaty of Waitangi. The relevant principles of Section 8 for the Project are the principle of active protection of rangatiratanga, the principle of partnership and the principle of mutual benefit.

The partnership with tangata whenua has provided for the active protection of rangatiratanga. This has acknowledged the status held by tangata whenua and the continuing role that they play in traditional, cultural and heritage terms in the sustainable management of natural and physical resources in the project area. In this regard Waka Kotahi is committed to an ongoing partnership with tangata whenua during and after the formal RMA process.

The principle of partnership is one where both parties (Waka Kotahi and tangata whenua) participate in the resource management process. The partnership with tangata whenua for the Project is evidence that this principle has and is being followed.

The principle of mutual benefit applies in that both Waka Kotahi and tangata whenua have received a measure of benefit from the involvement of tangata whenua in the Project to date. Waka Kotahi has benefited from an improved understanding of the cultural heritage and environmental issues associated with the project area, while tangata whenua have benefited through the knowledge that their issues have been raised and taken into consideration during the route selection Notices of Requirement/resource consent process.

All of the relevant Treaty principles as set out above will continue to be recognised in an ongoing manner through the proposed mitigation measures and conditions of consent to ensure that the tangata whenua relationship to the land, waterways and natural and physical environment in the Project area is appropriately recognised.

75 Summary of statutory assessment

The Project gives rise to significant positive effects and will form an integral part of the region's transport network. The Project will enable people and communities to provide for their social, economic, and cultural well-being and for their health and safety, consistent with the purpose of the RMA.

The actual and potential adverse effects on the environment of the Project will be comprehensively addressed by the measures contained in the proposed designation and draft resource consent conditions contained within Appendix Five.

The Project is consistent with the key RMA policy and planning documents, as well as other relevant non-RMA documents and plans. The resource consent applications are able to meet the section 104D(1)(b) "gateway" test, as they are not contrary to the objectives and policies of the relevant RMA plans.

Overall, the Project will achieve and promote the purpose of the RMA. Therefore, for the reasons set out above, the Notices of Requirement can be confirmed, and the resource consents can be granted subject to the proposed designation and consent conditions set out in Appendix Five.