

**Peka Peka to Ōtaki Expressway**

**Volume 01**

# **Landscape and Urban Design Plan**

**Rev. 6 – Documented at A3**

Mā te rongo ka mōhio

Mā te mōhio ka marama

Mā te marama ka mātau

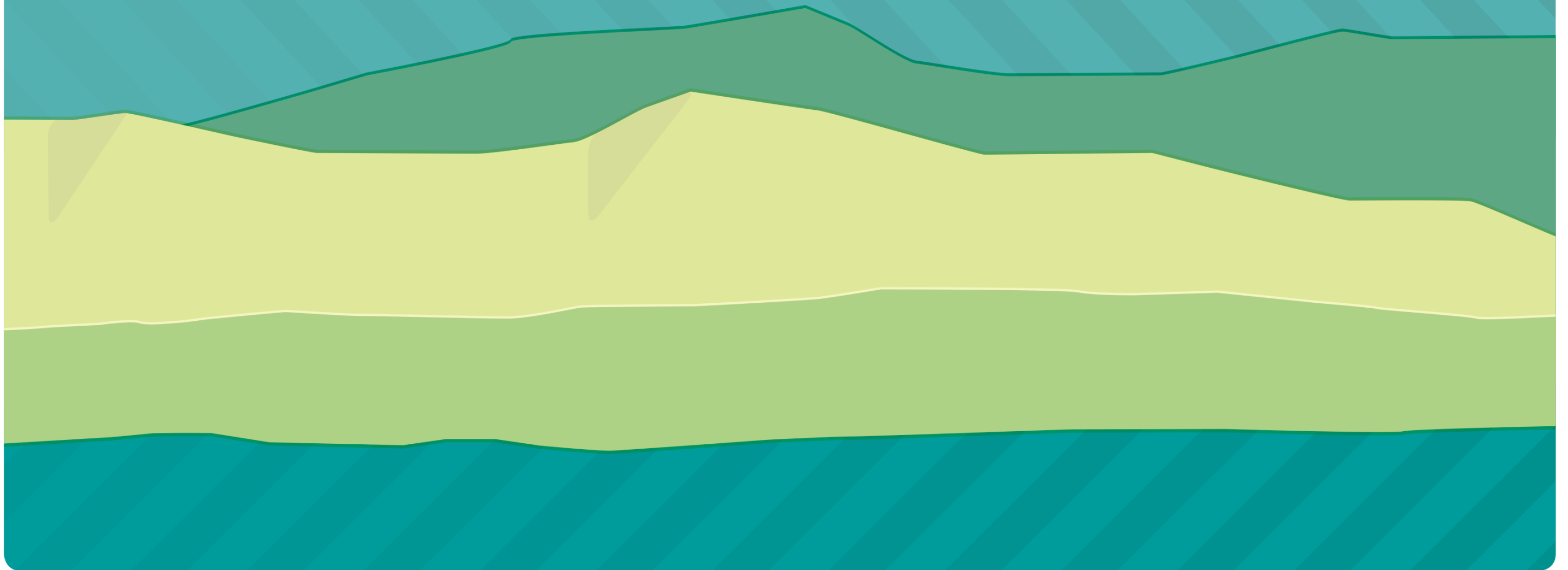
Mā te mātau ka ora

Through perception and listening comes awareness

Through awareness comes understanding

Through understanding comes knowledge

Through knowledge comes well being





## Document Revision History

Version	Prepared By	Status	Date Issued
Rev 1	Stuart Dun/Simon Hardy	For information only	January 2017
Rev 2	Stuart Dun/Simon Hardy	For information only	April 2017
Rev 3	Stuart Dun/Simon Hardy	For Consultation	May 2017
Rev 4	Stuart Dun/Simon Hardy	For Consultation	September 2017
Rev 5	Stuart Dun/Simon Hardy	For Certification	October 2017
Rev 6	Stuart Dun/Simon Hardy	For Certification	November 2017

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## Document Acceptance

Action	Name	Signed	Date
Prepared by:	Stuart Dun/Simon Hardy		17.11.2017
Reviewed by:	Bruce Symmans		17.11.2017
Approved by:	Andrew Goldie		17.11.2017
On behalf of:	Fletcher Construction Company Ltd		

## Certification Record

Revision	Action	Name	Position	Signature	Date
Rev 6	Certified by*:	Vijay Soma	Acting manager Resource consents and compliance On Behalf of KCDC		24/11/17

\* Subject to the provisos set out in the councils letter of 24.11.2017

24 November 2017

Fletcher Construction Ltd

Att: B Symmans

E-mail: Bruce Symmans <BSymmans@tonkintaylor.co.nz>

**Subject: Peka Peka to Otaki Expressway (Designation No. D0109).  
Certification of the Landscape and Urban Design Plan (LUDP).**

This letter relates to the certification of the Landscape and Urban Design Management Plan (LUDP) under the conditions of the designation for the Expressway as detailed below. That certification is required to be provided by the Resource Consents and Compliance Manager (i.e. 'the Manager') in the conditions. The certification does not extend to any matters beyond those required by the conditions.

A '.pdf' version of Version 6 of the LUDP has been sent to the Council for signature including a page for certification. This letter is to confirm that the Council has certified the LUDP subject to the provisos listed below. A copy of the certification page is attached. Would you arrange for this page to be incorporated into the final version and returned to the Council. We would appreciate two hardcopies and a .pdf version to save into the Councils records.

The certification of the LUDP does not extend to the following matters:

- Shared pathway. Details of the full length of the shared pathway are not included in the LUDP, and are not required to be reflected in the LUDP. That work is ongoing, and is expected to be delivered in a manner consistent with the LUDP.
- Gateways. The LUDP captures key principles for the gateways and incorporates a process for the ongoing governance and design of the gateways. The certification is an endorsement of those principles and the process only and provides a platform for the ongoing work proposed. Certification of the output of that process will be required by May 2018 in accordance with the programme in Chapter 8 of the LUDP.
- Pare-o-Matangi: The LUDP captures key principles for the Pare-o-Matangi reserve, and incorporates a number of specific design principles and outcomes. The process for design of the reserve is included in the LUDP and will occur in a

manner that involves the parties that are required to be consulted in the conditions including KCDC as the reserve owner. The certification is an endorsement of those principles and the process only and provides a platform for the ongoing work proposed. Certification of the output of that process will be required by March 2018 in accordance with the programme in Chapter 7 of the LUDP.

- River Bridge narratives and Otaki Bridge vertical marker. The narratives for the bridges will be located as depicted in the LUDP and in accordance with the objectives and processes detailed in that document. The final design is yet to be determined. Similarly, the proposed vertical marker for the Otaki River Bridge is subject to further consultation and final design as set out. The Council does not consider it necessary to have to certify the final design of these elements but does expect that the design process and outcomes will be in accordance with that set out in the LUDP.
- Vegetation. Any outstanding vegetation details not captured in the LUDP shall be reflected in a Site Specific Environmental Management Plan for that purpose.

There are two relatively minor aspects that are noted here for the record and which will require further attention;

1. The Council would like to be involved in the ongoing work on the bridge narratives and the Otaki Bridge marker. This is not specifically set out.
2. There is no detail on the reinstatement and revegetation of the construction yard at Rahui Road. This will be required as specified under Condition 75(c)(i).

The certification of the LUDP does not extend to, and is without prejudice to, the Councils ongoing responsibilities in relation to the following matters.

- Property access and property transactions.
- Traffic Management Plans as a Road Controlling Authority
- The design and implementation of storm water management systems and inundation levels in the Pare-o-Matangi Reserve.



Vijay Soma

Acting Resource Consents and Compliance Manager.



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- BOI Conditions
- Consultation Record
- Landscape Technical Specifications

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# Acronyms and Abbreviations Used

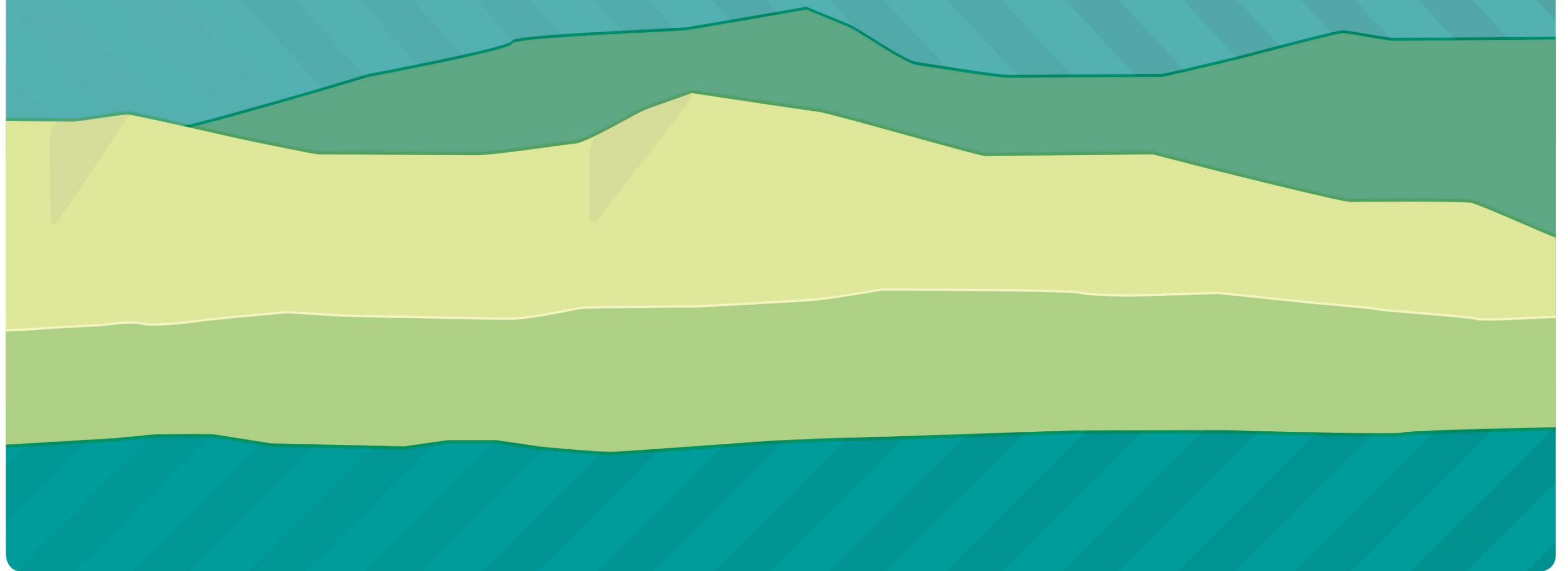
Acronym/Abbreviation	Definition
BoI	Board of Inquiry
CPTED	Crime Prevention Through Environmental Design
EMP	Ecological Management Plan
FOTOR	Friends of the Ōtaki River
GWRC	Greater Wellington Regional Council
KCDC	Kāpiti Coast District Council
LUDP	Landscape and Urban Design Plan
M2PP	Mackays to Peka Peka Expressway
NZTA	New Zealand Transport Agency
NHoŌ	Ngā Hapū o Ōtaki
NIMT	North Island Main Trunk (Rail Line)
OGPA	Open Graded Porous Asphalt
ŌCB	Ōtaki Community Board
PP2Ō	Peka Peka to Ōtaki Expressway
RE Wall	Reinforced Earth Retaining Wall
RoNS	Roads of National Significance
SSEMP	Site Specific Environmental Management Plan
SH1	State Highway 1
ULDF	Urban and Landscape Design Framework (ULDF TR23)

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01

# Introduction





## This Landscape and Urban Design Plan (LUDP) has been prepared to create and support the conceptual design philosophy of the new expressway from Peka Peka to Ōtaki.

The outcomes proposed have been developed collaboratively between, landscape architecture and urban design, civil and structural engineering, ecology and other key disciplines. This design plan is also the product of extensive consultation with a number of stakeholders and affected parties.

This design plan captures the design aspirations for the project and outlines the design response to the Board of Inquiry decision conditions, which includes the stated objectives of the Urban and Landscape Design Framework (ULDF March 2013 – TR23) for the project.

### 1.1 Purpose

The purpose of the LUDP is to outline the methods and measures to be implemented prior to the works, during the construction phase, and for a defined period thereafter to avoid, remedy and mitigate adverse effects of the construction and the Project on landscape amenity. The LUDP documents the permanent mitigation measures, as well as the necessary monitoring and management required to successfully implement those measures during construction and the transition to the Operational phase of the Project.

This LUDP should be read in conjunction with the Ecological Management Plan (EMP) prepared for the project.

### 1.2 Project Description

Peka Peka to Ōtaki is a section of the Kāpiti Expressway as part of the Wellington Northern Corridor Roads of National Significance.

The section of expressway covered in this document extends from Te Kowhai Road in the south, through to Taylors Road in the north, an approximate distance of 12.2km, passing through predominantly rural land as well as the townships of Te Horo and Ōtaki.

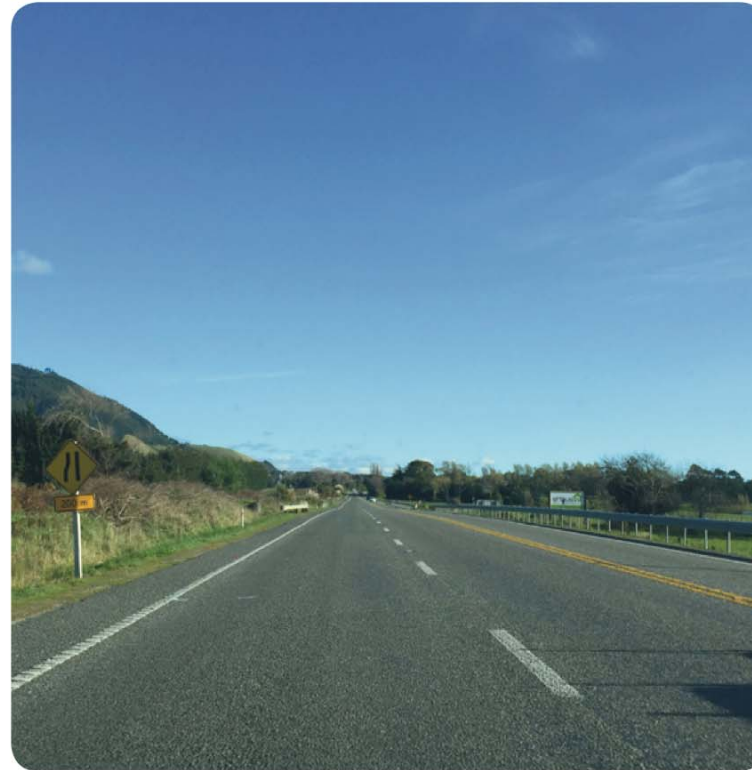


Figure 01. Section of the Wellington Northern Corridor

The project will provide a four lane expressway that generally runs parallel with the existing State Highway (SH1), minimising the impact on the surrounding land. Connections to existing local roads, new local roads and east/west connectivity roads are provided. There will be a new bridge crossing the Ōtaki River along with a bridge crossing at Waitohu stream and local road bridges crossing the expressway to maintain east-west connections. The existing SH1 will be retained as a local arterial road. A section of the existing SH1 at Makahuri is required to be relocated as part of this project. Throughout this LUDP the existing SH1 will be referred to as the former SH1. Any other redevelopment or revocation of the former SH1 (other than at Makahuri) does not form part of this project.

Three elements of the design shown in the LUDP differ from what was shown in the plans presented to the BoI or in subsequent approved amendments. The elements are a shared path on the eastern side of the Ōtaki River bridge, Taylors Road running beneath the Waitohu River Bridge and the Rahui Underpass shorter and slightly to the south. Approval is being sought from KCDC for these changes and if approval is not obtained the LUDP will be amended to reflect the original proposals.

The Transport Agency are investigating options (currently as a separate



Figure 02. Existing environment looking north towards Ōtaki

project) to construct a shared path from the Te Hapūa Road to Rahui Road/Pare-O-Matangi Reserve. The Agency plan to consult with the community and key stakeholders in mid-October 2017 on two different options for locating the shared path within the transport corridor. While still to be finalised, there is likely to be an eastern option and a western option. The eastern option would extend down the eastern side of the proposed expressway corridor. The western option would utilise the existing State Highway 1 corridor.

The expressway design (geometrics, earthworks drainage and structures) has been developed to include sufficient width in the formation to accommodate the future addition of the shared path down the eastern side of the expressway. This provision in the design includes for connections to the local roads and other east-west networks. If following consultation, this eastern route is selected as the preferred route, the LUDP will be amended to reflect this change. The most notable amendment would be to planting plans. There is sufficient flexibility in the planting areas to achieve the required area of planting without significant amendment.





Figure 03. Ōtaki River environment



Figure 04. Existing SH1 along Te Horo



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**The design vision for this project is to create a 'green corridor' that enhances and accentuates the unique character of the area, while speaking of the importance of the history and culture of the Kāpiti region.**

### 1.3 Vision Statement

The design vision for this project is to create a 'green corridor' that enhances and accentuates the unique character of the area, while speaking of the importance of the history and culture of the Kāpiti region.

Creating strong east-west connections is vital to the success of the project in retaining important local links for the existing communities. These connections will be expressed visually, and will establish a safe network of paths to enable all modes of transport, such as walking and cycling.

### 1.4 Design Intent

The landscape and urban design elements discussed within this document have been developed in line with the relevant Principals Requirements (PRs) for this project, the Board of Inquiry Conditions of Consent, and the design objectives outlined in the Draft Urban and Landscape Design Framework (ULDF March 2013 - TR23).

### 1.5 Referenced Design Documents

A number of documents have been referenced in the development of the design including:

- Bridging the Gap: NZTA Urban Design Guidelines 2013
- Transit New Zealand's Guidelines for Highway Landscaping (dated December 2006) Note: Superseded by NZTA 'Landscape Guidelines' Final Draft - September 2014
- Transit New Zealand's 'Urban Design Implementation Principles' (2006)
- Ministry of Justice (2005) National Guidelines for Crime Prevention through Environmental Design (CPTED) in New Zealand
- AUSTROADS Part 6 and 6A Pedestrian and Cyclist Paths and New Zealand Supplement (2008) to the AUSTROADS guide to Traffic Engineering Practice: Part 14 Bicycles
- New Zealand Transport Agency Bridge Manual
- NZTA P39 Standard Specification for Highway Landscape Treatments
- KCDC Planting Principles for Roads of National Significance Draft 2013

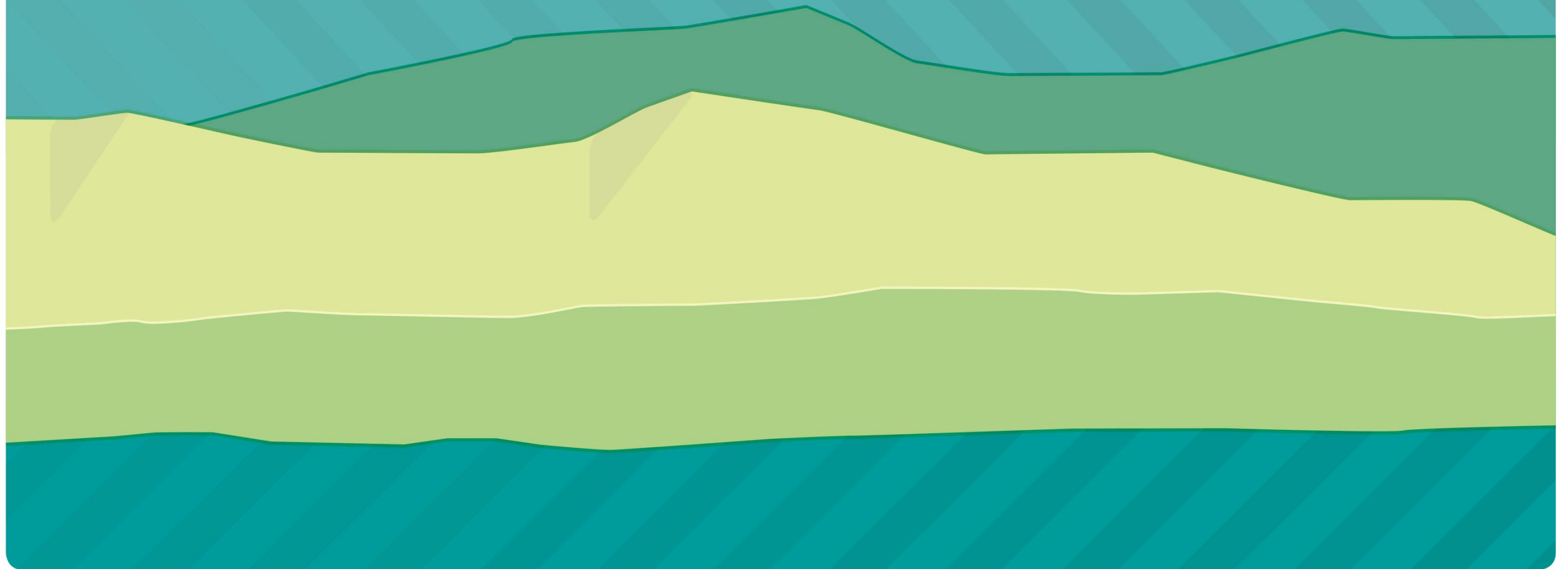
### 1.6 Acknowledgements

The design team would like to acknowledge the commitment and valuable contributions of all stakeholders, interested parties, and members of the community consulted in the preparation of this document.

The following design plans are the result of a collaborative design approach and represents a considerable investment in time and energy from a number of individuals and organisations to achieve the best outcomes for the communities of Te Horo, Ōtaki, and surrounding areas.

02

# Consultation

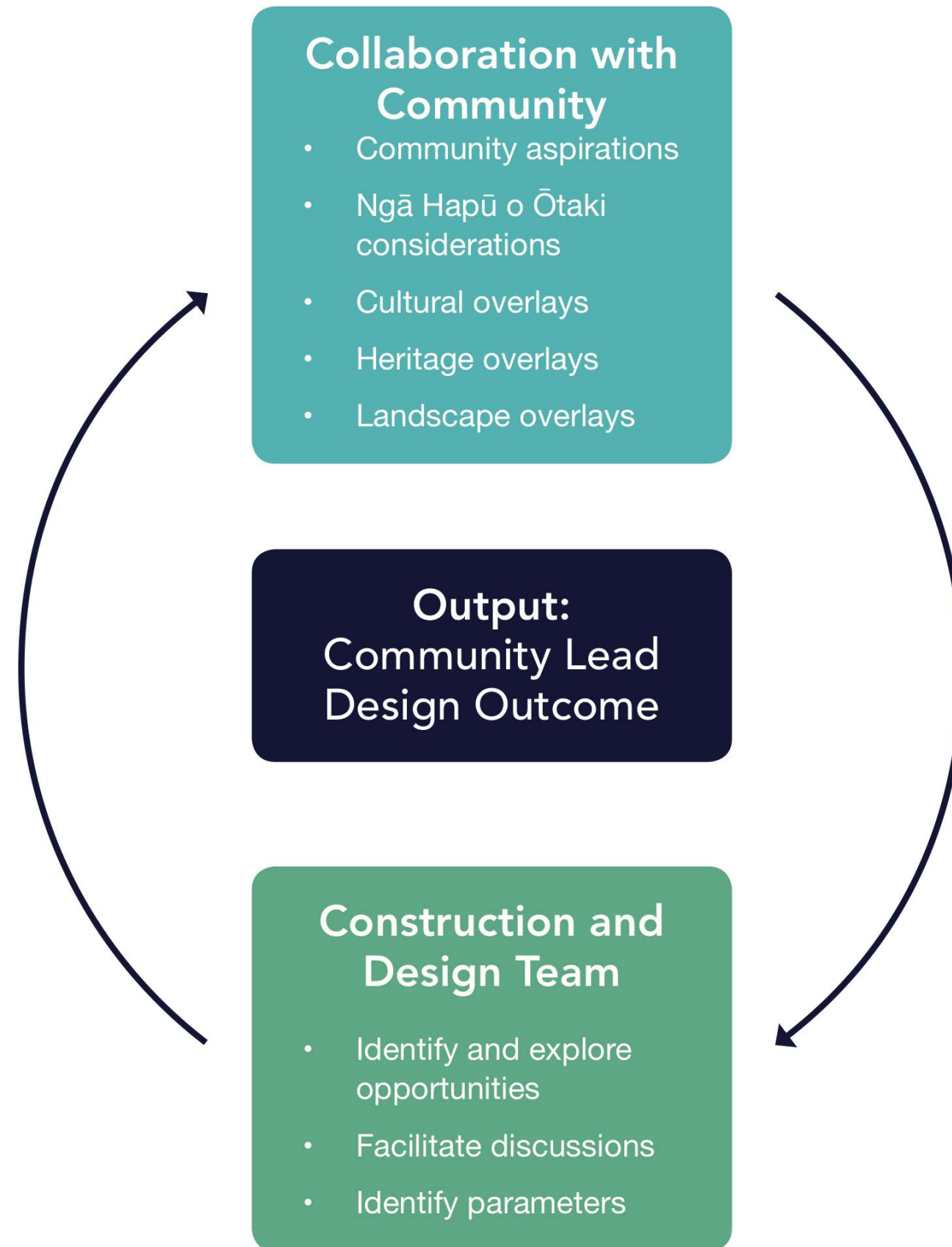


**Collaborative consultation is a critical part of the design process for PP2Ō. The importance of effective consultation is reflected in the Board of Inquiry decision and the designation conditions.**

The project team has established a strong communications team to manage stakeholder, iwi, affected parties and community consultation. This ensures that clear and meaningful lines of communication and feedback between the design team and community are established and maintained.

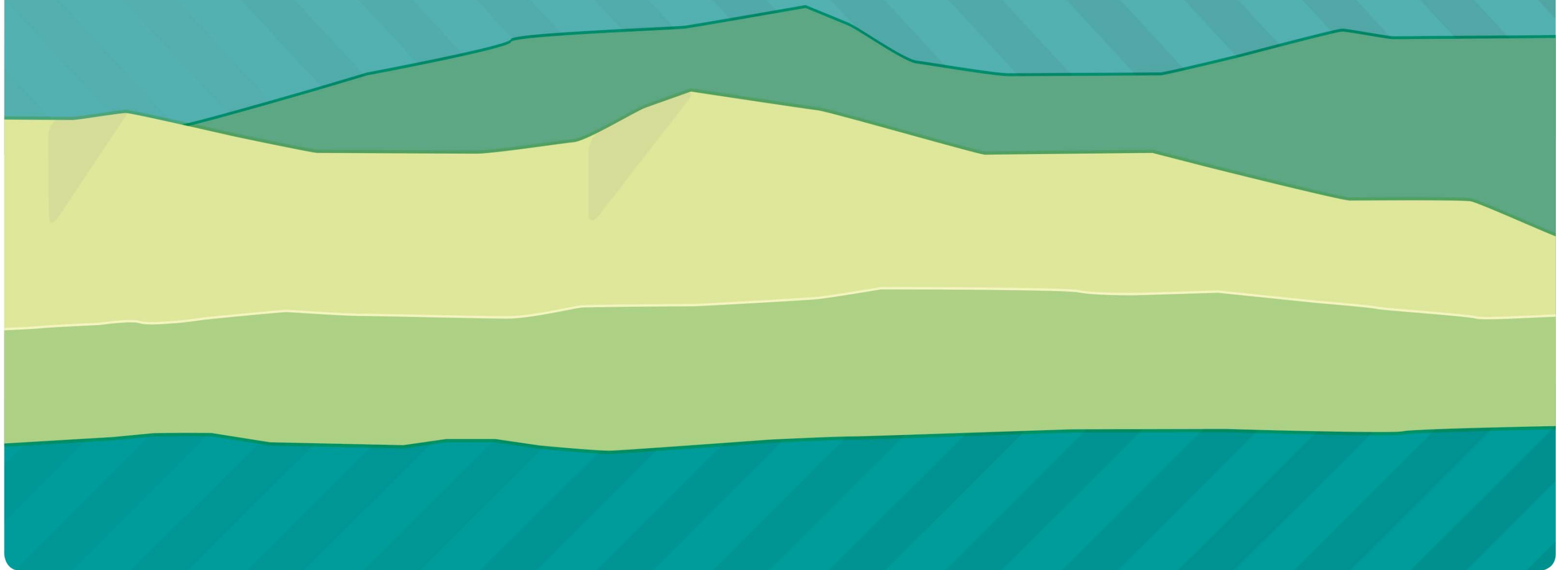
The process has enabled community-led design outcomes for specific elements being the gateways, Pare-o-Matangi Reserve and patterning to the bridge barriers, as directed by the Board of Inquiry conditions as well as the aspirations of the local community.

Consultation to date has significantly influenced the outcomes proposed in the LUDP, and will remain ongoing throughout the detail design and construction process.



03

# Context





### 3.1 Landscape Character

#### Ōtaki Railway Retail Area

The Ōtaki Railway Retail area consists of a main shopping and outlet strip along the current SH1. With the shift of the expressway to skirt around to the east, gateways to the north and south will emphasise Ōtaki and the retail area as a destination.

Pare-o-Matangi Reserve to the north of the township has recreational and cultural significance for the Ōtaki region. The reserve will be affected by the realignment of the expressway, however through design with the community and stakeholders the amenity of the reserve will be greatly improved.

#### Ōtaki

The Ōtaki sector is bordered by waterways with Ōtaki River to the south and Waitohu Stream to the north, creating natural bookends to the Ōtaki township and east-west ecological corridors. The Ōtaki River has significant cultural and recreational importance within the community and provides a natural landscape marker for Ōtaki.

The majority of the Ōtaki township is located to the west with a small portion of the community to the north-east, bisected from the township by the state highway. The addition of east-west connections will provide infrastructure to link the community, providing varied means of travel across the expressway.

The landscape treatment through this section will consist of planting that reflects the modified nature of the landscape, while the use of plant species endemic to the area will link back to the natural ecology of the Kāpiti region.

#### Te Horo

The central sector of the expressway is straight in alignment, running parallel with the existing SH1, which will be retained as a local road for the surrounding community.

The foothills of the Tararua Ranges extend further inland to the east, creating wide open plains of predominantly agricultural land.

The community of Te Horo is located towards the southern end of this section. It is currently bisected by SH1 with the main community facilities located along School Road to the eastern side of the highway. The proposed design incorporates the addition of the School Road Underpass, which will provide better local connections either side of the expressway.

Pockets of remnant vegetation between Te Waka Road and Old Hautere Road provide an opportunity to restore and enhance native ecosystems.

#### Peka Peka to Makahuri

The first sector at the southern extent of the project stretches from Te Kowhai Road through to Makahuri. It is characterised by a predominantly rural landscape that is divided up by existing shelter belts of both exotic and native vegetation. Undulating landforms, created by remnant dune formations interspersed with clusters of vegetation, follow the alignment on the western side of the expressway, while a predominant escarpment runs parallel with the expressway to the east.

The emphasis is on compression as the expressway passes through this section of the project before opening out into the Te Horo straights. The proposed design for this sector aims to accentuate this character through planting and the rounding of earthworks to match with the existing dune formations. The important ecological area proposed at Makahuri also informs the landscape character at this location.

“ The expressway corridor has been identified as having four sectors of unique landscape characteristics that have been used to help guide the concept design of the corridor



Figure 05. Sector location



## Peka Peka to Makahuri

Context	Response
<b>Peka Peka to Makahuri</b>	
Prominent escarpment and tall existing vegetation	Create emphasis on compression by planting species that have bulk and size, relative to the context
	Planting to escarpment
Remnant dune/undulating landforms	Round tops and sides of engineered landforms to reflect natural land formation



Figure 06. Current SH1 looking north at Makahuri

## Te Horo

Context	Response
<b>Te Horo</b>	
Open plains	Maintain views to Tararua Ranges
	Celebrate rural landscape
	Low planting in areas to maintain sense of openness
Remnant pockets of native vegetation	Link where possible to create ecological corridors
	Retain and enhance



Figure 07. Current SH1 looking south on Te Horo straight



## Ōtaki

Context	Response
<b>Ōtaki</b>	
Town bisected by expressway	Create strong east-west connections
River landscape	Maintain views along Ōtaki River, to Tararua Ranges and the coast
Cultural identity	Design elements that reflect culture and heritage
	Structural landscape planting
	Create strong gateway strategy



Figure 08. Current SH1 looking south at Ōtaki railway bridge

## Ōtaki Railway Retail Area

Context	Response
<b>Ōtaki Railway Retail Area</b>	
Existing community in a highly modified landscape	Strengthen community connections
	Enhance the 'sense of place'
	Create a sense of arrival
	Celebrate Ōtaki's cultural heritage and identity
	Retain and enhance



Figure 09. Current SH1 looking north along Ōtaki Railway Retail Area



### 3.2 Existing Vegetation

The landscape along the designation is highly modified, however pockets of existing native vegetation exist in close proximity to the expressway. Areas of adjacent remnant bush at Makahuri, Cottle's Bush, Hautere Bush, and Te Hapūa Bush will be protected through construction and enhanced with additional planting.

Detailed design will also include:

1. Identification of pest plants and development of a removal methodology
2. Consultation with affected property owners to resolve location of mitigation planting and reinstated shelter belts where necessary

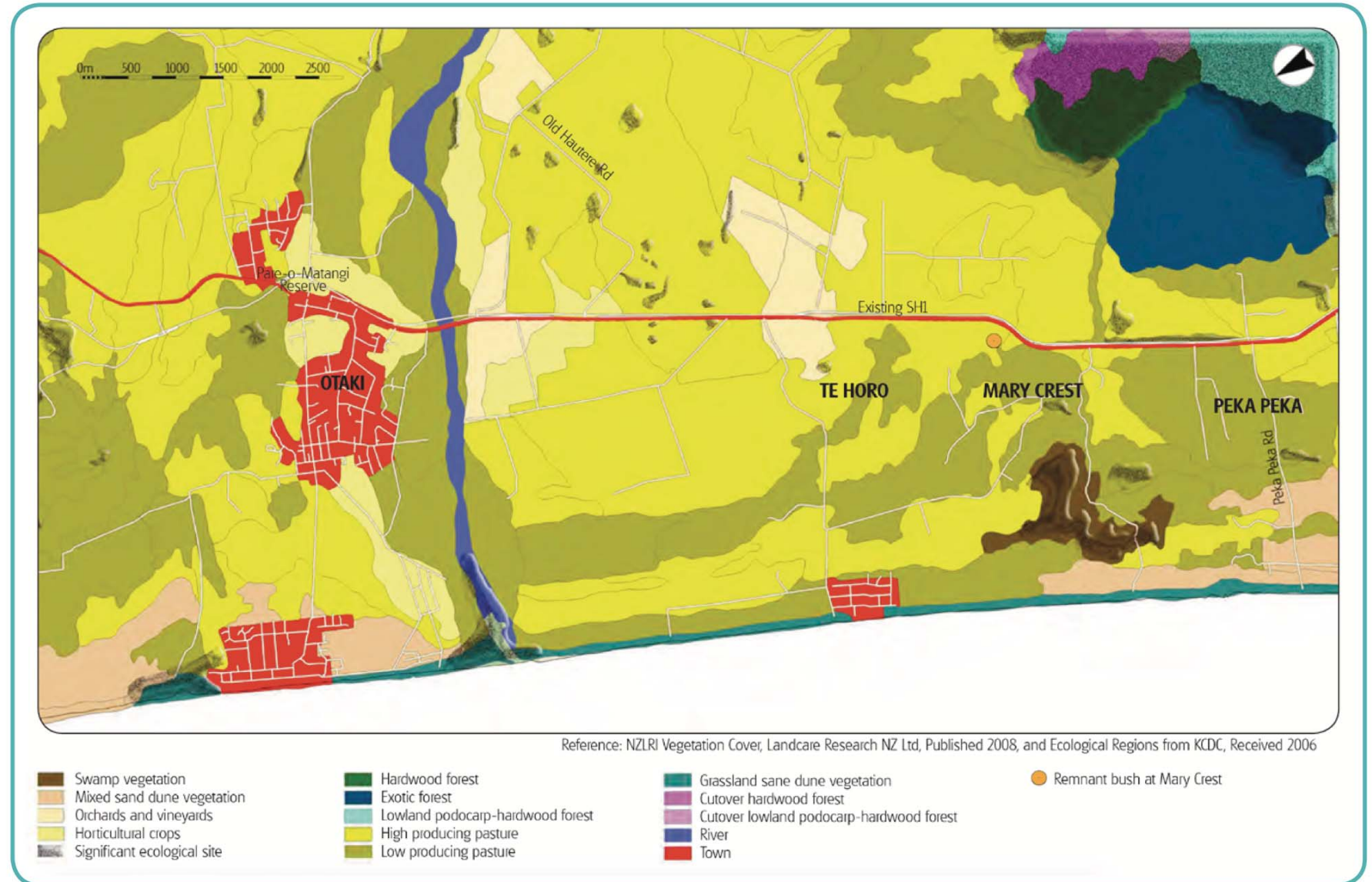


Figure 10. Vegetation Cover extracted from ULDF PG. 32

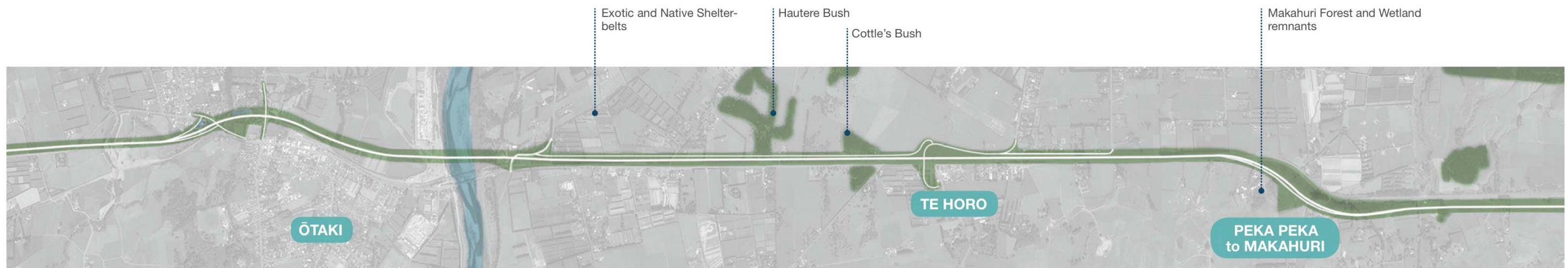


Figure 11. Existing vegetation location



### 3.3 Landform

Landform plays a key part in the experience of the expressway. It engages in the inherent qualities of the landscape through expressions in shape and form, which in turn help to shape and highlight significant views and features within the wider landscape.

The two key landform types within the site have been identified as lowland terrace and duneland which each have a distinct language.

The lowland terrace is typified by extensive plains with shallow sloping gradients that extend to the foothills of the Tararua Ranges. In contrast the dunelands are much more dynamic, consisting of gently rolling mounds and hollows that reduce in height towards the coast.

Varied land-use patterns provide further definition to these typologies along the length of the expressway, resulting in the four landscape character areas already discussed: Peka Peka to Makahuri, Te Horo, Ōtaki and the Ōtaki Railway Retail Area, which range from pastoral farmland to urban environments.

This combination of landform and land-use provide a varied and engaging setting that will allow users to gain a comprehensive understanding of this unique landscape.

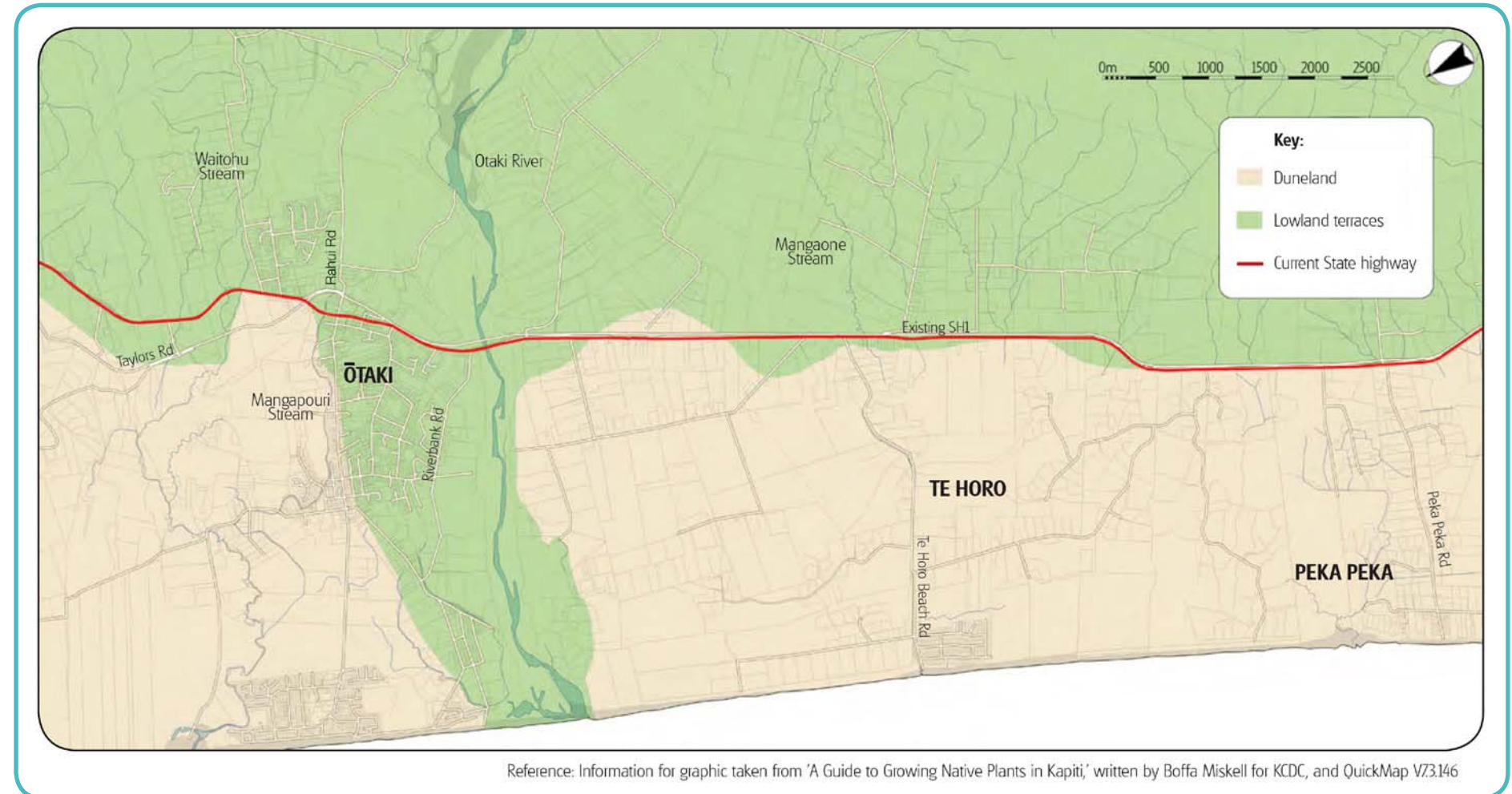
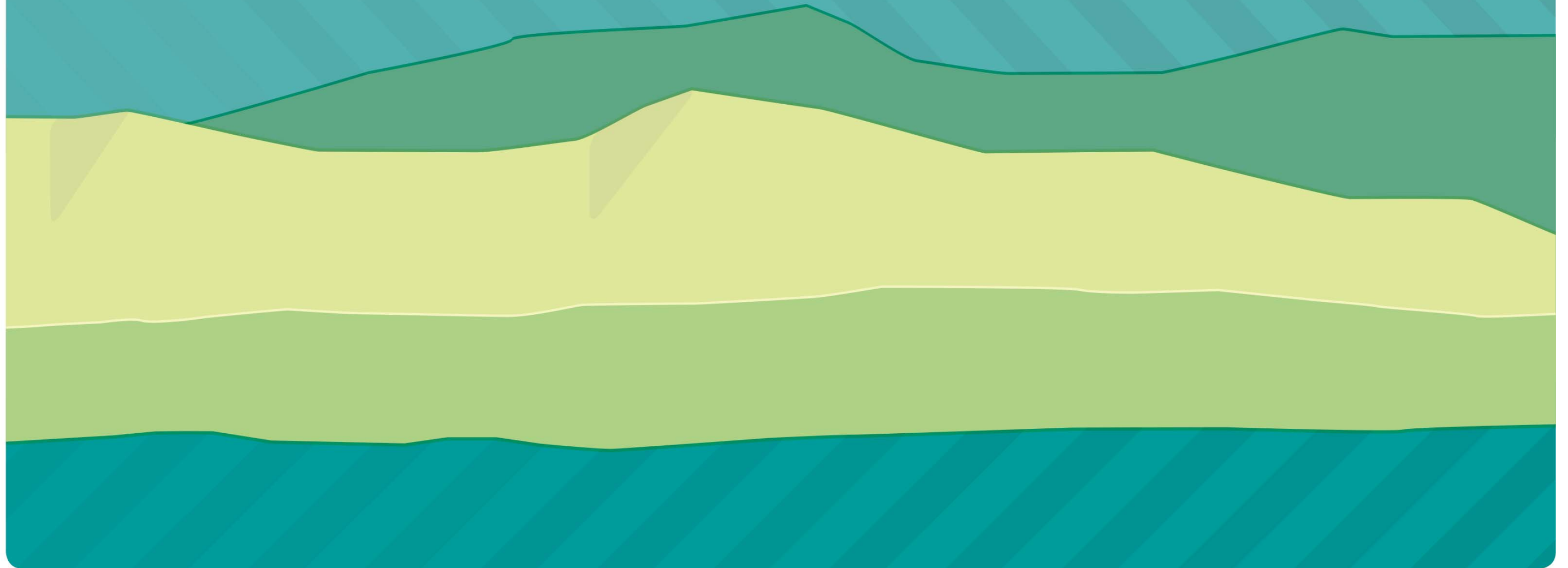


Figure 12. Landform Typologies Map extracted from ULDF PG. 33

04

# Overarching Concept





The overarching design concepts for the project, set by the ULDF, are to create a green corridor that reflects the unique character of the region, and to strengthen east-west connections.

In addition to the four character sectors described in the context section, the project traverses two distinct ecological zones – dune land and lowland terrace, and two broad landscape types – rural and urban. These broad landscape zones are the basis for the wider green corridor and form the general approach. Within this framework localised landscape features, existing areas of vegetation, topography, geology and hydrology inform a more detailed response.

The expressway moves through a highly modified landscape and the desire of this project is to express that landscape in a way that its underlying formation, land-use and ecology can be 'read' so as to better understand its special characteristics and inherent values.

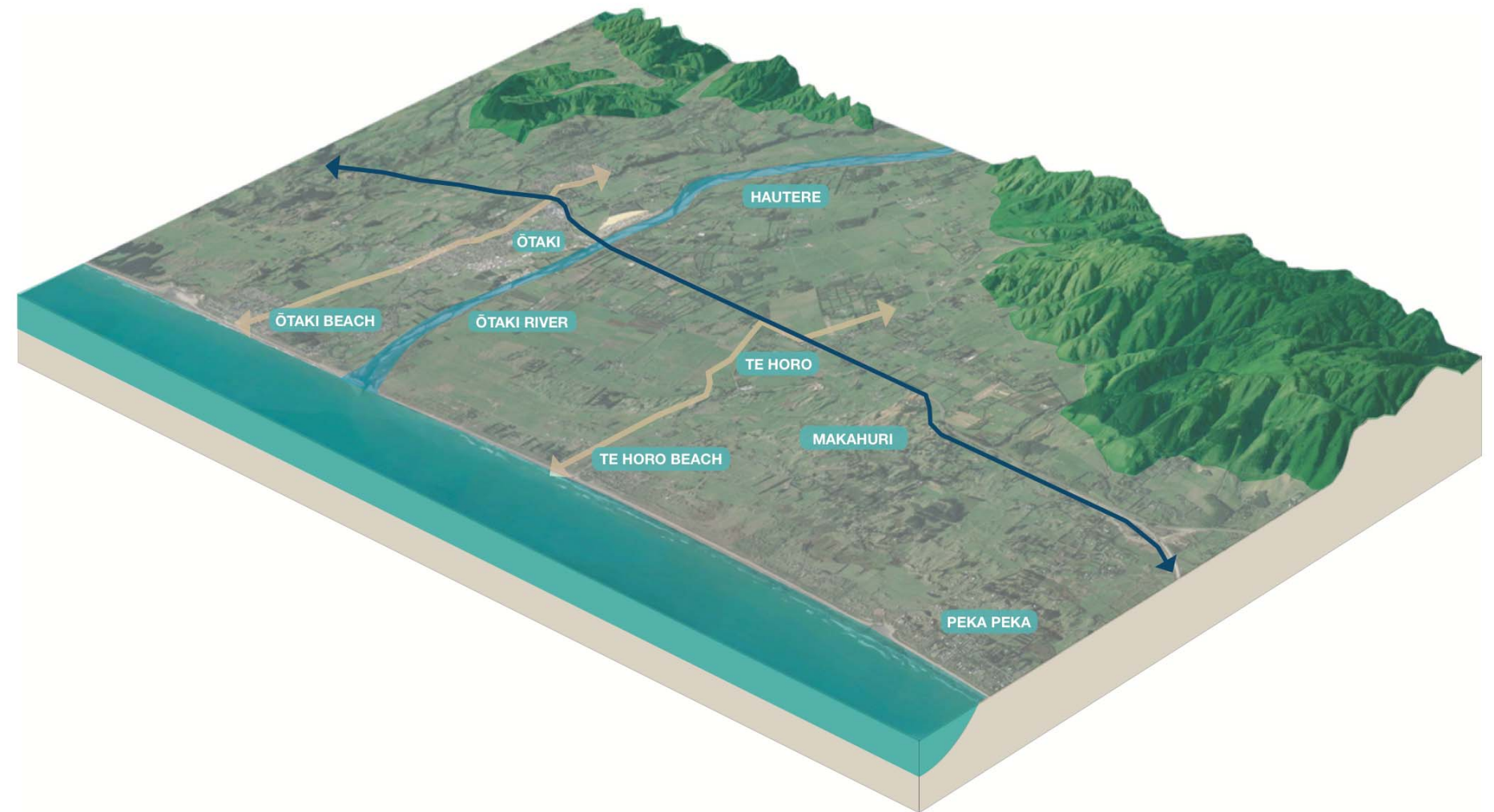
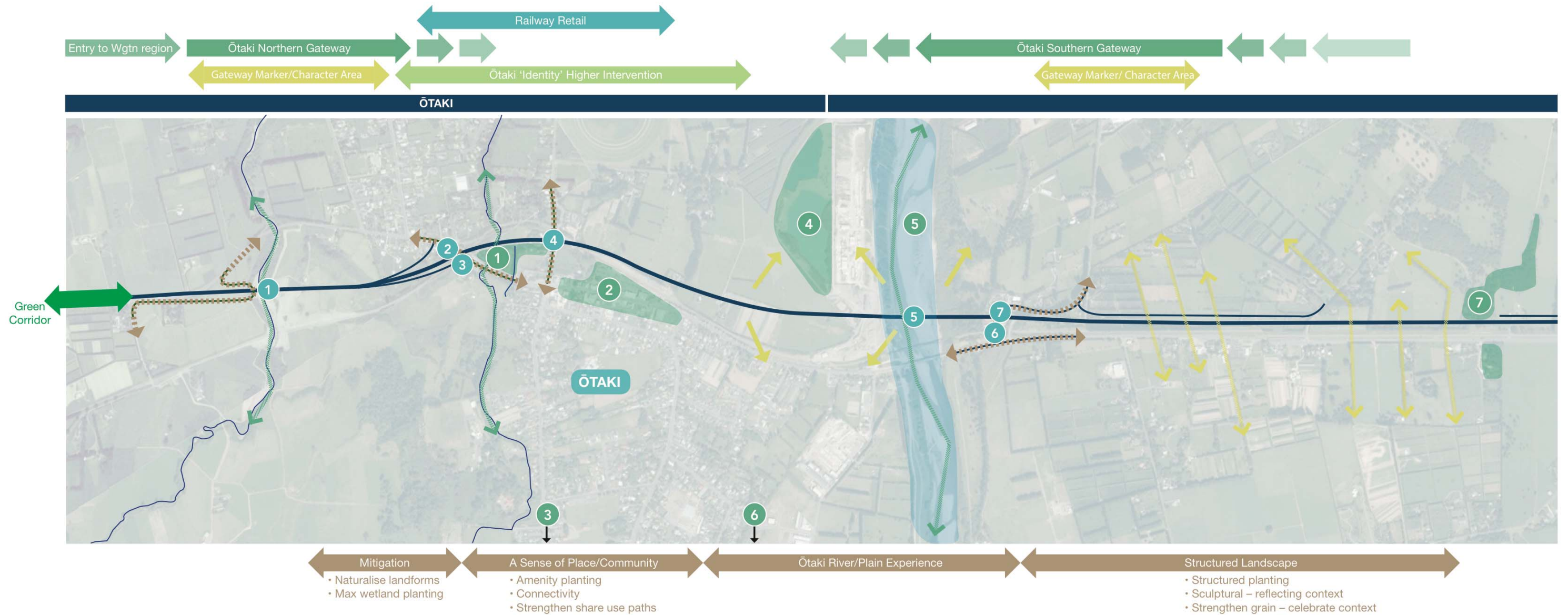


Figure 13. Overarching Concept Diagram



## Proposed Expressway Alignment with Overarching Concept



### Key

- |  |                                  |  |                           |  |                                 |
|--|----------------------------------|--|---------------------------|--|---------------------------------|
|  | Proposed Expressway              |  | Pare-o-Matangi Reserve    |  | Waitohu Stream Bridge           |
|  | Physical East-West Connections   |  | Ōtaki Railway Retail Area |  | North Ōtaki Main Road Underpass |
|  | Ecological East-West Connections |  | Ōtaki Township            |  | North Ōtaki Rail Overpass       |
|  | Visual East-West Connections     |  | Ōtaki Lake Development    |  | Rahui Road Underpass            |
|  | Existing Waterways               |  | Ōtaki River               |  | Ōtaki River Bridge              |
|  | Views over Landscape             |  | Ōtaki 'Clean Tech' Area   |  | South Ōtaki Rail Overpass       |
|  |                                  |  |                           |  | Ōtaki Gorge Road Underpass      |



- 7 Hautere Bush
- 8 Cottles Bush
- 9 Makahuri Bush Remnants
- 10 Tararua Ranges Foothills
- 8 School Road Underpass
- 9 Makahuri Rail Overpass

Figure 14. Proposed expressway alignment with overarching concept



“ A key objective of the project, as set out in the ULDF, is to design the expressway as a green corridor to integrate with the Roads of National Significance projects to the south and north.

#### 4.1 Green Corridor

The expressway will be experienced in multiple ways, from high speed transit through to slow speed east-west connections, and shared paths integrating with the existing residential, rural and urban fabric.

As such, a variety of landscape treatments will be employed to provide visually stimulating, attractive environments that are experienced at a range of scales and speeds and serve to celebrate a localised ‘sense of place’.

Planting for landscape mitigation, ecological enhancement, framing of key views, and visual amenity extends the length of the project.

The linear nature of the expressway, combined with the wide cross section that comprises of the expressway, local roads and rail corridor, has the potential to create a very linear and ‘tunnel-like’ effect. A number of design tools have been employed to ensure a much more sensitive outcome, such as reducing the corridor width where possible through the geometric design and retaining the existing rural character close up to the expressway. This includes the option to return land to adjoining neighbours, allowing the agricultural and horticultural activities to be present and visible from the expressway. This emphasises the unique and changing character of the surrounding landscape.

Another key aspect of mitigating the linear effect is to open up key views along the journey. A number of key views have been identified in the ULDF such as the foothills of the Tararua Ranges, gateway zones, sand dune topography, and Makahuri bush remnants. The design responds to these key views as important design drivers.

In areas such as Makahuri and the School Road Underpass, the planting is deliberately intensified with a focus on verticality to create areas of compression so as to heighten the effect of opening up views across the landscape along the straights. Furthermore, views to the Tararua Ranges are preserved with breaks in shelter belt planting, and open areas of pasture grass. The overall effect is to create an expressway experience that provides a balance of consistency and variety.



Figure 15. Illustrative cross section looking south at the Te Horo straight



## 4.2 East-West Connections

The expressway runs north to south traversing a range of landscape character areas as discussed. Of equal importance (particularly to the 'reading' of the landscape) are the east-west connections. These are significant for both physical connectivity (through bridges and underpasses), visual connectivity from the mountains to the sea, and the expression of the underlying hydrology and ecology with significant waterways bisecting the expressway.

In landscape terms, the strategy is to mark these east-west connections so that they register with expressway users and form important landmarks and reference points along the journey. The connections will be reinforced by landform and reflect the local character through planting.

### Bridges

Bridges form an important part of the east-west narrative and are discussed in detail later in this document. An intensification of planting around bridge structures combine with the urban design of the structures to create meaningful elements that are stitched into the surrounding landscape.

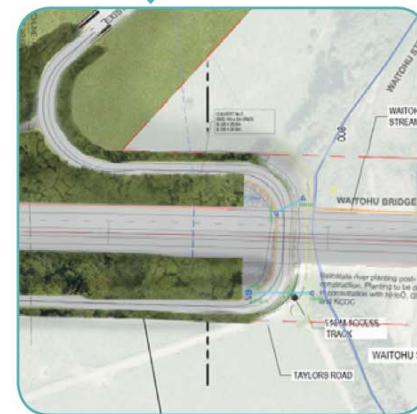
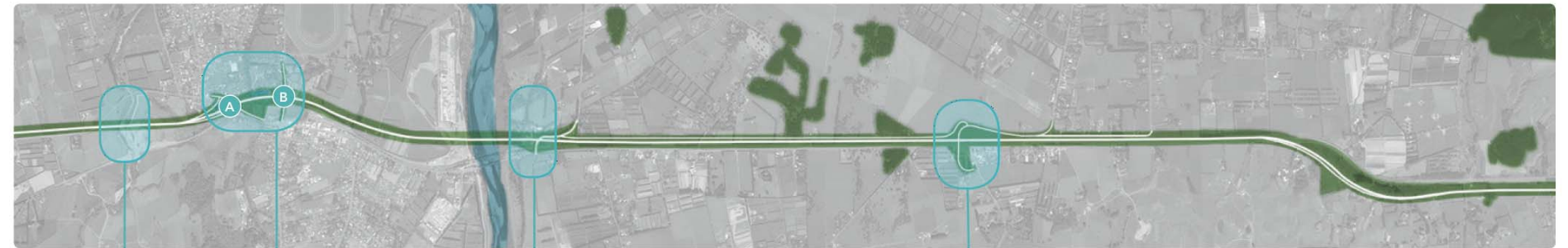
### Waterways

A number of waterways bisect the expressway moving from the ranges in the east toward the coast on the west. These waterways are important to the ecological and environmental story of the area. Where they bisect the expressway it presents an opportunity to mitigate the negative effects of surrounding agricultural practice in this highly modified environment. Through riparian planting, fencing and adjacent native 'buffer' planting, these waterways will be protected, enhanced, and celebrated.

### Pedestrian Connectivity

Pedestrian connectivity across the expressway is critical to maintaining local connections. Pedestrian footpaths accompany local vehicle bridges and provision is also made for cycling and horses.

## Physical East-West Connections



### Taylor's Road

East west community connection and Northern Gateway character area

Maximise landscape amenity and access to Waitohu stream

Planting to reflect Waitohu stream and agricultural land



### North Ōtaki Main Road + Rahui Road

East west community connection

Maximise landscape amenity and connection to railway retail area

Minimise visual appearance of bridge between community



### Ōtaki Gorge Road

Create clear lines of sight through vertical planting

Integrate bridge form into surrounding landscape

Bridge to recede behind embankment landscape

Planting to enhance Southern Gateway character area



### School Road

Amplify ecological connection

Integrate bridge form into surrounding landscape

Bridge to recede behind embankment landscape

Figure 16. Proposed alignment with detail plans. Refer to landscape plans for detail.



### 4.3 Connectivity

The addition of shared use paths to the expressway will provide safe movement within the community and encourage pedestrians to avoid using the shoulder of the expressway.

- The most southern extent of the shared path will extend from Te Hapūa Road to Te Kowhai Road and link into the M2PP path
- Provision for walking and cycling paths has been made over the new bridges to provide a safe connection over the expressway

- |  |   |
|--|---|
| <b>A</b> Haruatai Park                   | <b>1</b> Waitohu Stream Bridge                  |
| <b>B</b> Pare-o-Matangi Reserve          | <b>2</b> North Ōtaki Main Road <u>Underpass</u> |
| <b>C</b> Ōtaki Train Station/Retail Area | <b>3</b> North Ōtaki Rail Overpass              |
| <b>D</b> Ōtaki Racecourse                | <b>4</b> Rahui Road <u>Underpass</u>            |
| <b>E</b> Ōtaki Domain                    | <b>5</b> Ōtaki River Bridge                     |
| <b>F</b> Hautere Bush                    | <b>6</b> South Ōtaki Rail Overpass              |
| <b>G</b> Cottles Bush                    | <b>7</b> Ōtaki Gorge Road <u>Underpass</u>      |
| <b>H</b> Te Horo Township                | <b>8</b> School Road <u>Underpass</u>           |
| <b>I</b> Makahuri Bush Remnants          | <b>9</b> Makahuri Rail Overpass                 |
| <b>J</b> Te Hapūa Bush                   |   |
| <b>K</b> Tararua Ranges Foothills        |   |

- Key**
- Former SH1
  - Proposed Expressway
  - Existing River/Stream
  - Beach Roads
  - Key Amenity Areas
  - Rail NIMT
  - PP2Ō CWB Extension (To match M2PP)
  - Existing Ōtaki River Walkway
  - 2.5 Shared Path Access (Unless otherwise stated)
  - Provision for Future Shared Path
  - Potential Future Connection Points
  - Potential Gear Road Extension

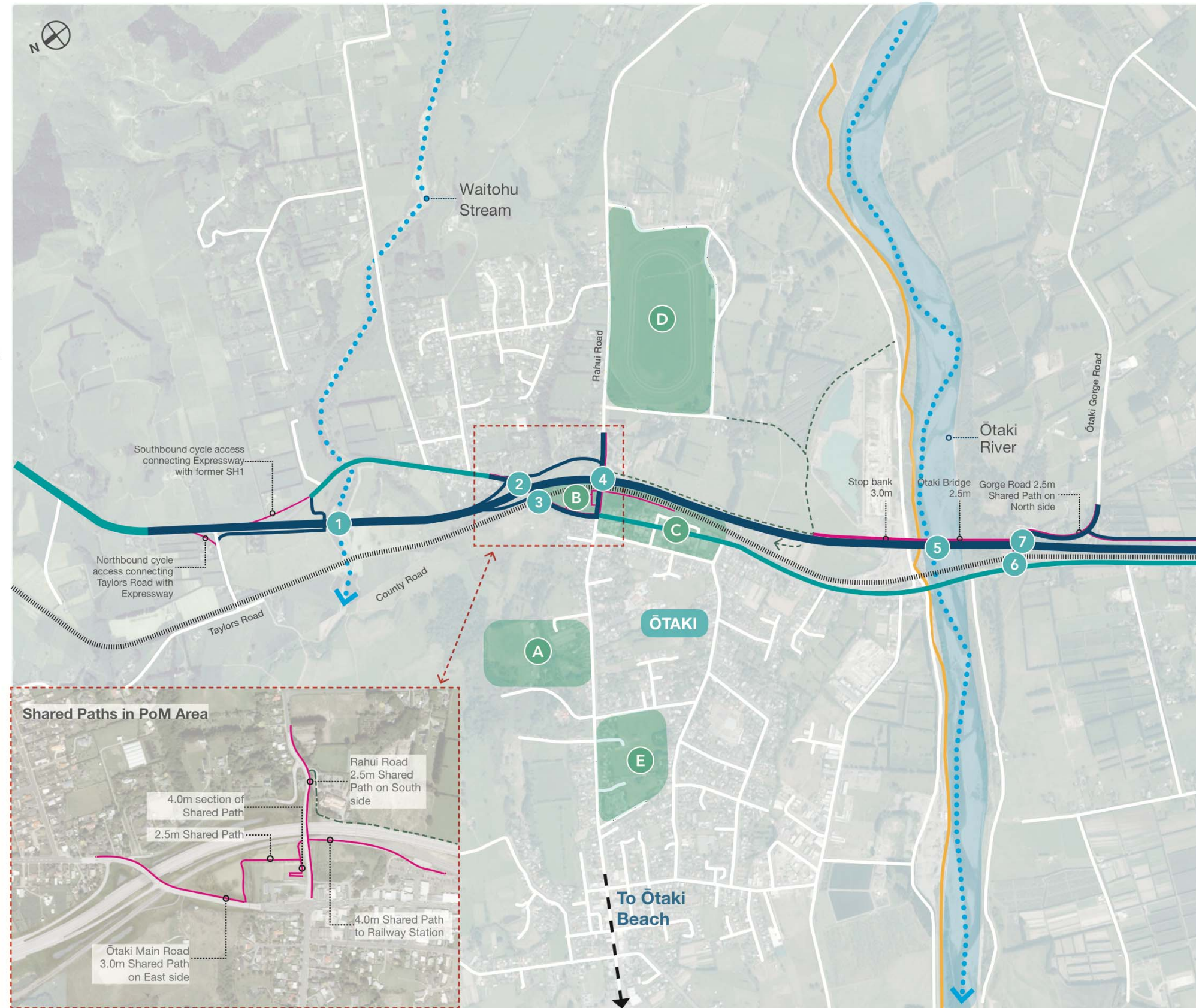


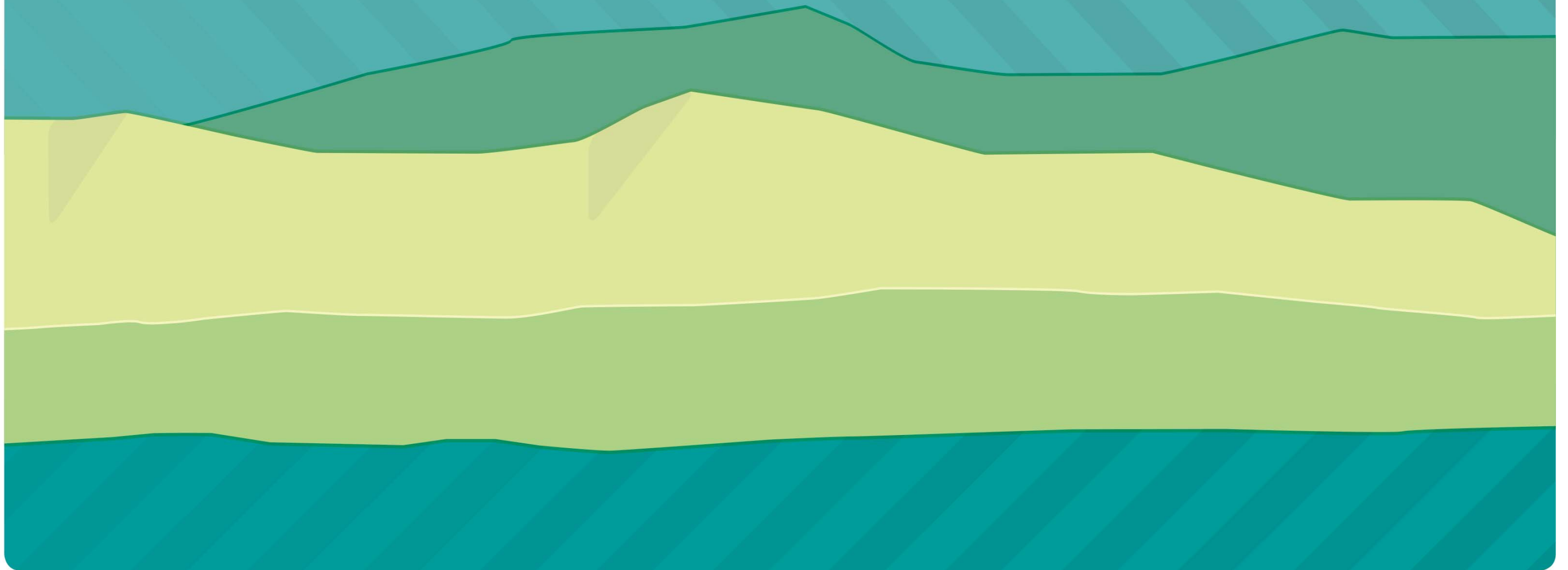




Figure 17. Proposed and existing shared path locations

05

# Landscape & Ecology





The LUDP and Ecological Management Plan (EMP) have been undertaken in tandem and should be read in conjunction. This is to ensure that objectives of the EMP are reflected in the LUDP, and that the LUDP supports the requirements of the EMP to provide the best possible integrated outcomes. The two documents will guide the detailed design and construction phase of the project.

The following section outlines the approach to ecology and key ecological areas, landform, earthworks and planting.

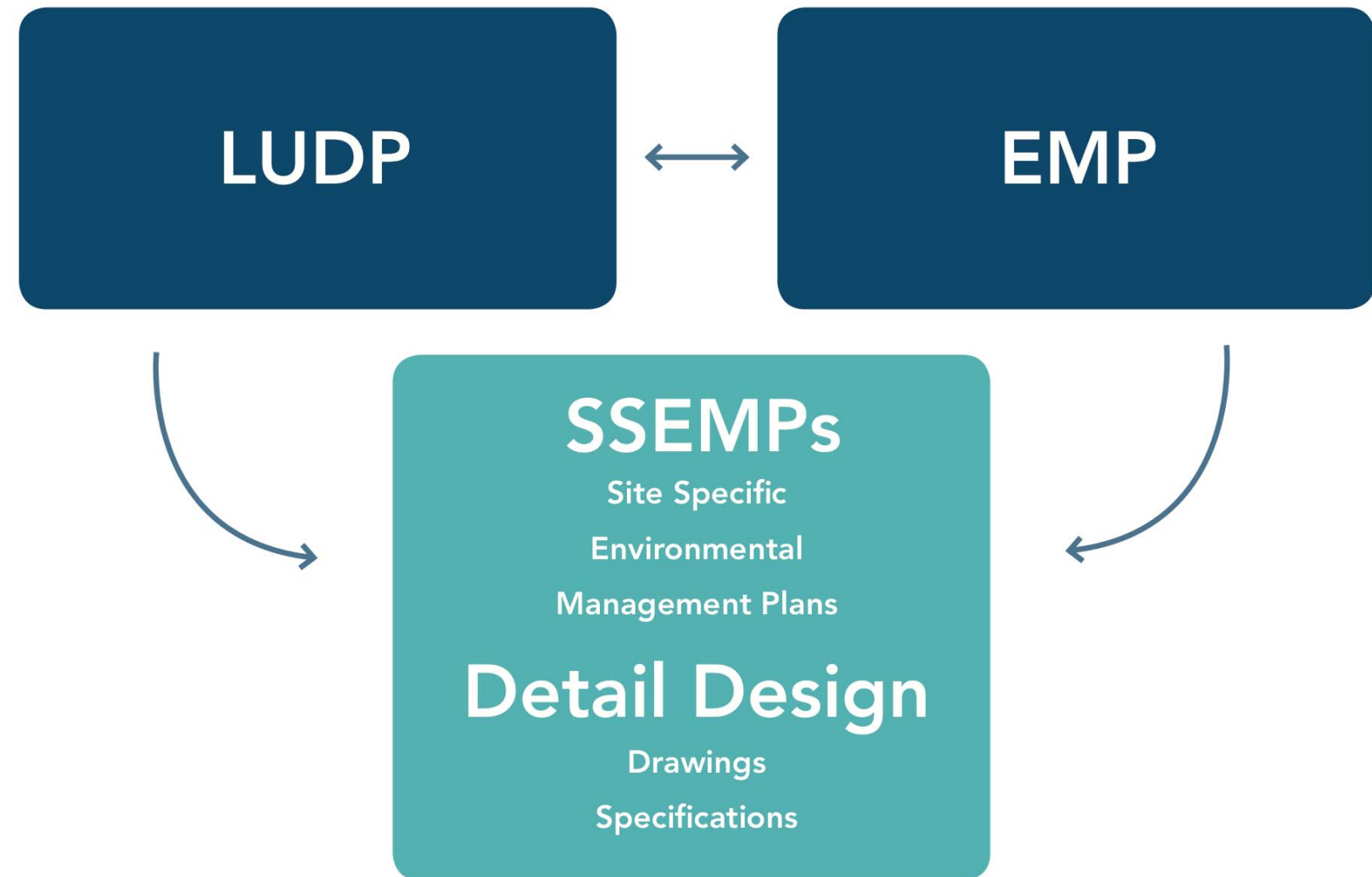


Figure 18. Cooper Skink



Figure 19. Koura

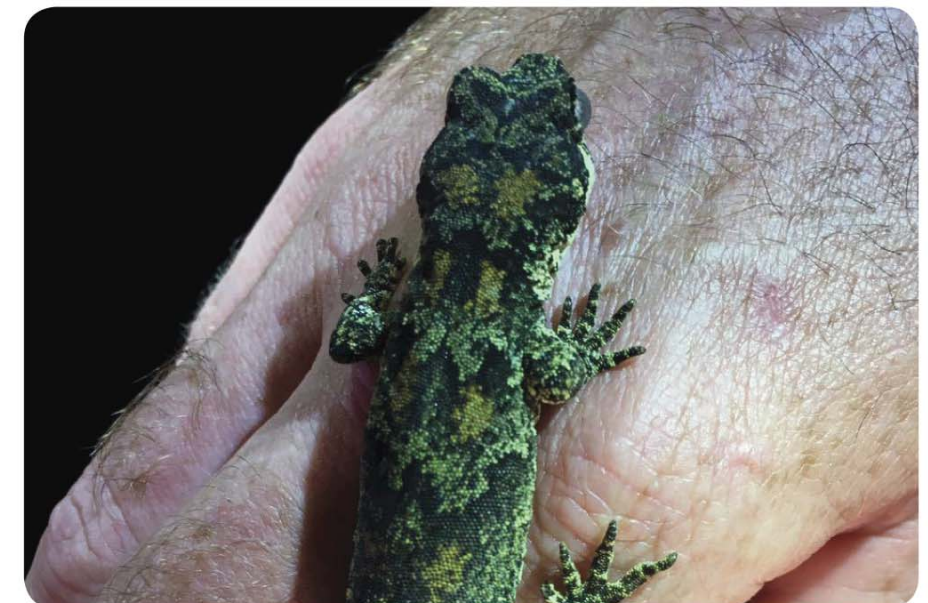


Figure 20. Forest Gecko



## 5.1 Ecology

As required by the consent conditions, a minimum of 38ha of native planting will be undertaken along the length of the project. Additional to this, in excess of 1.1ha of wetland habitat, including restoration of swamp forest and wetland habitat at Makahuri will be planted within designation. Outside of designation 1.5ha of indigenous terrestrial forest species and 2.6km of riparian planting is proposed to meet consent conditions.

Key locations for ecological restoration work along the expressway include Makahuri, the remnant Ōtaki Railway Wetland, Jewell stream and Te Horo forest remnants.

Native lizards, at risk Ōtaki land snails and the small vulnerable insects such as velvet worms will be surveyed and rescued from the small patches of native forest within the expressway footprint and moved to safe habitats. Important habitat features for those species, such as old logs, will also be salvaged and transferred to the relocation sites.

Native dotterels will be monitored and nesting habitat for these nationally vulnerable birds will be enhanced upstream of the Ōtaki River bridge site.

Native fish such as the whitebait species, brown mudfish and eels will be surveyed and moved from harm's way at new stream crossing and diversion sites. New stream diversions will be designed to match existing stream habitats and enhanced with planting to improve shading and habitat.

All new stream diversions and culverts will include specific design features that assist native fish species to move freely between habitats upstream and downstream of the expressway to complete their life cycles.

### Strategy for Consistency

The key principles and approaches that will be employed to minimise adverse ecological effects and optimise ecological and landscape benefits, include:

- The use of highly qualified ecologists who are experienced in managing all types of ecological effects associated with roading projects. Specifically, the project ecology team includes terrestrial, wetland and freshwater ecologists
- Working closely with local Iwi who are involved in the development of mitigation plans and ecological monitoring & management work on the ground
- A focus on long-term tangible mitigation outcomes



Figure 21. Riparian planting



Figure 22. Giant kokopu



Figure 23. Banded dotterel



### Optimising Ecological Benefits

The expressway alignment passes through a highly modified landscape, of which indigenous habitats and vegetation have been significantly reduced with only 1.7% of indigenous vegetation cover and 1.3% of wetland habitat now remaining. What does remain therefore warrants efforts to both minimise adverse effects and to appropriately mitigate for effects that cannot be avoided.

The expressway design will have potential adverse ecological effects on forest, wetland and stream/river habitat types and associated species. However, these have been reduced by:

- Vertically lowering the alignment in several locations, which results in significantly less earthworks and a reduction in the overall alignment footprint relative to the Specimen Design
- Significantly reducing the quantum of stream diversions that are required

Planting can often serve dual purposes and as such every endeavour has been made to create opportunities not only for landscape mitigation but to link ecological communities and provide environmental benefits.

By aligning ecological and landscape objectives, significant native landscape plantings have been included at locations immediately adjacent or in close proximity to sites of existing ecological value and ecological mitigation sites that are required by consent conditions (i.e. at Ōtaki Railway wetland, Kennedy's Wetland, Makahuri, Cottle's Bush, Te Hapūa Bush and Hautere Bush). These landscape plantings will benefit and optimise existing ecological values by:

- Increasing the areal extent of habitats (i.e. existing habitats and ecological mitigation sites required by consent conditions)
- Providing an ecological buffer to existing habitats to reduce edge effects
- Improving ecological connectivity in the landscape through:
  - » The provision of 'ecological stepping stones' to reduce distances between suitable habitat patches
  - » Joining of smaller habitat patches into larger contiguous habitat patches
  - » Improved linkages between similar habitat types and improved linkages between freshwater streams, wetlands and terrestrial habitat types.

### Wetlands and Streams

Wetlands and streams form critical components within the expressway from stormwater, ecological and amenity perspectives. Water quality is also of critical concern to Ngā Hapū o Ōtaki - having a long term view to the sustainability of the wetlands and streams as sources of eel and fish for harvest by future generations.

Development of wetlands (including enrichment of existing wetlands) and riparian planting will be carried out in conjunction with the project ecologist and Environmental Management Plan, in accordance with consent conditions.



Figure 24. Powelliphanta traversii (native snail)



Figure 25. Native seedlings



Figure 26. Brown mudfish



## 5.2 Railway Wetland

### Ōtaki Railway and Kennedy Wetlands

The existing Ōtaki Railway wetland is an important ecological feature that is dominated by raupō marsh with several other native plant and animal species also common. This ecological character will form an important part of the expressway users experience and understanding of the Ōtaki rohe. The wetland is a key focus of the projects ecological mitigation work due to its ecological significance. Wetland mitigation measures will focus on minimising effects and optimising like-for-like habitat creation in available areas within the Remnant Wetland East, Remnant Wetland West, in Kennedy Wetland and also at Makahuri.

- 1 Remnant Wetland East
- 2 Kennedy's Wetland
- 3 Railway Wetland
- 4 Remnant Wetland West
- 5 Pare-o-Matangi Reserve

The landscape planting strategy for this area is to provide visibility to the wetlands and strengthen users experience and understanding of the Ōtaki rohe, and will include the following species:

- Raupō
- Harakeke
- Tī Kōuka



Figure 27. Proposed Railway Wetland



## 5.3 Cottles & Hautere Bush

### Hautere Plains:

#### Existing totara remnants at Hautere Bush and Cottle's Bush

Remnant stands of totara and native planting exist at Hautere Bush and Cottle's Bush with scattered native trees (predominately totara) between. This area is recognised as significant in terms of ecological importance and opportunity. The design looks to intensify planting of native terrestrial species and native screen planting in this area to protect, enhance and link the bush remnants. Native planting is proposed along this stretch to Te Horo and will comprise in excess of the 1,000 totara, 100 titoki, and 100 matai required in the designation conditions as well as other appropriate species. Plants will be selected to encourage self sustainability once established.

Buffer planting adjacent to the expressway will mitigate the 'edge effect' created during construction.

- 1 Native terrestrial mitigation planting with totara dominant enrichment planting - stitching together remnant sections of bush
- 2 Planting will be fenced to exclude stock
- 3 Kilns to be relocated on property to the east

The landscape planting strategy for this area is to protect, enhance and link bush remnants, and will include the following species:

- Totara
- Titoki
- Matai
- Narrow Leave Maire



Figure 28. Proposed Cottles and Hautere Bush



## 5.4 Makahuri

### Makahuri

The Makahuri area presents the greatest opportunity for ecological mitigation on the project. The area is adjacent to an existing pukatea-kahikatea dominated swamp forest remnant that will be expanded through wetland mitigation planting. Small areas within Makahuri are also suitable for the recreation of raupō marsh wetland habitat and this will enable like-for-like mitigation for the loss of raupō-carex habitat within Ōtaki Wetland. Finally, non-wetland terrestrial habitat will be planted in appropriate areas to optimise the biodiversity within the site and enhance linkages across multiple habitat types. Iwi have a strong interest in this area as a potential location of a Kete Kai and will be involved in the specification of (rongoā) species, which could be locally sourced, for example: a selection of a diverse range of harakeke for different weaving purposes.

The completed planting will include riparian, low stature, wetland, swamp forest and terrestrial habitats rich in biodiversity, and will be fenced to exclude stock. Further planting along Jewel stream will create a series of east-west ecological stepping stones through to the coast. Makahuri will become a significant visual marker and reference point for the health and vitality of the region.

- 1 Treatment wetland outside of ecological area to the eastern side of the expressway
- 2 Accessibility for cultural harvest, includes groves of kanuka and manuka for bees and harakeke for weaving. Extent TBC with iwi, KCDC and NZTA
- 3 Terrestrial enhancement planting
- 4 Swamp forest planting
- 5 Low stature wetland planting
- 6 Adjacent native bush retained

The landscape planting strategy for this area is to provide visibility to the wetlands and focus on signature species associated with them, for example:

- Kahikatea
- Pukatea
- Swamp Maire

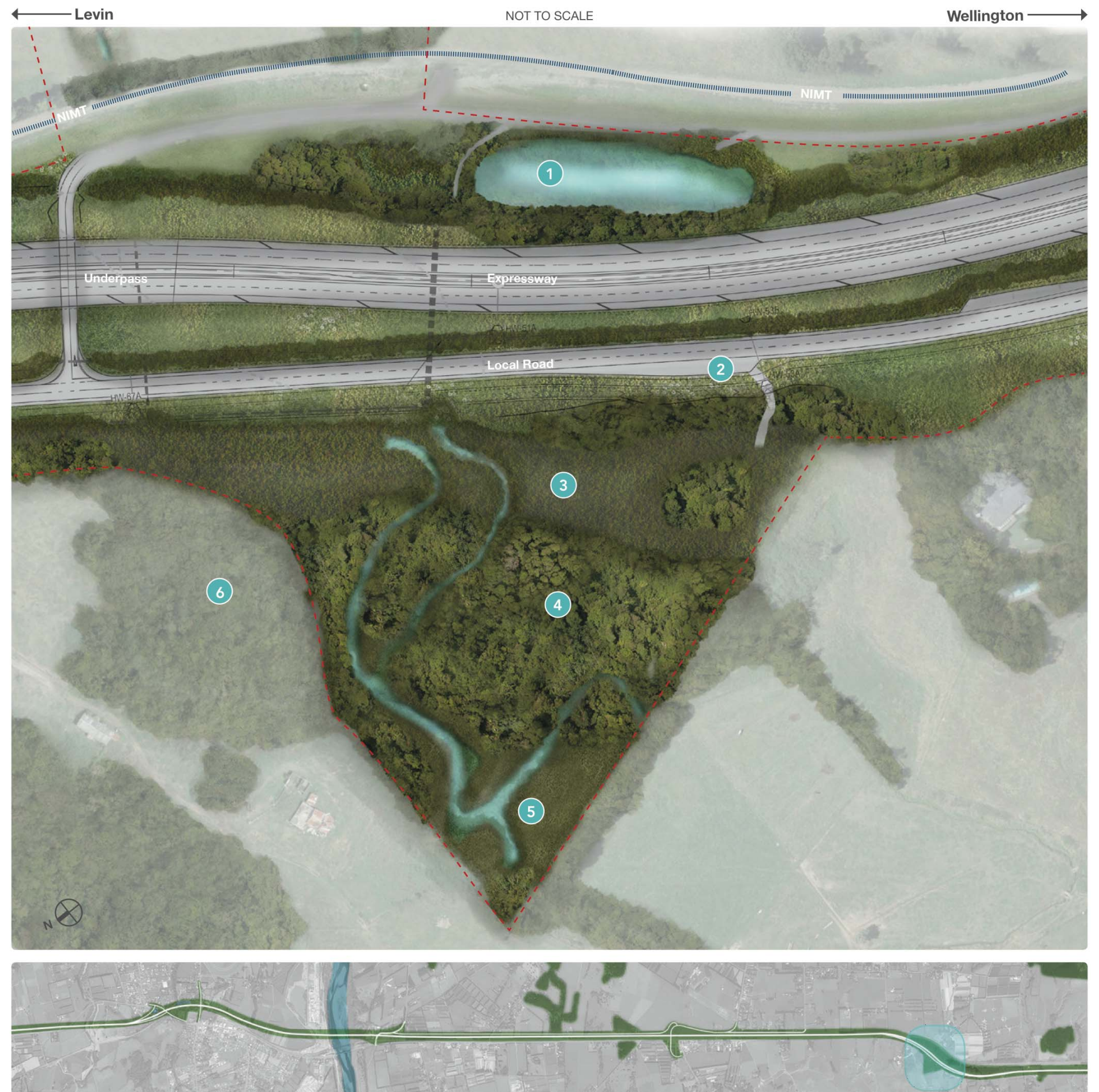


Figure 29. Proposed Makahuri



### 5.5 School Road Underpass - Mangaone Stream

The School Road Underpass and Mangaone Stream are an important east-west connection. From an urban design aspect the planting around the overpass has been maximised to form a 'marker' for Te Horo. This intensification of planting also provides ecological benefits by linking terrestrial and stream ecologies with the Mangaone Stream.



Figure 30. Mangaone Stream planting plan

### 5.6 Te Hapūa Bush

Te Hapūa Bush is a significant area of native vegetation along from Makahuri requiring minimisation of loss and protection of the forest edge. The exposed edge will be protected during construction and species selected to provide a long-term buffer from the expressway.



Figure 31. Te Hapūa Bush planting plan

“ An important objective of the landscape strategy is to support and enhance the ecological aims of the project.



Figure 32. Proposed Mangaone Stream/Te Hapūa Location



## 5.7 Riparian Planting (Outside Designation)

In compliance with resource consent condition G46 b), riparian mitigation planting is required for 2601 linear metres of planting to a minimum of 20m each side of the Water Body, unless agreed by the manager. Initially this planting was proposed along Mangaone Stream.

Following consultation with Greater Wellington Regional Council around suitability and flooding on Mangaone Stream, it was proposed that the riparian mitigation planting be located instead at Jewel Stream. The total length of riparian planting planned is 2,610m. The planting width has been reduced to 5m with agreement of GWRC. The properties involved are all small land holdings and using a 5m planting width significantly simplified the process of getting the landowner agreements. Also, some sections of planting will only be on one bank, this has been done with agreement with GWRC to allow GWRC to access the stream for future maintenance.

Refer Opus 'Draft PP2O Mitigation Planting Outside Designation Management Plan'.

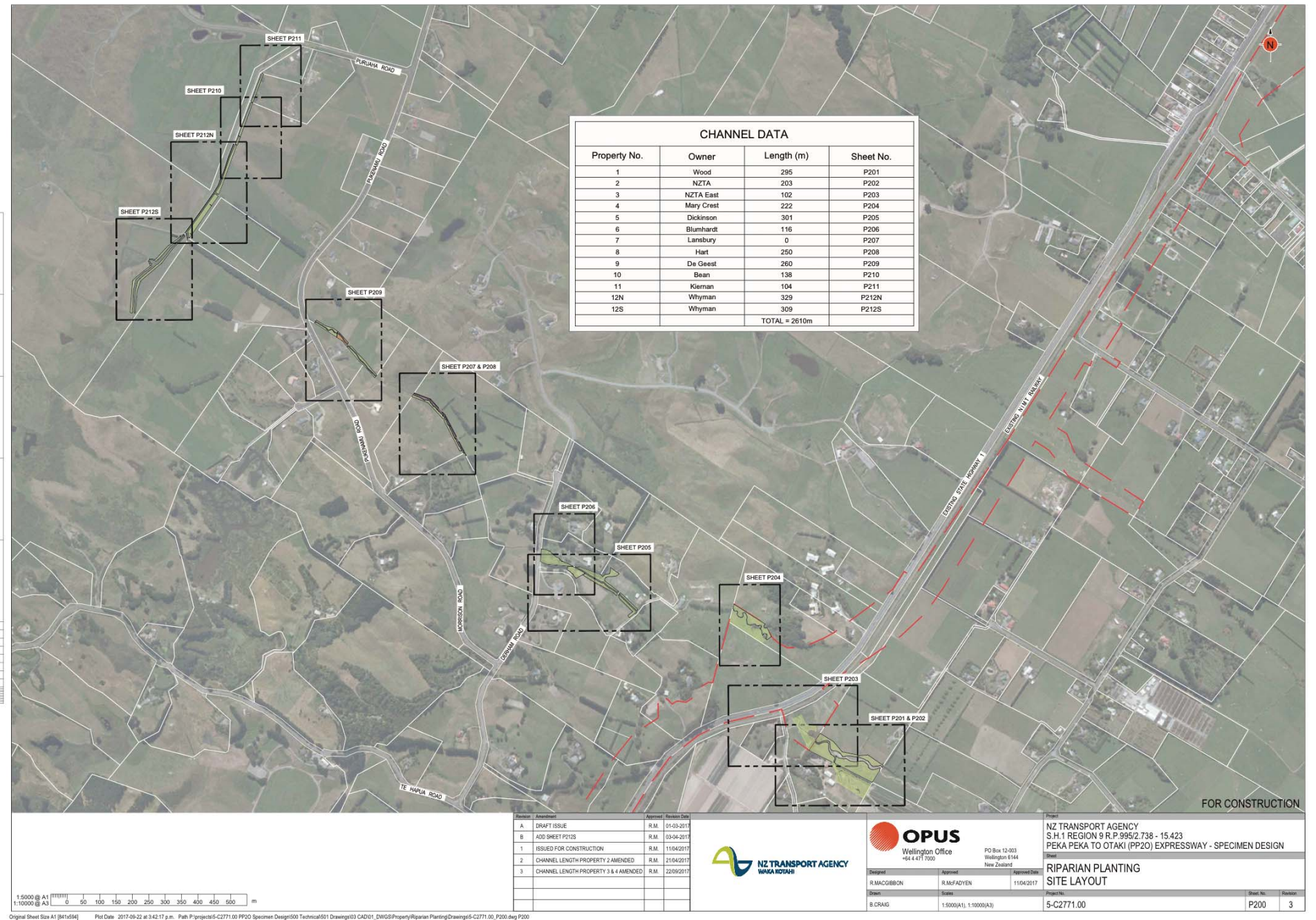


Figure 33. Proposed riparian planting

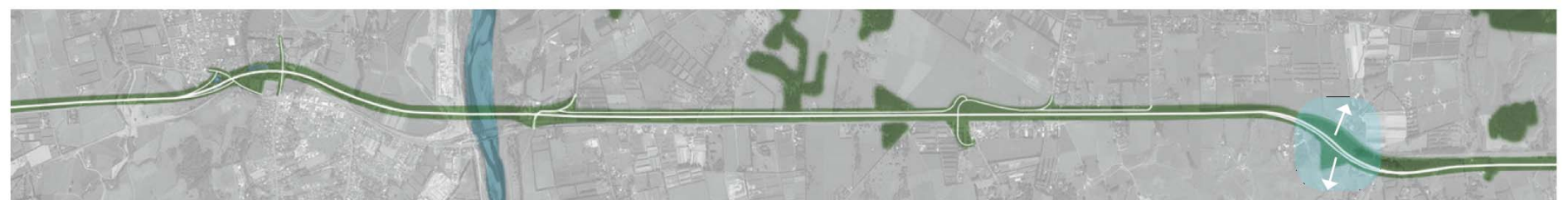


Figure 34. Proposed riparian location



## 5.8 Terrestrial Mitigation Planting (Outside Designation)

In compensation for habitat disturbance, as part of resource consent conditions - G. 46 a) NZTA are required to plant at least 1.5 ha of edge and inter-planting of indigenous forest species (Ecosystem Type WF2). Following the completion of the planting, the consent holder (NZTA) shall ensure the full area, being the entire forest remnant where planting has been undertaken, is fenced and legally protected.

An area for this planting has been identified by Opus and will be undertaken by them. Refer Opus 'Draft PP2O Mitigation Planting Outside Designation Management Plan'.



Figure 35. Mitigation Planting outside Designation Management Plan

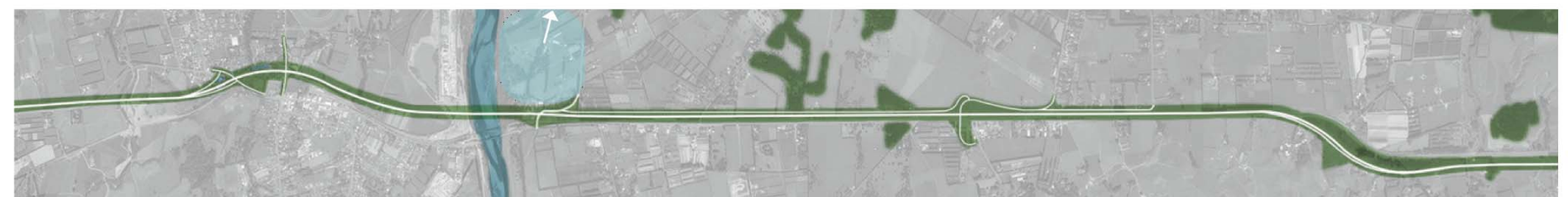


Figure 36. Proposed terrestrial mitigation location



## 5.9 Stormwater Treatment

A comprehensive stormwater treatment scheme has been developed that manages stormwater runoff through a system of swales and wetlands. The scheme aims to achieve the best possible water quality results. Low-maintenance and long-term effectiveness are also seen as key to success.

### Swales

Swales form a significant component of the expressway corridor as part of the stormwater treatment train. Combining swales for the expressway and local roads where practicable, allows for a reduction in the overall number of swales. This reduces the overall maintenance required and whole of life costs without compromising on water treatment or stormwater functionality.

The design proposes four strategies for treatment of the swales:

1. Cobbled swales
2. Grassed swales
3. Planted swales
4. Soakage swales

### Cobbled Swales

The underlying geology provides the opportunity to create ‘cobbled’ swales by exposing the layer of stone and gravels below and retaining this as the base of the swales in appropriate locations.

This is in keeping with the ‘story’ of the area and helps in the reading of the geological landscape by referencing the alluvial plains beneath. The additional benefit is a reduction in maintenance due to a reduced area of mowing required. Planting and landscape treatment up the sides of the swales will be varied in line with the overall strategy for the green corridor and the cobbled swales will terminate in appropriately sized areas of planting for stormwater treatment. Sections of grassed or planted swales will be created at the start, end and at intermediate locations within areas of cobbled swales to provide additional water quality treatment.

### Grassed Swales

Where the adjacent landscape is open pasture, the intention is that the swales and margins will be grassed so as to maintain existing landscape character and retain views. Grass swales may also be employed in locations where key views across the open plains are to be retained. Where grassed, sloped sides will be no greater than 1:4 for safe maintenance.

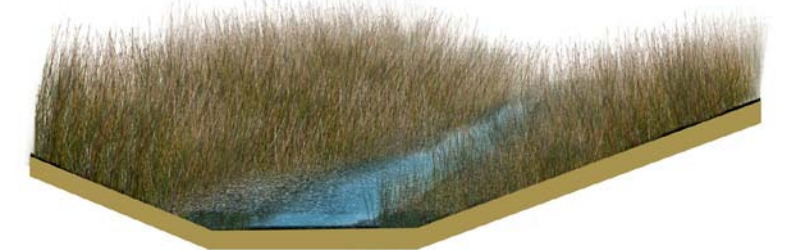
### Planted Swales

In areas of dense planting or wetlands (such as around Makahuri and through Ōtaki) the swales will be planted to contribute to the landscape character and ecological biodiversity.

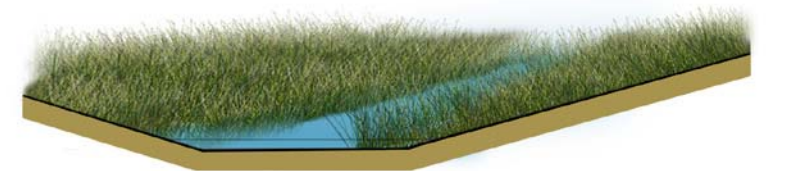
### Soakage Swales

Alongside the existing railway between the Ōtaki rail station and the Ōtaki River, rainfall falling on the local floodplain currently soaks into the ground, recharging the local groundwater. This situation will be preserved in the proposed situation via culverts under the expressway that will maintain the connection between the local floodplain and current areas of soakage, and also by creating ‘soakage swales’ alongside the expressway. The soakage swales will be similar in appearance to the cobbled swales described above. Expressway runoff will be treated prior to entering the soakage swales by disperse sheet flow across vegetated or grassed strips, and by dedicated sections of grassed or planted swales.

### Cobbled/Soakage Swales



### Grassed Swales



### Planted Swales



Figure 37. Proposed swale visualisations



## 5.10 Planting

Beyond the ecological mitigation planting, the consent conditions require approximately 38ha of native planting landscape treatments over the project length.

Planting palettes have been developed to provide visual stimulation and variation across the length of the project, reflecting the character of adjacent land-use, land form & ecological and vegetation patterns.

Plant material will be genetically sourced from the ecological district as much as practical, and emphasis will be given to establishing self-sustainable habitats and ecosystems.

All engineered landforms will be top soiled with 300mm of topsoil for planting. Peat won from the site will be utilised where possible, as has been done very successfully on M2PP. Trials and testing developed for M2PP will be adopted for PP2O and the peat will be modified as required to ensure that an optimum growing medium is achieved.

Non-engineered areas will be grassed or planted with appropriate species for the specific conditions with topsoil limited to localised planting holes.

A programme of enrichment planting will introduce a broader range of species once initial planting has established.

Rapid and sustained plant growth will be achieved through:

- Using adequate topsoil coupled with the use of plant fertiliser tablets
- Undertaking all planting in late autumn/early winter (peak planting period), to ensure that root structures have developed adequately prior to spring growth
- Using high grade eco-sourced planting stock that is well adapted to regional conditions
- Customising plantings to local site conditions
- Robust maintenance programmes (particularly with respect to plant and animal pest management)

“ Planting forms a significant component of the green corridor approach, providing a cohesive experience, linking PP2O with M2PP, and reflecting the local landscape and ecologies.



Figure 38. Established wetland planting at M2PP

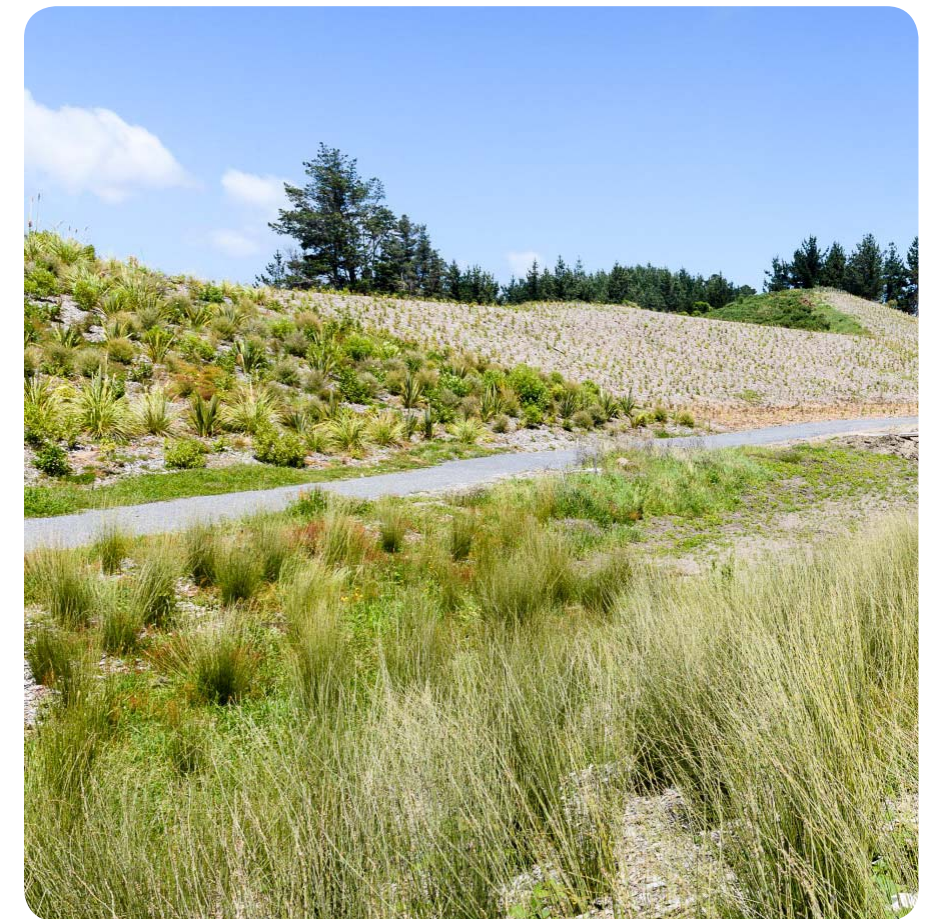


Figure 39. Established batter planting at M2PP



## 5.11 Planting Character Areas

Based on the four sectors of landscape character identified in section 3.1 the alignment has been broken down further into the broad planting character areas outlined below. These character areas help to inform the planting palettes for the length of the expressway identifying objectives and signature species.



Figure 40. Planting character areas

Character Area	North Ōtaki	Ōtaki Township Railway Wetland	Ōtaki River	Hautere Plains	Te Horo	Peka Peka – Makahuri
<b>Character</b>	<ul style="list-style-type: none"> <li>Rural landscape</li> </ul>	<ul style="list-style-type: none"> <li>Urban environment</li> <li>Ōtaki and Kennedy wetlands</li> <li>Pare-o-Matangi reserve</li> </ul>	<ul style="list-style-type: none"> <li>Alluvial plains</li> </ul>	<ul style="list-style-type: none"> <li>Remnant totara forest</li> <li>Productive rural land</li> </ul>	<ul style="list-style-type: none"> <li>Productive landscape</li> </ul>	<ul style="list-style-type: none"> <li>Swamp forest remnants</li> <li>Sense of compression</li> </ul>
<b>Objectives</b>	<ul style="list-style-type: none"> <li>Maintain views to rural landscape</li> </ul>	<ul style="list-style-type: none"> <li>Create identity for Ōtaki</li> <li>Reflect wetland character</li> <li>Mitigate visual effects of expressway on local community</li> </ul>	<ul style="list-style-type: none"> <li>Maintain views to and along river</li> </ul>	<ul style="list-style-type: none"> <li>Enhance ecological benefits</li> <li>Visually (and ecologically) connect remnant stands of totara</li> </ul>	<ul style="list-style-type: none"> <li>Maintain views to surrounding landscape</li> <li>Create strong east-west visual connection at Te Horo</li> </ul>	<ul style="list-style-type: none"> <li>Enhance ecological benefits</li> <li>Emphasise sense of compression</li> </ul>
<b>Signature Species</b>	<ul style="list-style-type: none"> <li>Kanuka/Manuka</li> <li>Taupata</li> <li>Mingimingi</li> <li>Coastal Tree Daisy</li> </ul>	<ul style="list-style-type: none"> <li>Raupō</li> <li>Harakeke</li> <li>Ti Kōuka</li> </ul>	<ul style="list-style-type: none"> <li>Toetoe</li> <li>Ti Kōuka</li> <li>Harakeke</li> <li>Akiraho</li> </ul>	<ul style="list-style-type: none"> <li>Totara</li> <li>Titoki</li> <li>Matai</li> <li>Narrow Leave Maire</li> </ul>	<ul style="list-style-type: none"> <li>Totara</li> <li>Titoki</li> <li>Matai</li> <li>White Maire</li> </ul>	<p>Swamp forest species:</p> <ul style="list-style-type: none"> <li>Kahikatea</li> <li>Pukatea</li> <li>Swamp Maire</li> </ul> <ul style="list-style-type: none"> <li>Kanuka/Manuka</li> <li>Matai</li> <li>White Maire</li> </ul>

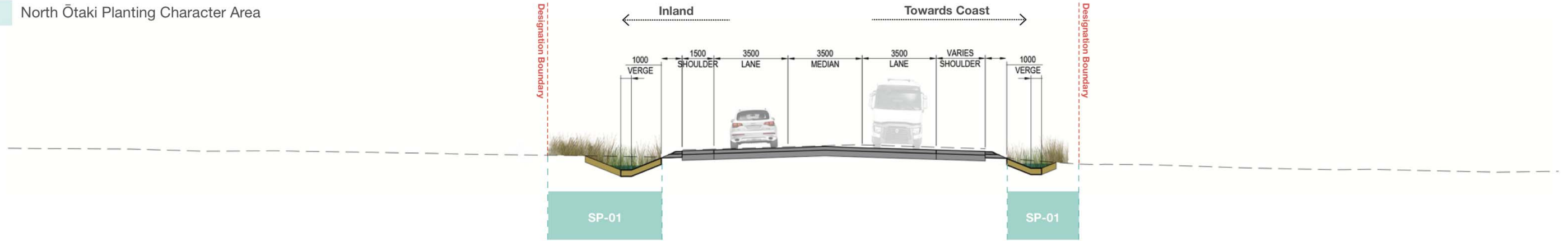


## 5.12 Cross Sections

### Cross Section A – Northern Tie-in

Scale @ A3 1:100 Chainage 200m

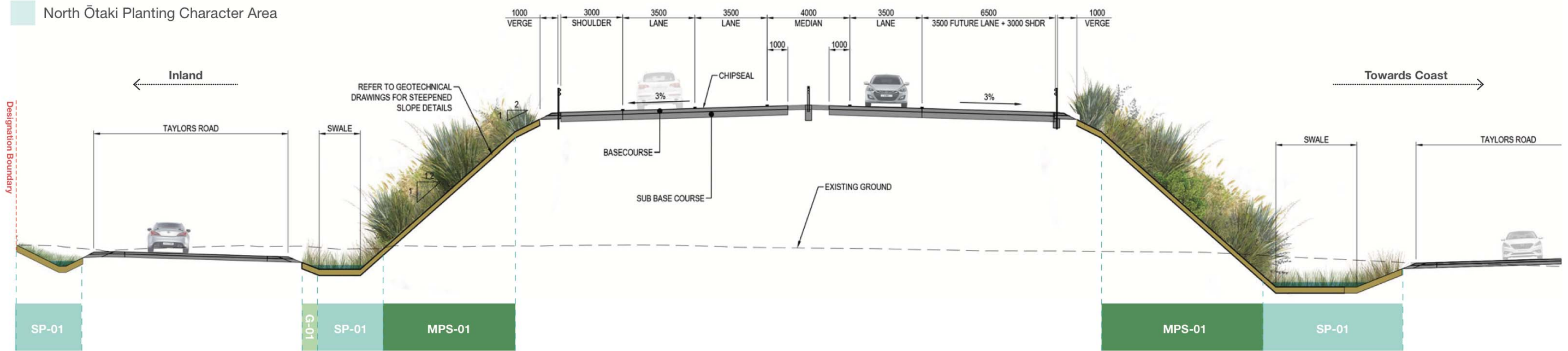
North Ōtaki Planting Character Area



### Cross Section B – Expressway and Taylors Road

Scale @ A3 1:100 Chainage 750m

North Ōtaki Planting Character Area



#### Key

- SP-01 Swale Planting
- G-01 Grass Planting
- MPS-01 Massed Planting Steep Sites



» Refer to section 5.14 *Planting Lists* for planting mixes

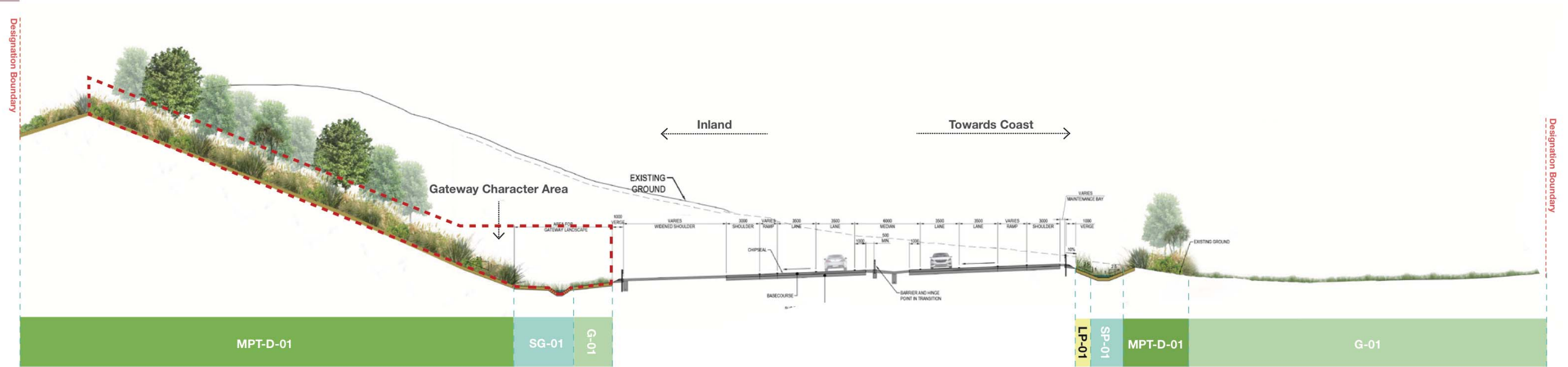
Figure 41. Cross sections through Ōtaki region at northern extent of proposed alignment



### Cross Section C – Expressway Northern Gateway Area

Scale @ A3 1:200 Chainage 1200m

Ōtaki Township / Railway Wetland Planting Character Area



#### Key

- MPT-D-01 Massed Planting with Tree Enrichment-Dune
- SG-01 Grassed Swale Planting
- SP-01 Swale Planting
- LP-01 Low Planting
- G-01 Grass Planting

» Refer to section 5.14 *Planting Lists* for planting mixes



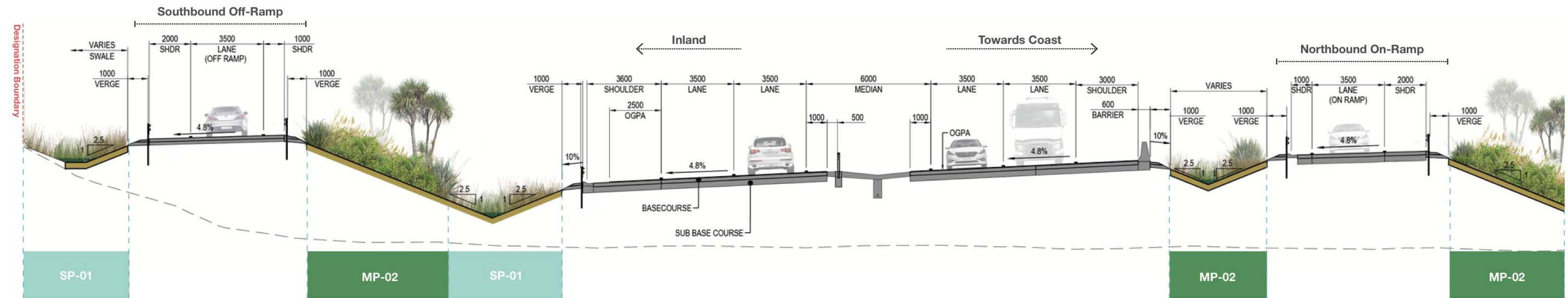
Figure 42. Cross sections through proposed alignment in the Ōtaki region



### Cross Section D – North Ōtaki Main Road, Southbound Off-ramp and On-ramp

Scale @ A3 1:100 Chainage 1500m

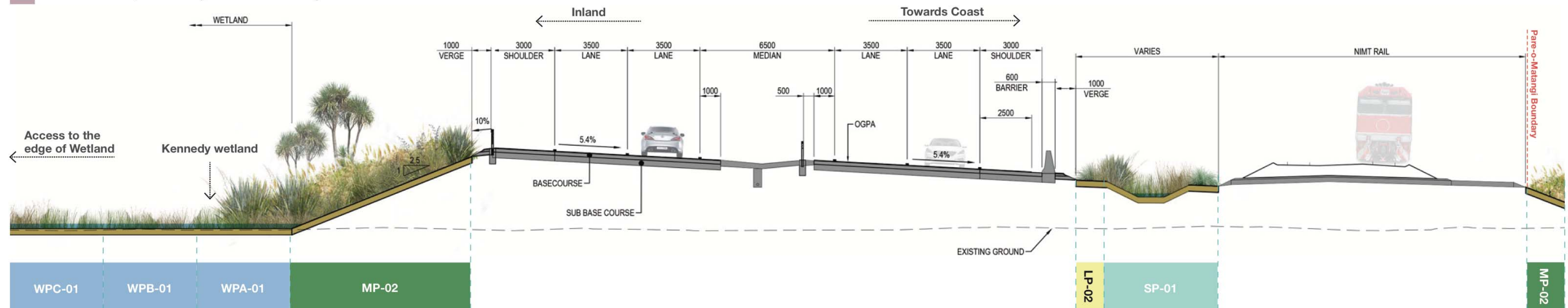
Ōtaki Township / Railway Wetland Planting Character Area



### Cross Section E – Expressway, Rail and County Road Wetland

Scale @ A3 1:100 Chainage 1900m

Ōtaki Township / Railway Wetland Planting Character Area



#### Key

- MP-02 Massed Planting
- LP-02 Low Planting
- SP-01 Swale Planting
- WPA-01 Wetland Planting - A
- WPB-01 Wetland Planting - B
- WPC-01 Wetland Planting - C

» Refer to section 5.14 Planting Lists for planting mixes



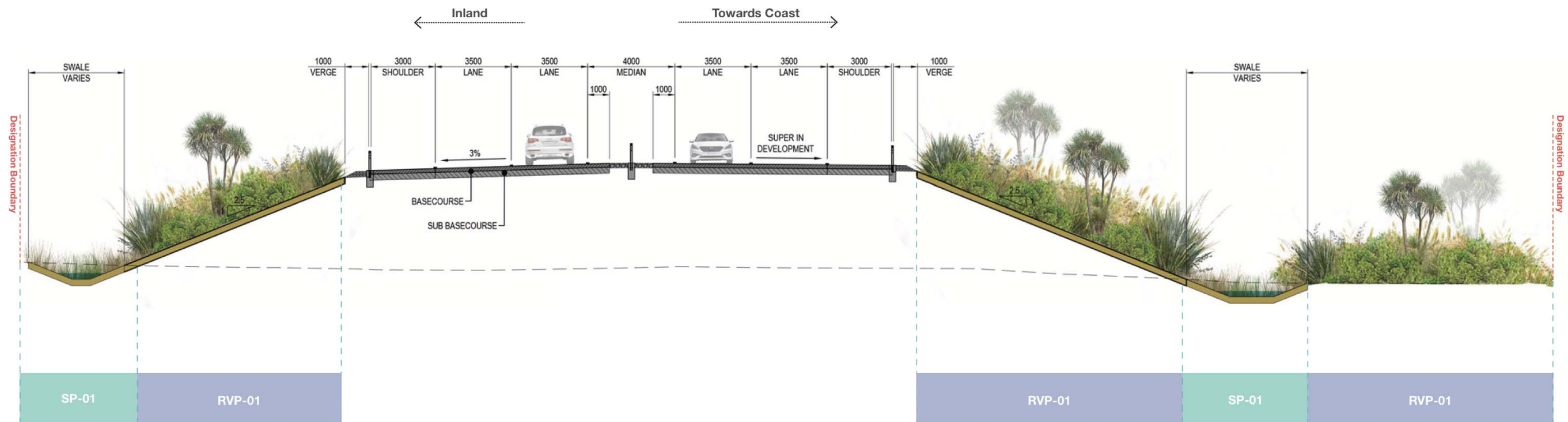
Figure 43. Cross sections through proposed alignment in the Ōtaki region



### Cross Section F – Expressway South to Ōtaki Bridge

Scale @ A3 1:100 Chainage 3250m

Ōtaki River Planting Character Area



#### Key

- SP-01 Swale Planting
- RVP-01 River Planting

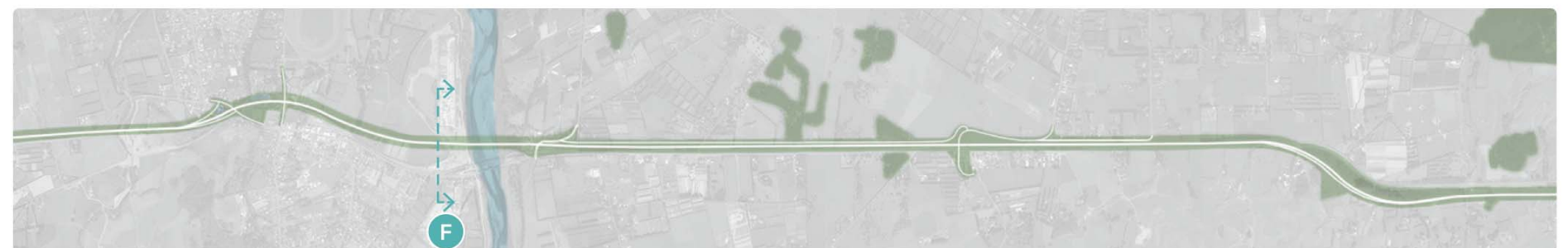


Figure 44. Cross sections through proposed alignment in the Ōtaki region

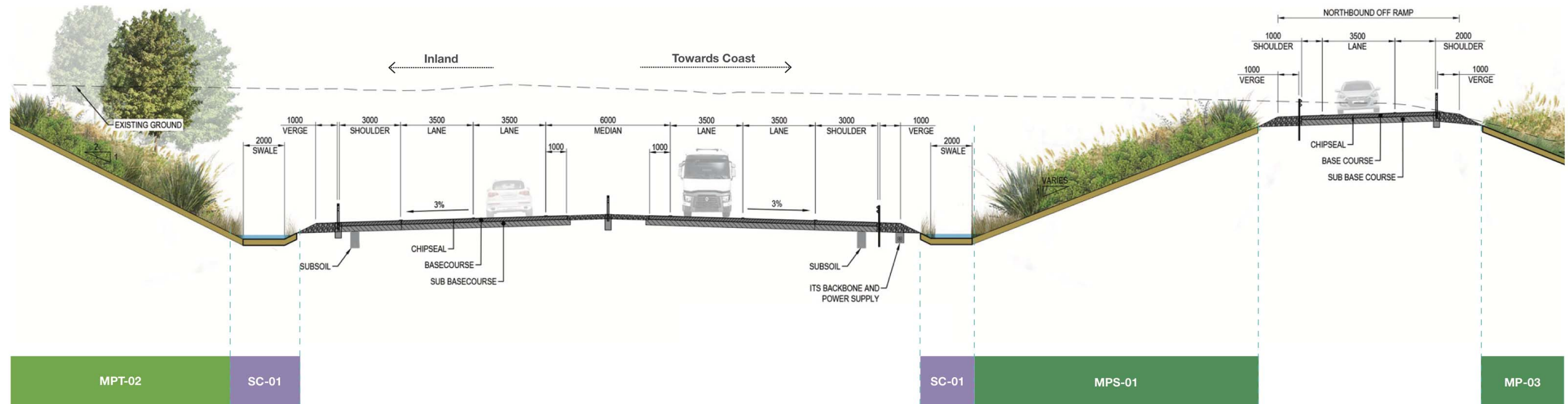
» Refer to section 5.14 *Planting Lists* for planting mixes



### Cross Section G – Expressway and Northbound Off-ramp

Scale @ A3 1:100 Chainage 4120m

Hautere Plains Planting Character Area



#### Key

- MPT-02 Mass Planting with Tree Enrichment
- SC-01 Cobbled Swale
- MPS-01 Massed Planting Steep Sites
- MP-03 Massed Planting



Figure 45. Cross sections through proposed alignment at Te Horo

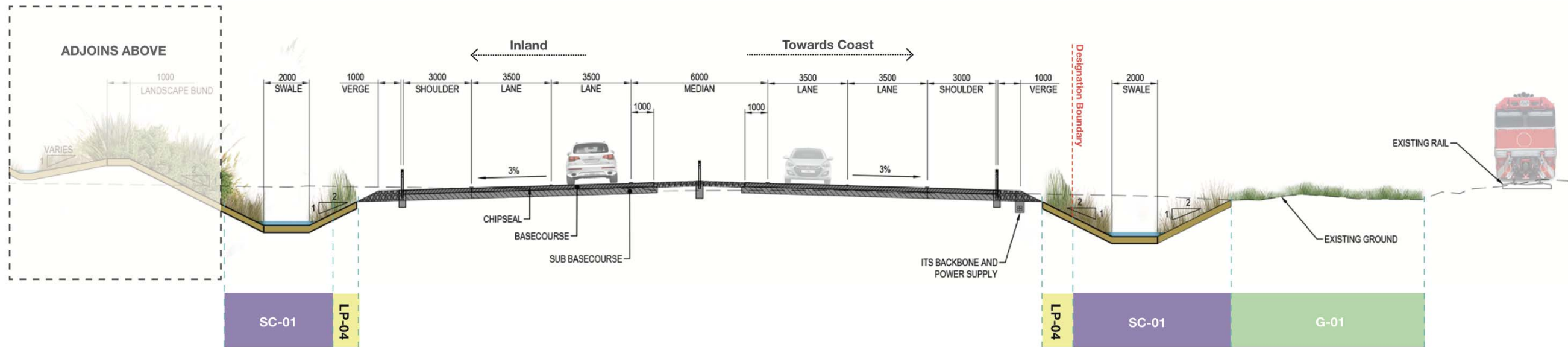
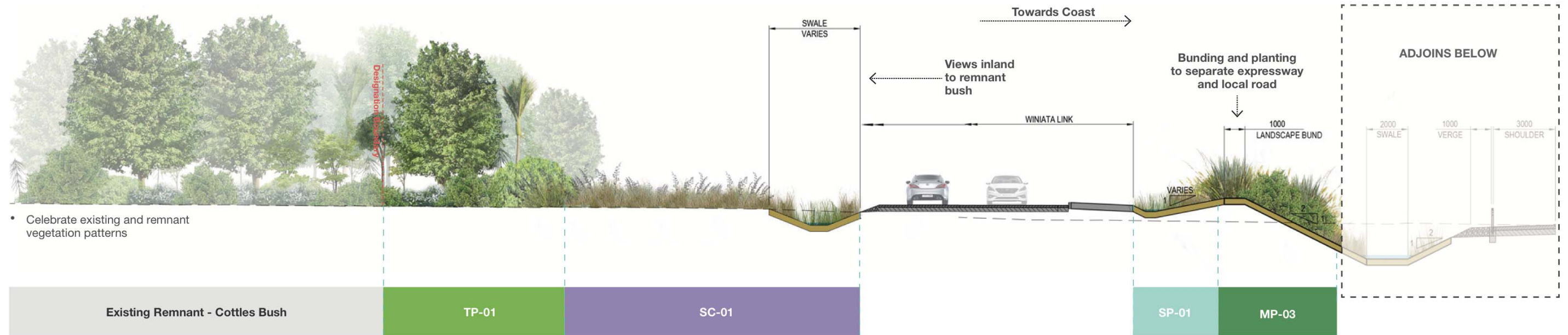
» Refer to section 5.14 *Planting Lists* for planting mixes



### Cross Section H – Winiata Link, Expressway and Existing Rail

Scale @ A3 1:100 Chainage 6700m

Hautere Plains Planting Character Area



- Key**
- TP-01 Terrestrial Planting
  - SC-01 Cobbled Swale
  - SP-01 Swale Planting
  - MP-03 Massed Planting
  - LP-04 Low Planting
  - G-01 Grass Planting

» Refer to section 5.14 *Planting Lists* for planting mixes



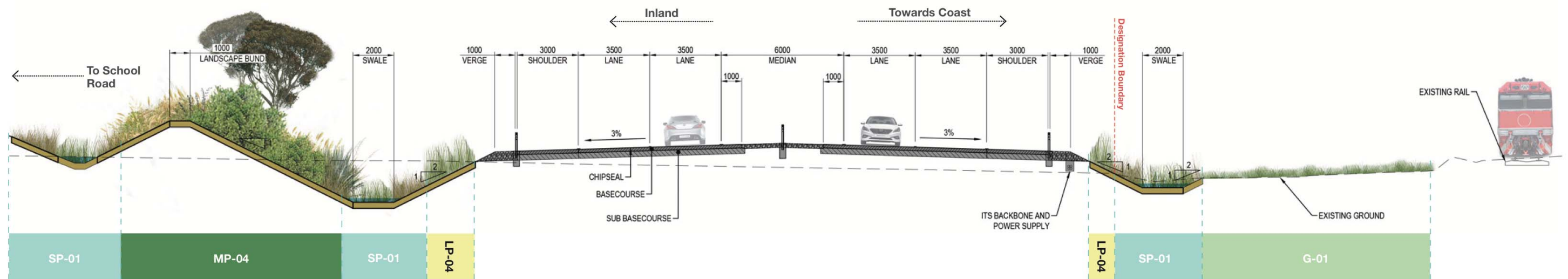
Figure 46. Cross sections through proposed alignment at Te Horo



### Cross Section J – Expressway at School Road and Existing Rail

Scale @ A3 1:100 Chainage 7600m

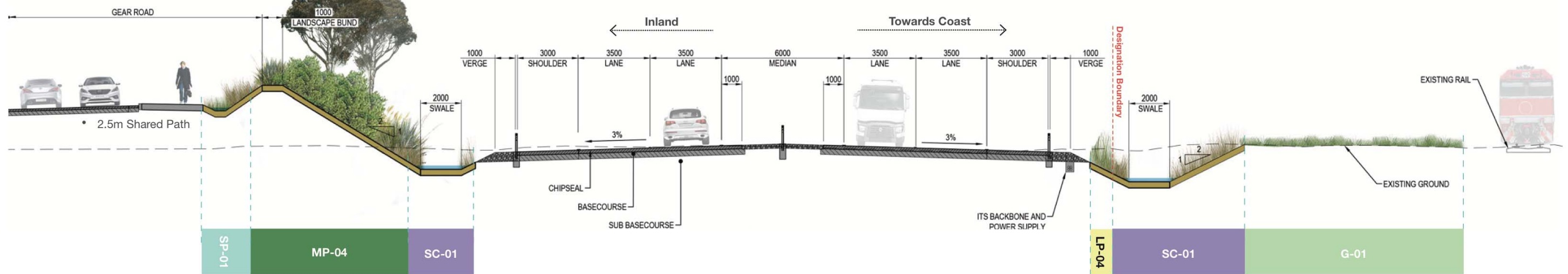
Te Horo Planting Character Area



### Cross Section K – Expressway, Gear Road and Existing Rail

Scale @ A3 1:100 Chainage 8050m

Te Horo Planting Character Area



#### Key

- G-01 Grass Planting
- SC-01 Cobbled Swale
- SP-01 Swale Planting
- MP-04 Massed Planting
- LP-04 Low Planting

» Refer to section 5.14 Planting Lists for planting mixes



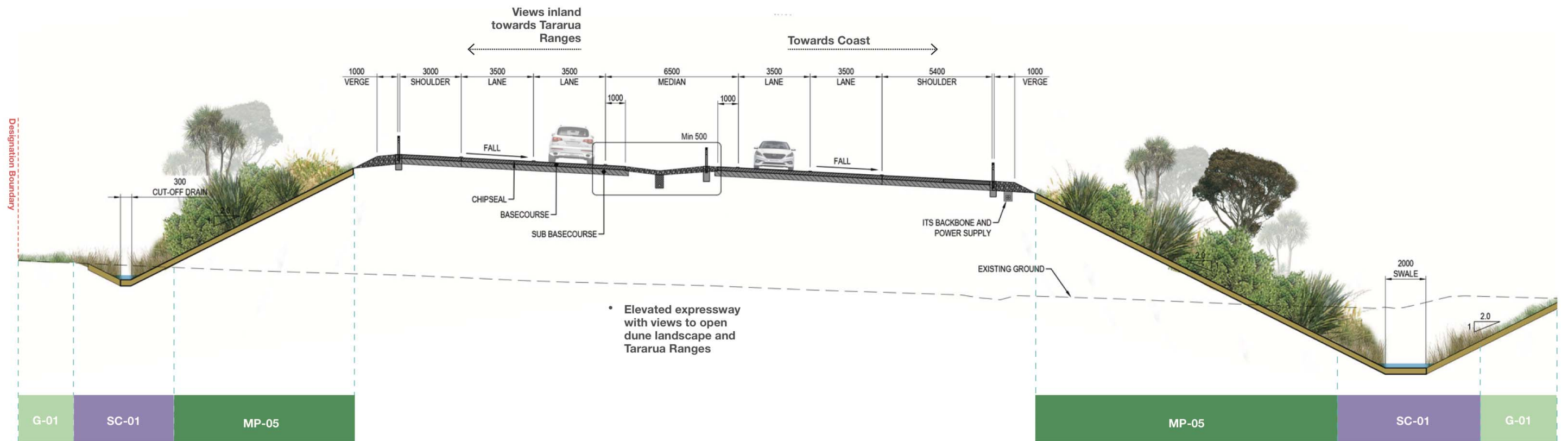
Figure 47. Cross section through proposed alignment at the Southern extent



### Cross Section L – Expressway at Makahuri and New Arterial Road

Scale @ A3 1:100 Chainage 9600m

█ Peka Peka - Makahuri Planting Character Area



#### Key

- █ G-01 Grass Planting
- █ SC-01 Cobbled Swale
- █ MP-05 Massed Planting



Figure 48. Cross sections through proposed alignment at Makahuri and Makahuri

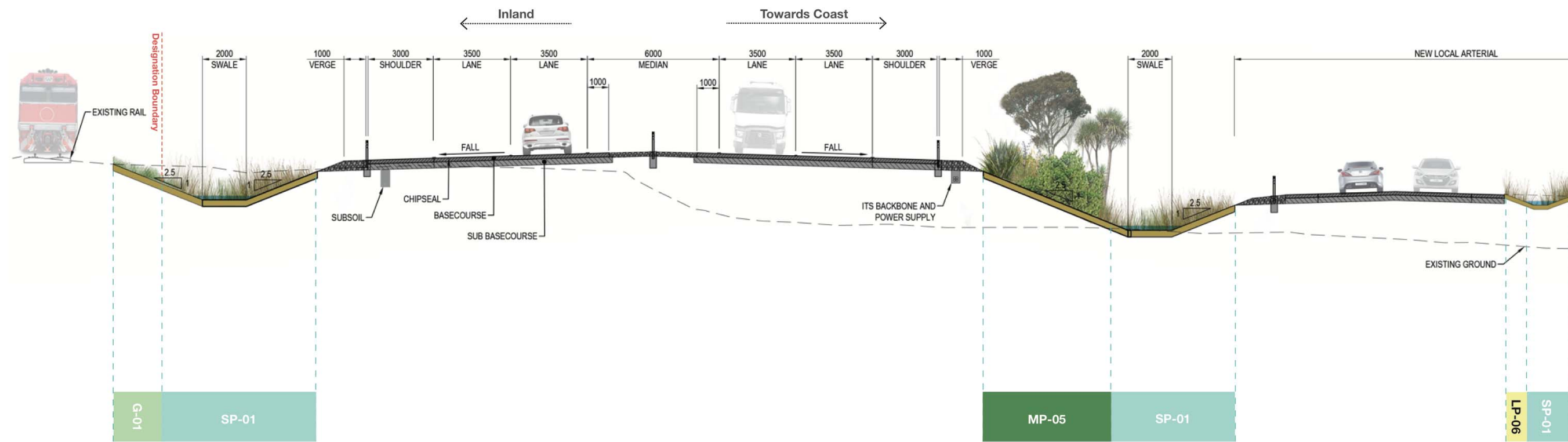
» Refer to section 5.14 *Planting Lists* for planting mixes



### Cross Section M – Expressway at New Local Arterial Road

Scale @ A3 1:100 Chainage 11500m

Peka Peka - Makahuri Planting Character Area



#### Key

- G-01 Grass Planting
- SP-01 Swale Planting
- MP-05 Massed Planting
- LP-06 Low Planting



Figure 49. Cross sections through proposed alignment at Makahuri and Makahuri

» Refer to section 5.14 *Planting Lists* for planting mixes



## 5.13 Indicative Planting Palettes

### Low planting



*Coprosma repens*



*Acaena novae-zelandiae*



*Coprosma propinqua*



*Hebe stricta*



*Olearia solandri*



*Muehlenbeckia complexa*



*Carex solandri*



*Carex dipsacea*



*Olearia paniculata*

### Wetland planting



*Cordyline australis*



*Carex virgata*



*Juncus australis*



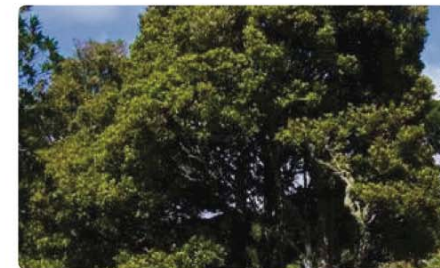
*Blechnum novae-zelandiae*



*Carex secta*



*Dicksonia fibrosa*



*Syzygium maire*



*Baumea articulata*

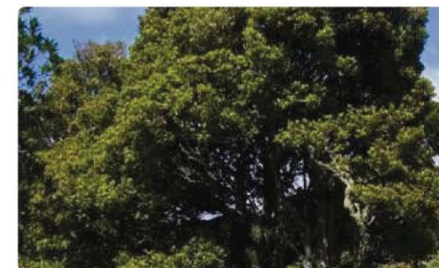
### Low stature wetland planting



*Ficinia nodosa*



*Phormium tenax*



*Syzygium maire*



*Myrsine australis*



*Carex virgata*



*Baumea articulata*



*Carex geminata*

Figure 50. Native planting palettes



**Riparian planting**



*Apodasmia similis*



*Cyperus ustulatus*



*Carex secta*



*Carex virgata*



*Coprosma propinqua*



*Carex geminata*



*Coprosma tenuicaulis*



*Hebe stricta*



*Cortaderia fulvida*

**Terrestrial Revegetation Planting**



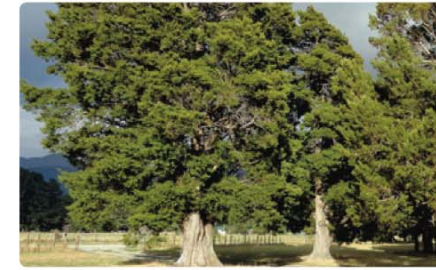
*Melicytus ramiflorus*



*Nestegis lanceolata*



*Streblus banksii*



*Podocarpus totara*



*Prumnopitys taxifolia*



*Rhopalostyis sapida*



*Pseudopanax ferox*



*Pittosporum tenuifolium*

**Massed planting**



*Carpodetus serratus*



*Coprosma rhamnoides*



*Hebe stricta*



*Kunzea ericoides*



*Melicytus ramiflorus*



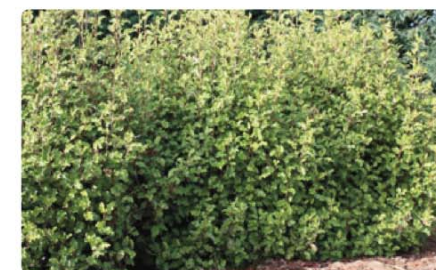
*Leptospermum scoparium*



*Phormium tenax*



*Pittosporum tenuifolium*



*Olearia paniculata*



*Dodonaea viscosa*

Figure 51. Native planting palettes



**Tree enrichment**



*Alectryon excelsus*



*Nestegis montana*



*Dysoxylum specabile*



*Streblus banksii*



*Podocarpus totara*



*Prumnopitys taxifolia*



*Syzygium maire*



*Nestegis lanceolata*

**River planting**



*Coprosma robusta*



*Cordyline australis*



*Griselinia littoralis*



*Phormium tenax*



*Cortaderia fulvida*



*Olearia paniculata*

**Swamp forest planting**



*Dacrydium dacrydioides*



*Laurelia novae-zealandiae*



*Myrsine australis*



*Phormium tenax*



*Rhopalostyis sapida*



*Syzygium maire*



*Coprosma robusta*



*Cyathea medullaris*



*Cyathea dealbata*

Figure 52. Native planting palettes



## 5.14 Planting Lists

The following plant lists have been developed in consultation with landscape and ecology experts, and guided by the specimen design. The landscape plans identify planting areas by code (e.g. WPA-01 etc) which relate to the below plant mixes. Through detailed design these plant mixes will be made site specific to respond best to their exact location.

Therefore, for example Massed Planting (MP-XX) will vary along the length of the expressway as specific palettes are developed from this master list to be specific for local climatic, or character areas.

This will achieve a balance of consistency and variety along the length of the expressway and ensure the establishment and the long term success of the planting.

### Ecological Mitigation - Planting Areas

#### BOI Condition G.46 a) i)

a) Plant at least 1.5ha of edge and inter-planting of indigenous terrestrial forest species (Ecosystem Type WF2). The planting shall be in and around one of the established remnants identified on Exhibit 10 (attached as Annexure 2), which is not already physically fenced. Following planting the consent holder shall ensure the full area (including existing remnant) is fenced and legally protected;

Current Design - Indigenous Terrestrial Forest Planting NOTE: Refer to Opus Plans in LUDP section 5.8	Total Combined Area Hectares
Total	1.5

#### BOI Condition G.46 a) i)

b) Create a minimum of 1.1 ha of landscaped and planted indigenous wetland habitat, including restoration of swamp forest and wetland habitat at Mary Crest, as mitigation for the loss of indigenous habitat; and c) Plant swamp forest species at Mary Crest in the area stipulated on Annexure B to the Joint Statement of Ecological experts dated 28 August 2013 and plant low growing native wetland species in the remaining 25% of the attenuation basin.

Current Design - Indigenous Planting at Mary Crest/Makahuri	Total Combined Area Hectares
Low Stature Wetland Planting	0.294
Riparian Mitigation Planting	0.8111
Swamp Forest Planting	0.8055
Terrestrial Mitigation Planting	1.3364
<b>Total Planting in Current Design at Mary Crest/Makahuri</b>	<b>3.247</b>

#### BOI Condition G.46 a) i)

b) Riparian planting shall be a minimum of 2601 linear metres of planting to a minimum of 20m each side of the Water Body, unless agreed otherwise by the Manager.

Current Design - Riparian Planting NOTE: Refer to Opus Plans in LUDP section 5.7	Total Combined Length
Total	2.6km

#### BOI Condition G.46 c)

i.) Approximately 17,700 m<sup>2</sup>, comprising landscape treatments including grass, specimen trees, and visual screening at the Pareo- Matangi reserve;

Current design - Refer to Pare-o-Matangi section 7 in the LUDP

#### BOI Condition G.46 c)

ii.) Approximately 380,000 m<sup>2</sup> (38ha) of native planting landscape treatments (including specimen trees and visual screening) over the Project length;

Current Design - Native Planting Landscape Treatments	Total Combined Area Hectares
Low Planting	3.9989
Massed Planting (inc. dune and steep sites)	14.0685
Massed Planting with Tree Enrichment (inc. dune)	5.541
Riparian Planting	2.7756
River Planting	1.4895
Swale Planting (inc. Cobbled Swales)	13.70745
Terrestrial Revegetation Planting	0.722
Wetland Planting	2.9025
<b>Total Combined</b>	<b>45.20545</b>

\*Note: Details within the LUDP are correct as at Revision 6 [November 2017] and are subject to detailed design. Refinement of detail and minor changes remaining in accordance with the LUDP will be submitted and certified through the SSEMPs required by designation conditions 23-25. Any changes that are more than minor will approved through the process set out in designation condition 18B.

#### Swale Planting (SP-01)

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m <sup>2</sup> )	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	50%	PB2	1.8	Base
<i>Ficinia nodosa</i>	Knobby Club Rush	50%	PB2	1.8	Sides
		Total %	100%		

#### Cobbled Swale (SC-01)

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m <sup>2</sup> )	Notes
<i>Ficinia nodosa</i>	Knobby Club Rush	50%	PB2	1.8	Sides
		Total %	50%	note only 50% as base is not planted	

#### Grassed Swales (SG)

Name	Common Name	Percentage Mix	Grade	Density (x/m <sup>2</sup> )	Notes
Perennial Ryegrass		50%			
Fescue Grass		50%			
		Total %	100%		

#### Wetland Planting - A (WPA-01): Land Edge Mix

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m <sup>2</sup> )	Notes
<i>Carpodetus Serratus</i>	Marble leaf	5%	PB2	1	Mid
<i>Coprosma robusta</i>	Karamu	8%	PB2	1	Mid
<i>Cordylina australis</i>	Cabbage Tree	5%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Mid
<i>Dysoxylum spectabile</i>	Kohekohe	2%	PB15	0.25	Back
<i>Leptospermum scoparium</i>	Manuka	15%	PB2	1	Mid/back
<i>Hebe stricta</i>	Koromiko	5%	PB2	1	Front/mid
<i>Kunzea ericoides</i>	Kanuka	10%	PB2	1	Mid/back
<i>Meliclytus ramiflorus</i>	Mahoe	5%	PB2	0.25	Mid/back
<i>Phormium tenax</i>	NZ Swamp Flax	25%	PB2	1	Mid
<i>Shefflera digitata</i>	Pate	5%	PB2	1	Front/mid
		Total %	100%		

#### Wetland Planting - B (WPB-01): Periodically Inundated

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m <sup>2</sup> )	Notes
<i>Baumea articulata</i>	Baumea	5%	PB2	1	Waters edge
<i>Blechnum novae-zelandiae</i>	Swamp Kio Kio	2%	PB2	1	Waters edge
<i>Carex secta</i>	Pukio	8%	PB2	1.8	Mid
<i>Carex geminata</i>	Rautahi	8%	PB2	1.8	Mid
<i>Carex virgata</i>	Pukio	8%	PB2	1.8	Mid
<i>Cordylina australis</i>	Cabbage Tree	3%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid
<i>Coprosma tenuicaulis</i>	Swamp Coprosma	5%	PB2	1	Front/mid
<i>Cortaderia fulvida</i>	Toetoe	12%	PB2	1	Front/mid
<i>Ficinia nodosa</i>	Knobby Club Rush	8%	PB2	1.8	Mid
<i>Juncus australis</i>	Wiwi	10%	PB2	1.8	Waters edge
<i>Phormium tenax</i>	NZ Swamp Flax	25%	PB2	1	Mid
<i>Syzygium maire</i>	Swamp Maire	3%	PB15	0.25	Enrich-back
		Total %	100%		

Figure 53. Planting lists



**Wetland Planting - C (WPC-01): Wet Margin 0-0.3m depth**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	10%	PB2	1.8	
<i>Baumea articulata</i>	Baumea	30%	PB2	1.8	
<i>Carex secta</i>	Pukio	6%	PB2	1.8	
<i>Carex virgata</i>	Pukio	6%	PB2	1.8	
<i>Cyperus ustulatus</i>	Giant Umbrella Sedge	15%	PB2	1	
<i>Juncus australis</i>	Wiwi	30%	PB2	1.8	
<i>Phormium tenax</i>	NZ Swamp Flax	3%	PB2	1	
Total %		100%			

**Wetland Planting - D (WPD-01): Shallow Zone 0.3-0.6m+ depth**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Baumea articulata</i>	Baumea	30%	PB2	1.8	
<i>Bolboschoenus fluviatilis</i>	Purua Grass	5%	PB2	1.8	
<i>Carex secta</i>	Pukio	5%	PB2	1.8	
<i>Juncus australis</i>	Wiwi	25%	PB2	1.8	
<i>Schoenoplectus validus</i>	Kuawa	25%	PB2	1.8	
<i>Typha orientalis</i>	Raupo	10%	PB2	1.8	
Total %		100%			

**Riparian Planting - A (RPA-01): Standing Water/Waters Edge**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	10%	PB2	1.8	Front/Mid
<i>Carex secta</i>	Pukio	10%	PB2	1.8	Front
<i>Carex virgata</i>	Pukio	10%	PB2	1.8	Front
<i>Coprosma tenuicaulis</i>	Swamp Coprosma	8%	PB2	1	Back
<i>Cyperus ustulatus</i>	Giant Umbrella Sedge	20%	PB2	1	Front/Mid
<i>Ficinia nodosa</i>	Knobby Club Rush	10%	PB2	1.8	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	30%	PB2	1	Mid
<i>Typha orientalis</i>	Raupo	2%	PB2	1	
Total %		100%			

**Riparian Planting - B (RPB-01): Lower Bank**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	3%	PB2	1.8	Front/Mid
<i>Carex dipsacea</i>	Autumn Sedge	4%	PB2	1.8	Front
<i>Carex secta</i>	Pukio	4%	PB2	1.8	Front
<i>Carex virgata</i>	Pukio	4%	PB2	1.8	Front
<i>Coprosma tenuicaulis</i>	Swamp Coprosma	8%	PB2	1	Mid
<i>Cordyline australis</i>	Cabbage Tree	6%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	20%	PB2	1	Front/mid
<i>Cyperus ustulatus</i>	Giant Umbrella Sedge	8%	PB2	1	Front/Mid
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Ficinia nodosa</i>	Knobby Club Rush	3%	PB2	1.8	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	30%	PB2	1	Mid
Total %		100%			

**Riparian Planting - C (RPC-01): Upper Bank**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	5%	PB2	1.8	Front
<i>Carex geminata</i>	Rautahi	5%	PB2	1.8	Mid
<i>Coprosma propinqua</i>	Mingimingi	5%	PB2	1	Mid
<i>Cordyline australis</i>	Cabbage Tree	3%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Front/mid
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Olearia paniculata</i>	Akiraho	12%	PB2	1	Mid
<i>Phormium tenax</i>	NZ Swamp Flax	25%	PB2	1	Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	15%	PB2	1	Mid/Back
<i>Plagianthus regius</i>	Ribbonwood	5%	PB2	1	Back
Total %		100%			

**Riparian Mitigation Planting - A (RMPA-01): Standing Water/Waters Edge**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	10%	PB2	1.8	Front/Mid
<i>Carex secta</i>	Pukio	10%	PB2	1.8	Front
<i>Carex virgata</i>	Pukio	10%	PB2	1.8	Front
<i>Coprosma tenuicaulis</i>	Swamp Coprosma	8%	PB2	1	Back
<i>Cyperus ustulatus</i>	Giant Umbrella Sedge	20%	PB2	1	Front/Mid
<i>Ficinia nodosa</i>	Knobby Club Rush	10%	PB2	1.8	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	30%	PB2	1	Mid
<i>Typha orientalis</i>	Raupo	2%	PB2	1	
Total %		100%			

**Riparian Mitigation Planting - B (RMPB-01): Lower Bank**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	3%	PB2	1.8	Front/Mid
<i>Carex dipsacea</i>	Autumn Sedge	4%	PB2	1.8	Front
<i>Carex secta</i>	Pukio	4%	PB2	1.8	Front
<i>Carex virgata</i>	Pukio	4%	PB2	1.8	Front
<i>Coprosma tenuicaulis</i>	Swamp Coprosma	8%	PB2	1	Mid
<i>Cordyline australis</i>	Cabbage Tree	6%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	20%	PB2	1	Front/mid
<i>Cyperus ustulatus</i>	Giant Umbrella Sedge	8%	PB2	1	Front/Mid
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Ficinia nodosa</i>	Knobby Club Rush	3%	PB2	1.8	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	30%	PB2	1	Mid
Total %		100%			

**Riparian Mitigation Planting - C (RMPC-01): Upper Bank**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	5%	PB2	1.8	Front
<i>Carex geminata</i>	Rautahi	5%	PB2	1.8	Mid
<i>Coprosma propinqua</i>	Mingimingi	5%	PB2	1	Mid
<i>Cordyline australis</i>	Cabbage Tree	3%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Front/mid
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Olearia paniculata</i>	Akiraho	12%	PB2	1	Mid
<i>Phormium tenax</i>	NZ Swamp Flax	25%	PB2	1	Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	15%	PB2	1	Mid/Back
<i>Plagianthus regius</i>	Ribbonwood	5%	PB2	1	Back
Total %		100%			

**Low Planting - North Otaki (LP-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	10%	PB2	1.8	Front
<i>Carex dipsacea</i>	Autumn Sedge	10%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	10%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	15%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	5%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Melicope simplex</i>	Poataniwha	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	20%	PB2	1	Mid/Back
<i>Phormium tenax</i>	Swamp Flax	10%	PB2	1	Back
Total %		100%			

**Low Planting - Otaki Town/Railway Wetland (LP-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	10%	PB2	1.8	Front
<i>Carex dipsacea</i>	Autumn Sedge	15%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	15%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	10%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	10%	PB2	1	Back
<i>Ficinia nodosa</i>	Knobby Club Rush	5%	PB2	1.8	Front - Wet
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Melicope simplex</i>	Poataniwha	5%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	10%	PB2	1	Mid/Back
<i>Phormium tenax</i>	Swamp Flax	10%	PB2	1	Back
Total %		100%			

**Low Planting - South Bound On Ramp Round-a-bout (LP-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	15%	PB2	1.8	Front
<i>Carex dipsacea</i>	Autumn Sedge	25%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	25%	PB2	1.8	Front
<i>Hebe stricta</i>	Koromiko	20%	PB2	1	Mid
<i>Olearia paniculata</i>	Akiraho	15%	PB2	1	Mid/Back
Total %		100%			

Figure 54. Planting lists



**Low Planting - Hautere Plains/Te Horo (LP-04)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	10%	PB2	1.8	Front
<i>Carex dipsacea</i>	Autumn Sedge	15%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	15%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	10%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	5%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	15%	PB2	1	Mid
<i>Melicope simplex</i>	Poataniwha	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	15%	PB2	1	Mid/Back
<i>Phormium tenax</i>	Swamp Flax	5%	PB2	1	Back
Total %		100%			

**Low Planting - Driveways (LP-05)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	15%	PB2	1.8	Front
<i>Carex dipsacea</i>	Autumn Sedge	15%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	15%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	15%	PB2	1	Mid/Back
<i>Hebe stricta</i>	Koromiko	25%	PB2	1	Mid
<i>Olearia paniculata</i>	Akiraho	15%	PB2	1	Mid/Back
Total %		100%			

**Low Planting - Peka Peka/Makahuri (LP-06)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	10%	PB2	1.8	Front
<i>Carex dipsacea</i>	Autumn Sedge	15%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	15%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	15%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	5%	PB2	1	Back
<i>Ficinia nodosa</i>	Knobby Club Rush	5%	PB2	1.8	Front
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Melicope simplex</i>	Poataniwha	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	10%	PB2	1	Mid/Back
<i>Phormium tenax</i>	Swamp Flax	5%	PB2	1	Back
Total %		100%			

**Low Planting Dune - North Otaki (LP-D-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	10%	PB2	1.8	Front
<i>Carex buechananii</i>	Buchanans Sedge	10%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	15%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	10%	PB2	1	Back
<i>Cortaderia fulvida</i>	Toetoe	5%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Muehlenbeckia complexa</i>	Pohuehue	10%	PB2	1	Mid
<i>Olearia solandri</i>	Coastal Tree-Daisy	20%	PB2	1	Mid/Back
<i>Phormium tenax</i>	Swamp Flax	10%	PB2	1	Back
Total %		100%			

**Low Planting Dune - Otaki Town/Railway Wetland (LP-D-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	10%	PB2	1.8	Front
<i>Carex buechananii</i>	Buchanans Sedge	10%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	10%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	10%	PB2	1	Back
<i>Cortaderia fulvida</i>	Toetoe	10%	PB2	1	Back
<i>Ficinia nodosa</i>	Knobby Club Rush	5%	PB2	1.8	Front - Wet
<i>Hebe stricta</i>	Koromiko	15%	PB2	1	Mid
<i>Muehlenbeckia complexa</i>	Pohuehue	10%	PB2	1	Mid
<i>Olearia solandri</i>	Coastal Tree-Daisy	10%	PB2	1	Mid/Back
<i>Phormium tenax</i>	Swamp Flax	10%	PB2	1	Back
Total %		100%			

**Low Planting Dune - Peka Peka/Makahuri (LP-D-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Acaena novae-zelandiae</i>	Piripiri	15%	PB2	1.8	Front
<i>Carex buechananii</i>	Buchanans Sedge	15%	PB2	1.8	Front
<i>Coprosma propinqua</i>	Mingimingi	20%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	5%	PB2	1	Back
<i>Cortaderia fulvida</i>	Toetoe	5%	PB2	1	Back
<i>Ficinia nodosa</i>	Knobby Club Rush	5%	PB2	1.8	Front - Wet
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Mid
<i>Muehlenbeckia complexa</i>	Pohuehue	10%	PB2	1	Mid
<i>Olearia solandri</i>	Coastal Tree-Daisy	10%	PB2	1	Mid/Back
<i>Phormium tenax</i>	Swamp Flax	5%	PB2	1	Back
Total %		100%			

**Massed Planting Steep Sites (MPS-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	5%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	5%	PB2	1.8	Front
<i>Coprosma rhamnoides</i>	Twiggy Coprosma	10%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	20%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	10%	PB2	1	Mid
<i>Phormium tenax</i>	NZ Swamp Flax	50%	PB2	1	Front/Mid
Total %		100%			

**Massed Planting - North Otaki (MP-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	5%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Cordyline australis</i>	Cabbage Tree	3%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	3%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	5%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Kunzea robusta</i>	Kanuka	15%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	10%	PB2	1	Back
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Muehlenbeckia complexa</i>	Pohuehue	2%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	5%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	3%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	5%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Pseudopanax arboreus</i>	Five-finger	2%	PB2	1	Mid
Total %		100%			

**Massed Planting - Otaki Town/Railway Wetland (MP-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	10%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Cordyline australis</i>	Cabbage Tree	10%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	5%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Muehlenbeckia complexa</i>	Pohuehue	3%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	5%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	3%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	5%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Sophora microphylla</i>	Kowhai	2%	PB2	1	Mid
Total %		100%			

Figure 55.Planting lists



**Massed Planting - Hautere Plains (MP-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	10%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma robusta</i>	Karamu	8%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	6%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	4%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	8%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	8%	PB2	1	Front/Mid
<i>Kunzea robusta</i>	Kanuka	2%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	2%	PB2	1	Back
<i>Myoporum laetum</i>	Ngiao	4%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	7%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	4%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	10%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
Total %		100%			

**Massed Planting - Te Horo (MP-04)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	10%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma rhamnoides</i>	Twiggy Coprosma	3%	PB2	1	Mid/Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	4%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Front/Mid
<i>Kunzea robusta</i>	Kanuka	2%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	2%	PB2	1	Back
<i>Melicytus ramiflorus</i>	Mahoe	8%	PB2	1	Back
<i>Myoporum laetum</i>	Ngiao	4%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	10%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	10%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
Total %		100%			

**Massed Planting - Peka Peka/Makahuri (MP-05)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	8%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	2%	PB2	1	Mid/Back
<i>Coprosma rhamnoides</i>	Twiggy Coprosma	2%	PB2	1	Mid/Back
<i>Cordyline australis</i>	Cabbage Tree	2%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	8%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	3%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Kunzea robusta</i>	Kanuka	6%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	6%	PB2	1	Back
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	2%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	3%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	3%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	3%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Pseudopanax arboreus</i>	Five-finger	3%	PB2	1	Mid
Total %		100%			

**Massed Planting Dune - North Otaki (MP-D-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	3%	PB2	1	Back
<i>Cordyline australis</i>	Cabbage Tree	2%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	3%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	5%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	5%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Kunzea amathicola</i>	Kanuka	12%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	10%	PB2	1	Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	5%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	5%	PB2	1	Mid/Back
<i>Olearia solandri</i>	Coastal Tree-Daisy	10%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	12%	PB2	1	Front/Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	12%	PB2	1	Mid/Back
Total %		100%			

**Massed Planting Dune - Otaki Town/Railway Wetland (MP-D-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	5%	PB2	1	Back
<i>Cordyline australis</i>	Cabbage Tree	10%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	5%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	5%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	5%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	5%	PB2	1	Mid/Back
<i>Olearia solandri</i>	Coastal Tree-Daisy	5%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	15%	PB2	1	Front/Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Sophora microphylla</i>	Kowhai	2%	PB2	1	Mid
Total %		100%			

**Massed Planting Dune - Peka Peka/Makahuri (MP-D-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	3%	PB2	1	Back
<i>Cordyline australis</i>	Cabbage Tree	2%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	10%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	3%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	5%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Kunzea amathicola</i>	Kanuka	8%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	8%	PB2	1	Back
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	3%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	3%	PB2	1	Mid/Back
<i>Olearia solandri</i>	Coastal Tree-Daisy	10%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	15%	PB2	1	Front/Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Sophora microphylla</i>	Kowhai	2%	PB2	1	Mid
Total %		100%			

Figure 56. Planting lists



**Massed Planting Tree Enrichment - Pioneer Species - Otaki Town/Railway Wetland (MPT-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	10%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Cordyline australis</i>	Cabbage Tree	10%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	5%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Muehlenbeckia complexa</i>	Pohuehue	3%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	5%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	3%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	5%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Sophora microphylla</i>	Kowhai	2%	PB2	1	Mid
Total %		100%			

**Massed Planting Tree Enrichment - Enrichment Species - Otaki Town/Railway Wetland (MPT-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	15%	PB15	0.1	Enrich
<i>Nestegis lanceolata</i>	White Maire	35%	PB15	0.1	Enrich
<i>Nestegis montana</i>	Narrow-Leaved Maire	5%	PB15	0.1	Enrich
<i>Podocarpus totara</i>	Totara	10%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	35%	PB15	0.1	Enrich
Total %		100%			

**Massed Planting Tree Enrichment - Pioneer Species - Hautere Plains (MPT-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	10%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma robusta</i>	Karamu	8%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	6%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	4%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	8%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	8%	PB2	1	Front/Mid
<i>Kunzea robusta</i>	Kanuka	2%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	2%	PB2	1	Back
<i>Myoporum laetum</i>	Ngiao	4%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	7%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	4%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	10%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
Total %		100%			

**Massed Planting Tree Enrichment - Enrichment Species - Hautere Plains (MPT-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	15%	PB15	0.1	Enrich
<i>Nestegis lanceolata</i>	White Maire	5%	PB15	0.1	Enrich
<i>Nestegis montana</i>	Narrow-Leaved Maire	5%	PB15	0.1	Enrich
<i>Podocarpus totara</i>	Totara	60%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	15%	PB15	0.1	Enrich
Total %		100%			

**Massed Planting Tree Enrichment - Pioneer Species - Te Horo (MPT-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	10%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma rhamnoides</i>	Twiggy Coprosma	3%	PB2	1	Mid/Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	4%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	10%	PB2	1	Front/Mid
<i>Kunzea robusta</i>	Kanuka	2%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	2%	PB2	1	Back
<i>Meliccytus ramiflorus</i>	Mahoe	8%	PB2	1	Back
<i>Myoporum laetum</i>	Ngiao	4%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	10%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	10%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
Total %		100%			

**Massed Planting Tree Enrichment - Enrichment Species - Te Horo (MPT-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	15%	PB15	0.1	Enrich
<i>Nestegis lanceolata</i>	White Maire	5%	PB15	0.1	Enrich
<i>Nestegis montana</i>	Narrow-Leaved Maire	5%	PB15	0.1	Enrich
<i>Podocarpus totara</i>	Totara	60%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	15%	PB15	0.1	Enrich
Total %		100%			

Figure 57. Planting lists



**Massed Planting Tree Enrichment - Pioneer Species - Peka Peka/Makahuri (MPT-04)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Carex dipsacea</i>	Autumn Sedge	2%	PB2	1.8	Front
<i>Carex solandri</i>	Forest Sedge	2%	PB2	1.8	Front
<i>Carpodetus Serratus</i>	Marble leaf	8%	PB2	1	Mid
<i>Coprosma propinqua</i>	Mingimingi	2%	PB2	1	Mid/Back
<i>Coprosma rhamnoides</i>	Twiggy Coprosma	2%	PB2	1	Mid/Back
<i>Cordyline australis</i>	Cabbage Tree	2%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	8%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	3%	PB2	1	Back
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Kunzea robusta</i>	Kanuka	6%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	6%	PB2	1	Back
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	2%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	3%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	3%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum eugenioides</i>	Lemonwood	3%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Pseudopanax arboreus</i>	Five-finger	3%	PB2	1	Mid

Total % 100%

**Massed Planting Tree Enrichment - Enrichment Species - Peka Peka/Makahuri (MPT-04)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	15%	PB15	0.1	Enrich
<i>Nestegis lanceolata</i>	White Maire	35%	PB15	0.1	Enrich
<i>Nestegis montana</i>	Narrow-Leaved Maire	5%	PB15	0.1	Enrich
<i>Podocarpus totara</i>	Totara	10%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	35%	PB15	0.1	Enrich

Total % 100%

**Massed Planting Tree Enrichment - Dune Pioneer Species - North Otaki (MPT-D-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	3%	PB2	1	Back
<i>Cordyline australis</i>	Cabbage Tree	2%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	5%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	5%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	5%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Kunzea amathicola</i>	Kanuka	12%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	10%	PB2	1	Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	5%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	5%	PB2	1	Mid/Back
<i>Olearia solandri</i>	Coastal Tree-Daisy	10%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front/Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	12%	PB2	1	Mid/Back

Total % 100%

**Massed Planting Tree Enrichment - Dune Enrichment Species - North Otaki (MPT-D-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	10%	PB15	0.1	Enrich
<i>Dysoxylum spectabile</i>	Kohekohe	20%	PB15	0.1	Enrich
<i>Nestegis cunninghamii</i>	Black Maire	35%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	35%	PB15	0.1	Enrich

Total % 100%

**Massed Planting Tree Enrichment - Dune Pioneer Species - Otaki Town/Railway Wetland (MPT-D-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	5%	PB2	1	Back
<i>Cordyline australis</i>	Cabbage Tree	10%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	15%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	5%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	5%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	5%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	5%	PB2	1	Mid/Back
<i>Olearia solandri</i>	Coastal Tree-Daisy	5%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	15%	PB2	1	Front/Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Sophora microphylla</i>	Kowhai	2%	PB2	1	Mid

Total % 100%

**Massed Planting Tree Enrichment - Dune Enrichment Species - Otaki Town/Railway Wetland (MPT-D-02)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	35%	PB15	0.1	Enrich
<i>Dysoxylum spectabile</i>	Kohekohe	20%	PB15	0.1	Enrich
<i>Nestegis cunninghamii</i>	Black Maire	25%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	20%	PB15	0.1	Enrich

Total % 100%

**Massed Planting Tree Enrichment - Dune Pioneer Species - Peka Peka/Makahuri (MPT-D-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid/Back
<i>Coprosma repens</i>	Taupata	3%	PB2	1	Back
<i>Cordyline australis</i>	Cabbage Tree	2%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	10%	PB2	1	Back
<i>Dodonea viscosa</i>	Ake Ake (Green Only)	3%	PB2	1	Back
<i>Griselenia littoralis</i>	Kapuka	5%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	3%	PB2	1	Front/Mid
<i>Kunzea amathicola</i>	Kanuka	8%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	8%	PB2	1	Back
<i>Melicope simplex</i>	Poataniwha	2%	PB2	1	Mid/Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Muehlenbeckia complexa</i>	Pohuehue	3%	PB2	1	Front/Mid
<i>Myoporum laetum</i>	Ngiao	3%	PB2	1	Mid/Back
<i>Olearia solandri</i>	Coastal Tree-Daisy	10%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	15%	PB2	1	Front/Mid
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid/Back
<i>Sophora microphylla</i>	Kowhai	2%	PB2	1	Mid

Total % 100%

**Massed Planting Tree Enrichment - Dune Enrichment Species - Peka Peka/Makahuri (MPT-D-03)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	10%	PB15	0.1	Enrich
<i>Dysoxylum spectabile</i>	Kohekohe	20%	PB15	0.1	Enrich
<i>Nestegis cunninghamii</i>	Black Maire	35%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	35%	PB15	0.1	Enrich

Total % 100%

**River Planting - Otaki River (RVP-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma robusta</i>	Karamu	5%	PB2	1	Back
<i>Cordyline australis</i>	Cabbage Tree	15%	PB2	1	Mid/Back
<i>Cortaderia fulvida</i>	Toetoe	30%	PB2	1	Mid/Back
<i>Griselenia littoralis</i>	Kapuka	5%	PB2	1	Mid/Back
<i>Olearia paniculata</i>	Akiraho	10%	PB2	1	Front/Mid
<i>Olearia solandri</i>	Coastal Tree-Daisy	10%	PB2	1	Front/Mid
<i>Phormium tenax</i>	NZ Swamp Flax	25%	PB2	1	Mid

Total % 100%

Figure 58. Planting lists



**Terrestrial Revegetation Planting - Hautere/Cottles Bush Pioneer Species (TP-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	3%	PB2	1	Mid
<i>Coprosma rhamnoides</i>	Twiggy Coprosma	3%	PB2	1	Mid
<i>Cortaderia fulvida</i>	Toetoe	8%	PB2	1	Front
<i>Hebe stricta</i>	Koromiko	4%	PB2	1	Front
<i>Kunzea ericoides</i>	Kanuka	8%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	8%	PB2	1	Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Muehlenbeckia complexa</i>	Pohuehue	5%	PB2	1	Front
<i>Olearia solandri</i>	Coastal Tree-Daisy	5%	PB2	1	Front
<i>Pittosporum eugenioides</i>	Lemonwood	5%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid
<i>Plagianthus regius</i>	Ribbonwood	3%	PB2	1	Back
<i>Phormium tenax</i>	NZ Swamp Flax	10%	PB2	1	Front
<i>Pseudopanax arboreus</i>	Five-finger	3%	PB2	1	Mid
<i>Pseudopanax ferox</i>	Fierce Lancewood	5%	PB2	1	Mid/Back
Total %		100%			

**Terrestrial Revegetation Planting - Hautere/Cottles Bush Enrichment Species (TP-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	18%	PB15	0.1	Enrich
<i>Nestegis lanceolata</i>	White Maire	5%	PB15	0.1	Enrich
<i>Nestegis montana</i>	Narrow-Leaved Maire	5%	PB15	0.1	Enrich
<i>Podocarpus totara</i>	Totara	60%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	6%	PB15	0.1	Enrich
<i>Streblus banksii</i>	Large Leaved Milk Tree	3%	PB15	0.1	Enrich
<i>Rhopalostylis sapida</i>	Nikau	3%	PB2	0.1	Enrich - Interior
Total %		100%			

**Terrestrial Mitigation Planting - Makahuri Pioneer Species (TPM-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Coprosma propinqua</i>	Mingimingi	5%	PB2	1	Mid
<i>Coprosma robusta</i>	Karamu	10%	PB2	1	Mid
<i>Hebe stricta</i>	Koromiko	5%	PB2	1	Front
<i>Kunzea ericoides</i>	Kanuka	5%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	5%	PB2	1	Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Muehlenbeckia complexa</i>	Pohuehue	5%	PB2	1	Front
<i>Olearia solandri</i>	Coastal Tree-Daisy	5%	PB2	1	Front
<i>Pittosporum eugenioides</i>	Lemonwood	10%	PB2	1	Mid/Back
<i>Pittosporum tenuifolium</i>	Kohuhu	10%	PB2	1	Mid
<i>Phormium tenax</i>	NZ Swamp Flax	15%	PB2	1	Front
<i>Pseudopanax ferox</i>	Fierce Lancewood	5%	PB2	1	Mid/Back
Total %		100%			

**Terrestrial Mitigation Planting - Makahuri Enrichment Species (TPM-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Alectryon excelsus</i>	Titoki	22%	PB15	0.1	Enrich
<i>Nestegis lanceolata</i>	White Maire	13%	PB15	0.1	Enrich
<i>Nestegis montana</i>	Narrow-Leaved Maire	5%	PB15	0.1	Enrich
<i>Podocarpus totara</i>	Totara	30%	PB15	0.1	Enrich
<i>Prumnopitys taxifolia</i>	Matai	15%	PB15	0.1	Enrich
<i>Streblus banksii</i>	Large Leaved Milk Tree	10%	PB15	0.1	Enrich
<i>Rhopalostylis sapida</i>	Nikau	5%	PB2	0.1	Enrich - Interior
Total %		100%			

**Swamp Forest Planting - Makahuri Pioneer Species (SWF-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Blechnum novae-zelandiae</i>	Swamp Kio Kio	15%	PB2	1	Mid
<i>Carex secta</i>	Pukio	10%	PB2	1	Waters Edge
<i>Carex virgata</i>	Pukio	10%	PB2	1	Waters Edge
<i>Coprosma robusta</i>	Karamu	5%	PB2	1	Mid
<i>Ficinia nodosa</i>	Knobby Club Rush	10%	PB2	1.8	Waters Edge
<i>Kunzea ericoides</i>	Kanuka	5%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	5%	PB2	1	Back
<i>Melicytus ramiflorus</i>	Mahoe	10%	PB2	1	Mid/Back
<i>Myrsine australis</i>	Red Matipo	5%	PB2	1	Mid/Back
<i>Phormium tenax</i>	NZ Swamp Flax	25%	PB2	1	Front
Total %		100%			

**Swamp Forest Planting - Makahuri Enrichment Species (SWF-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Asplenium oblongifolium</i>	Shining Splenwort	2%	PB2	0.25	Mid/Back-Enrich
<i>Cyathea cunninghamii</i>	Gully Tree Fern	3%	PB2	0.1	Enrich - Interior
<i>Cyathea dealbata</i>	Silver Fern	5%	PB2	0.1	Enrich - Interior
<i>Cyathea medullaris</i>	Mamaku	5%	PB2	0.1	Enrich - Interior
<i>Dacrycarpus dacrydioides</i>	Kahikatea	35%	PB15	0.1	Enrich
<i>Laurelia novae-zelandiae</i>	Pukatea	15%	PB15	0.1	Enrich
<i>Rhopalostylis sapida</i>	Nikau	5%	PB2	0.1	Enrich - Interior
<i>Syzygium maire</i>	Swamp Maire	30%	PB15	0.1	Enrich
Total %		100%			

**Low Stature Wetland Planting - Makahuri Pioneer Species (LSW-01)**

Botanical Name	Common Name	Percentage Mix	Grade	Density (x/m2)	Notes
<i>Apodasmia similis</i>	Oioi / Jointed Wire Rush	5%	PB2	1.8	Waters Edge
<i>Baumea articulata</i>	Baumea	2%	PB2	1	Waters edge
<i>Blechnum novae-zelandiae</i>	Swamp Kio Kio	2%	PB2	1	Waters edge
<i>Carex geminata</i>	Rautahi	3%	PB2	1.8	Mid
<i>Carex secta</i>	Pukio	15%	PB2	1	Waters Edge
<i>Carex virgata</i>	Pukio	15%	PB2	1	Waters Edge
<i>Ficinia nodosa</i>	Knobby Club Rush	5%	PB2	1.8	Waters Edge
<i>Kunzea ericoides</i>	Kanuka	10%	PB2	1	Back
<i>Leptospermum scoparium</i>	Manuka	10%	PB2	1	Back
<i>Myrsine australis</i>	Red Matipo	10%	PB2	1	Mid/Back
<i>Phormium tenax</i>	NZ Swamp Flax	20%	PB2	1	Front
<i>Syzygium maire</i>	Swamp Maire	3%	PB15	0.25	Enrich-back
Total %		100%			

Figure 59. Planting lists



## 5.15 Earthworks

To aid in the readability of the landscape, the earthworks for the project have been designed to integrate within the surrounding landform context. Subtle realignments of the geometric design have resulted in reduced earthworks leading to lesser cut and fill batters. Earthworks for the expressway will be undertaken to maintain and enhance the natural landform patterns of the local character areas by:

- Rounding the tops and sides of cut and fill batters to be consistent with surrounding landforms
- The construction footprint will be minimised to limit the impact of construction on existing vegetation and soil structures
- All slopes steeper than 1V:3H will have a geotechnical review
- Maintaining land formations and minimising disturbance of existing dunes
- Avoiding land modification in sensitive areas, where possible
- Where steeper slopes are unavoidable, these will be planted to control erosion and avoid slippage
- Distinct planting palettes that engage in the language of their respective context will supplement the landform character
- All exposed areas shall be temporarily protected to limit erosion from wind and rain, and minimise dust issues in adjoining properties.



Figure 60. Typical existing dune formations



Figure 61. Rounded dunes to reflect existing at M2PP



### 5.16 Retained Vegetation

Vegetation to be retained within the designation is identified in the 'Retained Vegetation Plans' and 'Landscape Plans'. These areas will be clearly identified on site and protected during construction.

### 5.17 Vegetation to be Removed

Vegetation to be cleared will be undertaken with ecological and landscape supervision.

### 5.18 Indigenous Vegetation to be Removed

A number of native trees will be required to be removed for the project. Iwi will be given access to native trees for cultural purposes.

Fallen trees and logs will also be removed and relocated within areas of bush being retained and/or in areas of new planting to provide habitat.



Figure 62. Existing vegetation adjacent to existing SH1



Figure 63. Existing vegetation adjacent to existing SH1



Figure 64. Existing vegetation adjacent to existing SH1

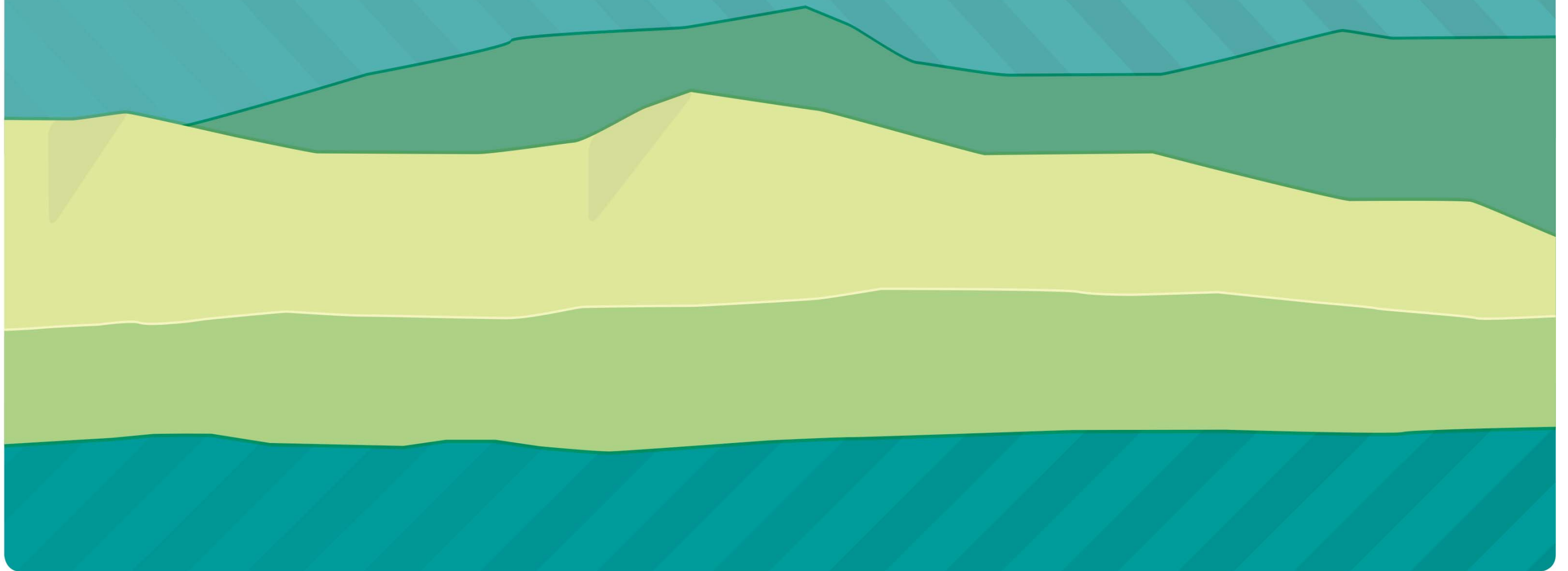


Figure 65. Existing vegetation adjacent to rail



06

# Bridges





## 6.1 Approach

The following general objectives apply:

- To develop a set of design consistencies for bridges according to type (who experiences the structures) and hierarchy.
- To make a positive contribution to the surrounding environment and communities.
- To ensure new bridges complement their context with an appropriate form, scale, design and quality, and considers the relationship to existing bridges (road and rail).
- To make a positive contribution to highway users and the driving experience.
- To consider the opportunities for consistency of bridge elements across the Wellington Northern Corridor RoNS.
- To ensure the bridge location and geometry fits in well with the wider movement network, making a positive contribution to the urban form.

## 6.2 Executive Summary

Through extensive consultation with Ngā Hapū o Ōtaki, Ōtaki Community Board and KCDC, the Peka Peka to Ōtaki bridges have been developed to have a consistency in form with the bridges in the Mackays to Peka Peka expressway, while maintaining a distinct personality that reflects both the culture and community of Ōtaki.

The Peka Peka to Ōtaki bridges have an inscription (refer to 6.4 Bridge Narrative) to a portion of the bridge barriers which are designed to tell a narrative of the Ōtaki rohe.

The river bridge piers to the Ōtaki and Waitohu bridges are designed with a simple triangular formation to the pier, relating it to the bridge structures crosshead while maintaining a minimal 'footprint' within the river beds.

There is an opportunity to express manaakitanga on the Ōtaki River bridge for people visiting the area. The bridge will have a shared path to the eastern side of the bridge allowing ease of access across the river for pedestrians. A slatted metal barrier will provide strong visual connections to the river below, allowing locals to deeply engage with the ever changing river and surrounding landscape.

Incorporated in to the end of the cycleway/walkway barrier is a vertical marker. The marker will have a visual and physical presence at the north eastern end of the bridge and will reference the cultural significance of the river to the local community and the region.

“ Bridges within the proposed expressway play an important role, providing east west connections within the community and contribute to the cultural and community identity of Ōtaki.

### Bridges Key

- 1 Waitohu Stream Bridge
- 2 North Ōtaki Main Road Underpass
- 3 North Ōtaki Rail Overpass
- 4 Rahui Road Underpass
- 5 Ōtaki River Bridge
- 6 South Ōtaki Rail Overpass
- 7 Ōtaki Gorge Road Underpass
- 8 School Road Underpass
- 9 Makahuri Rail Overpass

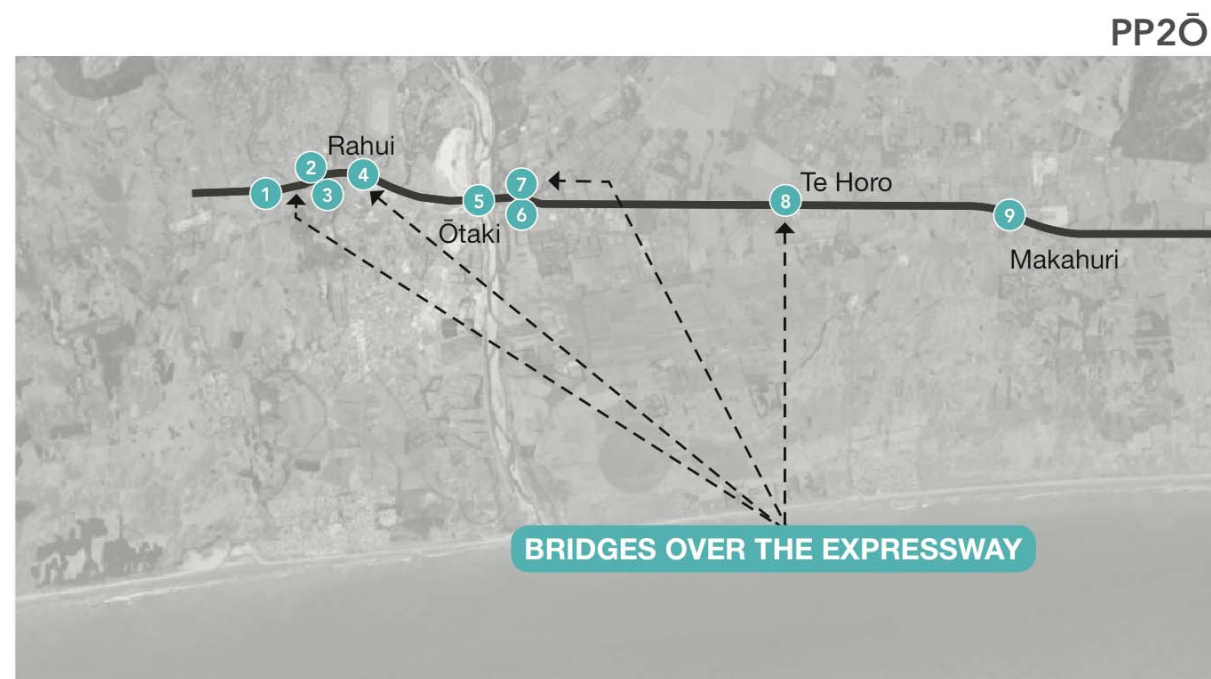


Figure 66. 'Family of Bridges' Locations in PP2Ō



## 6.3 Bridge Assemblage - Objectives

The following bridge assemblage objectives have been established through various stakeholder workshops. These objectives outline the common overriding principles for all bridges and work in tandem with the specific objectives for the individual bridges.

### RE Walls

- A1 To be visually recessive in an exposed aggregate finish, including the visible edges at the corners of the RE wall, with a NZ Transport Agency approved graffiti coating.
- A2 Top of the walls to be square and aligning with the crease fold in the bridge barriers.
- A3 Panels are structural 2.0x2.0m square panels with continuous vertical joints and staggered horizontal joints.
- A4 Safety handrails to be installed to the top edge of the RE wall as necessary as a barrier form fall.
- A5 Top of the RE wall return (parallel with barriers) to follow profile of barrier, with a consistent top edge.
- A6 Form joint detail into finished face of corner panels to maintain visual continuity from RE panels.

### Barriers

The barriers are to be read as a simple horizontal element in the landscape, similar to the creased profile in M2PP bridge barriers. The finish is off the form concrete with a selected NZ Transport Agency approved graffiti coating and will be a uniform finish.

- B1 The top edge of the barrier, with a crash rail over, is to be kept low, maximizing the visual connection to the surrounding landscape.
- B2 The top portion of the barrier (above the crease) is to be consistent across all bridges.
- B3 Bridges to have an extended barrier, below the car deck. This varies depending on the depth of the structure.
- B4 The bridge barrier is to be consistent in form up to the abutments. Alignment of safety handrails with barrier transitions.
- B5 The crease fold in the barrier is to line up with the top edge of the RE wall.

### Bridge Narrative

The narrative design is to be representative of the people, history, landscape, culture, ecology, flora and fauna of the rohe, in which the bridge sits. The narrative will be designed by a selected artist and to the following guidelines and objectives.

- C1 A narrative (pattern) to each bridge is applied to the outside face of the barrier.
- C2 The location of the narrative is at one end of the bridge barrier, adjacent to the RE wall. The narrative is contained within a predetermined zone, finishing on a barrier join. The narrative is aimed at users of the expressway and local roads and access way adjacent to the bridge.
- C3 The narrative is etched in to the finished surface of the bridge barrier.
- C4 The end of the narrative is not to stop abruptly and is to blend out as it moves away from the RE wall.
- C5 The narrative is to be lit at night.

### Bridge Structure

- D1 The concrete structure is an off the form finish.
- D2 The underbridge steel structure is to be coated in a dark, recessive NZ Transport Agency approved steel coating system.

## 6.4 Bridge Narratives - Objectives

The bridge narratives within the proposed expressway play an important role in connecting people to place. They are to represent local iwi and hapū core values that display the rohe as being distinct. The narrative is to be developed in collaboration with local artists and iwi and is to embody **manaakitanga** (respect, love and protection), **rangatiratanga** (mana, chieftain-ship, power), **whanaungatanga** (sense of belonging), and **kaitiakitanga** (guardianship).

Patterning on the outside of the bridge will allow Iwi to express manaakitanga to drivers using the expressway, local roads, and to people passing through by train. Patterning should depict local stories, maunga, awa, taonga species and the five hapū in the area, Ngāti Pare, Ngāti Koroki, Mai Ōtaki, Kapumanawawhiti, Ngāti Huia ki Katihiku.



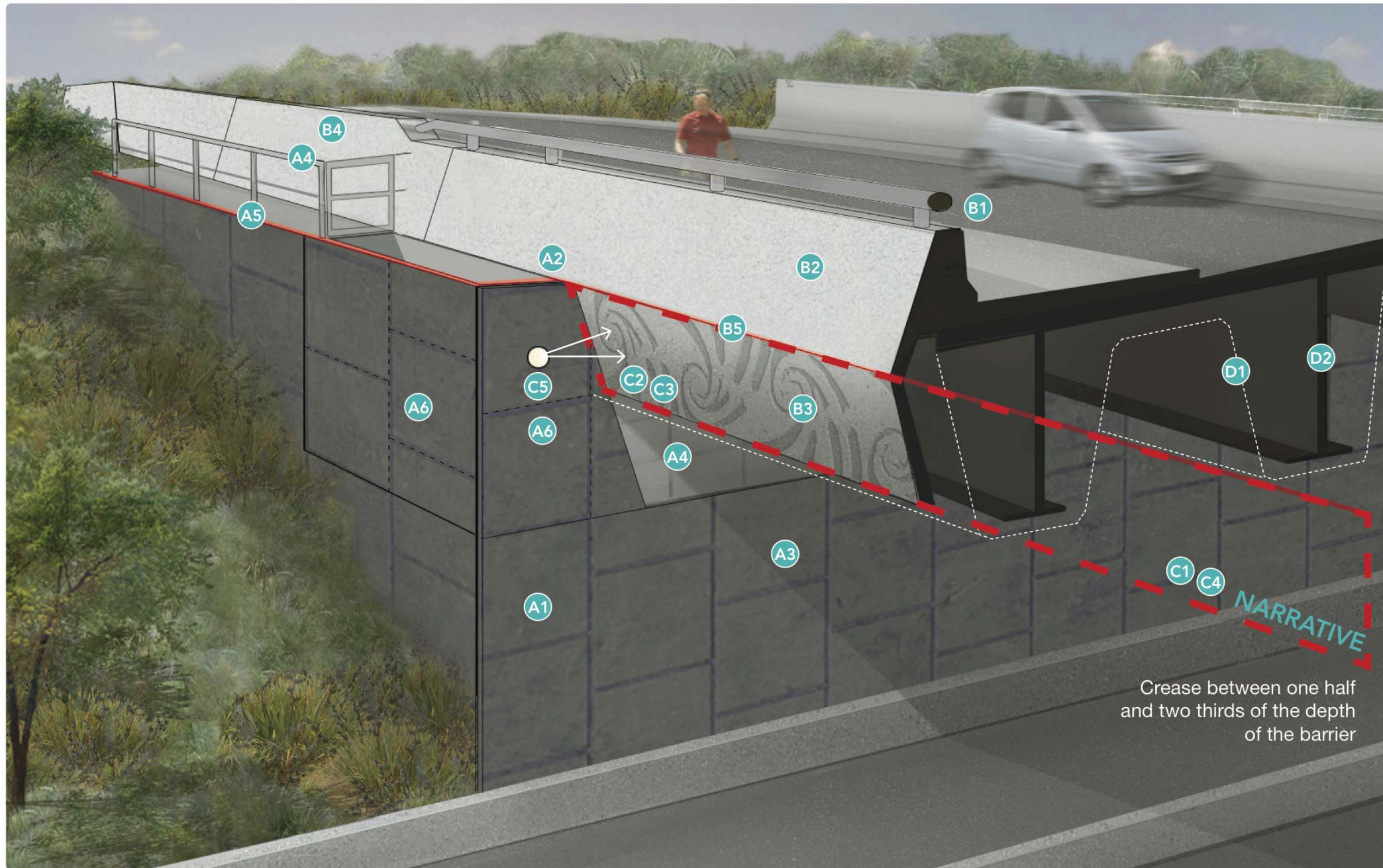


Figure 67. Bridge assemblage - Illustrative Only



Figure 69. Image indicating size and proportion of RE panels at 2.0m x 2.0m.

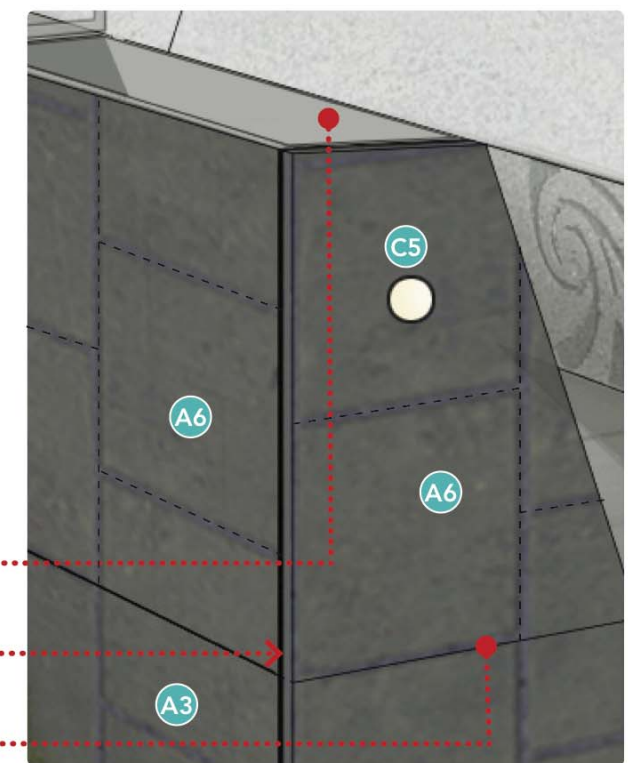


Figure 68. Bridge RE panel corner finish and materiality - Illustrative Only



Figure 70. Narrative Etching example - Te Wānanga o Raukawa

Corner panels to extend above RE panels to form square external corners. Behind these panels is the maintenance access area.

Interlocking RE panels, with exposed aggregate finish to ends of corner panels.

Corner panel patterning to continue with same rhythm through the corner panels, with joins aligning.



## 6.5 Bridges and Landscape Integration

The bridges are considered as an integral part of the wider landscape and offer opportunities to express and emphasise the east/west connections at key locations along the expressway. Rather than objects in isolation the bridges have been considered along with landform and planning.

Design Intent:

- 1 Maximise east/west visual and ecological connections.
- 2 Amplify the landscape connections with large scaled plantings to either side of the bridges.
- 3 Planting to minimise the visual appearance of the concrete RE walls to expressway users and local residents.
- 4 Planting to be selected to grow above the top edge of barriers, resulting in the landscape being the foreground with the bridge appearing as the background to the landscape – similar to M2PP.
- 5 Planting to reflect the surrounding character area.

Additional Plan Key:

- 6 Ecological east/west connection
- 7 Physical east/west connection
- 8 Planting as visual east/west connection
- 9 Pedestrian footpath ●●●●●
- 10 Horse demounting blocks ◆

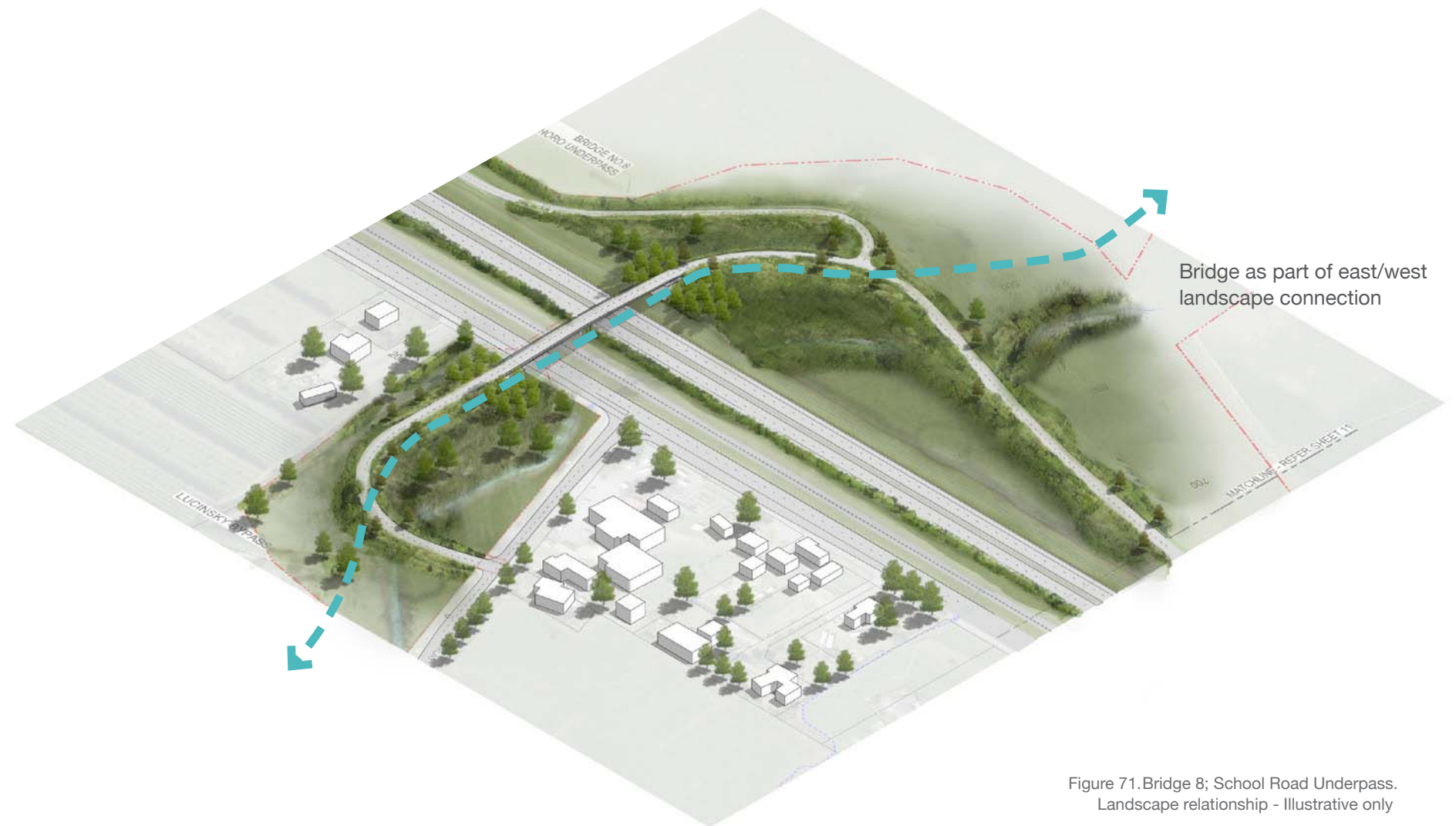


Figure 71. Bridge 8; School Road Underpass.  
Landscape relationship - Illustrative only



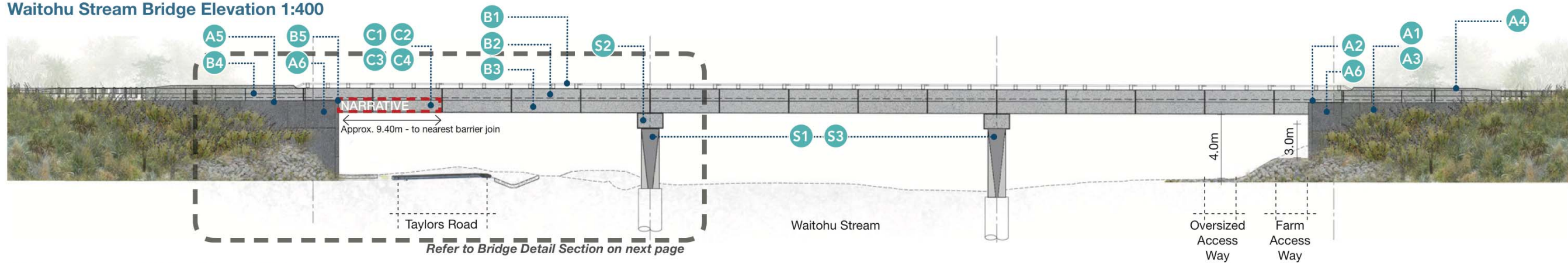


Figure 72. Bridge 8; School Road Underpass. Landscape plan - Illustrative only



## 6.6.1 Bridge 1 - Waitohu Stream Bridge

Waitohu Stream Bridge Elevation 1:400



Waitohu Stream Bridge Plan 1:400

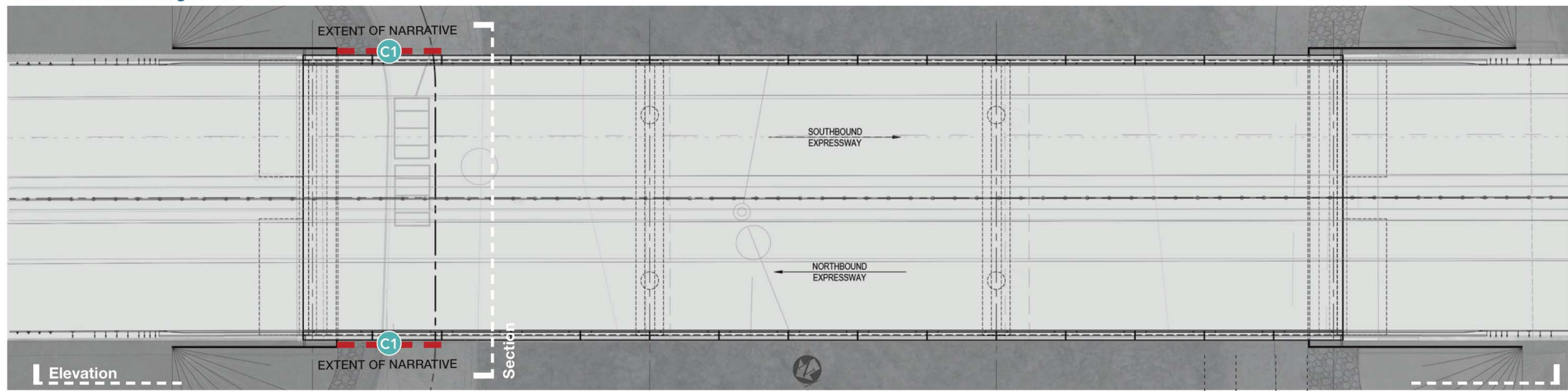


Figure 73. Waitohu Stream Bridge Elevation and Plan

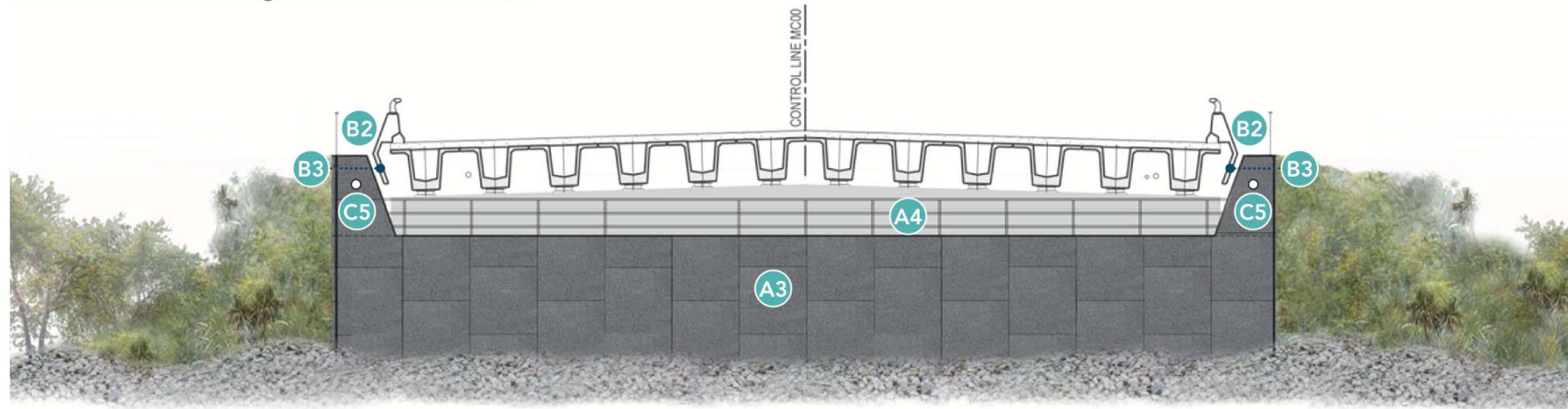
### Specific Objectives

- S1** Reduced number of piers to open the undercroft of the bridge and to open the appearance and view below the bridge for local road users.
- S2** Shaped crosshead ends to take the same profile as the adjoining barrier above.
- S3** Ōtaki River and Waitohu piers to be the same profile, with a triangular face to the outside edge of a circular column, facing away from the bridge. This allows the square, horizontal top of the triangle to sit up adjacent to the underside of the square crosshead. The triangular profile is to have a textured finish. Refer to section 6.6.44 for the river bridge pier profile.

» Refer to section 6.3 *Bridge Assemblage* for general objectives key



**Waitohu Stream Bridge Cross Section 1:200**



**Waitohu Stream Bridge Cross Section 1:50**

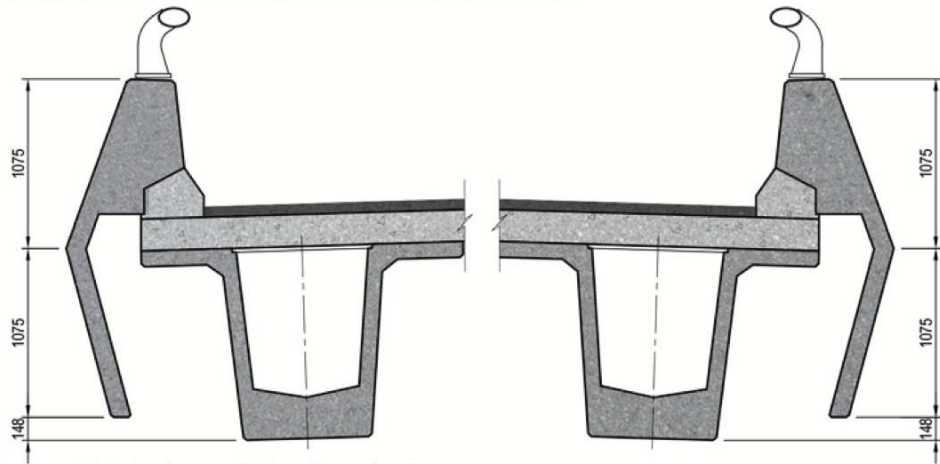


Figure 74. Waitohu Stream Bridge Cross Sections

**Waitohu Stream Bridge Detail Section 1:400**

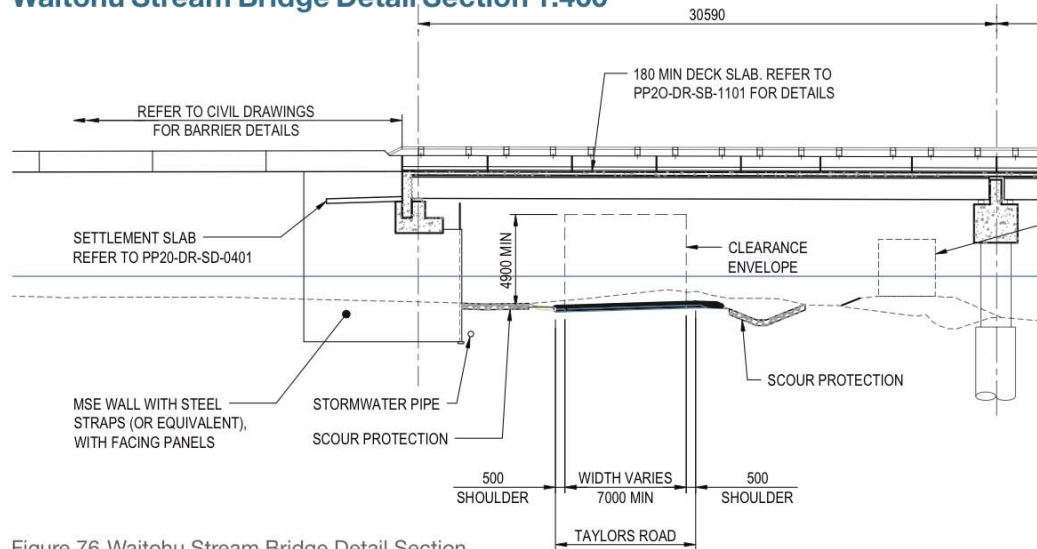


Figure 76. Waitohu Stream Bridge Detail Section

**Material Palette**



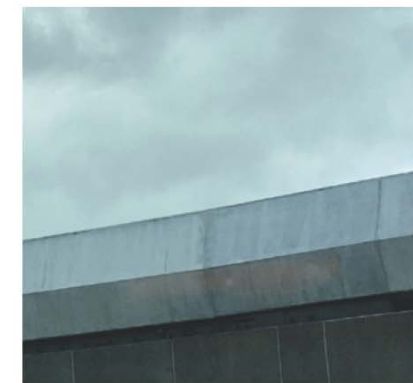
Abutment RE Wall Panels



Safety Handrails

**A3** Panels are structural 2.0x2.0m square panels with an NZ Transport Agency approved graffiti coating.

**A4** To be installed to the top edge of the RE wall as necessary as a barrier form fall -black finish.



Bridge Barrier



Pier Finish

**B2** Simple horizontal element. Finish is off the form concrete with a selected NZ Transport Agency approved graffiti coating.

**B3** Exposed concrete finish with a selected NZ Transport Agency approved graffiti coating.

**S3** Exposed concrete finish with a selected NZ Transport Agency approved graffiti coating.

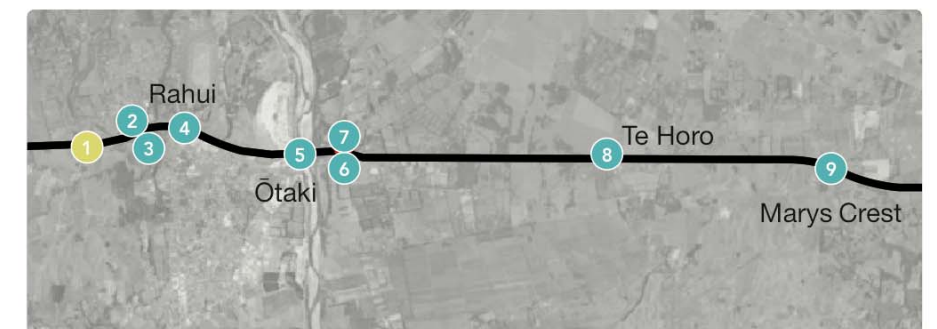
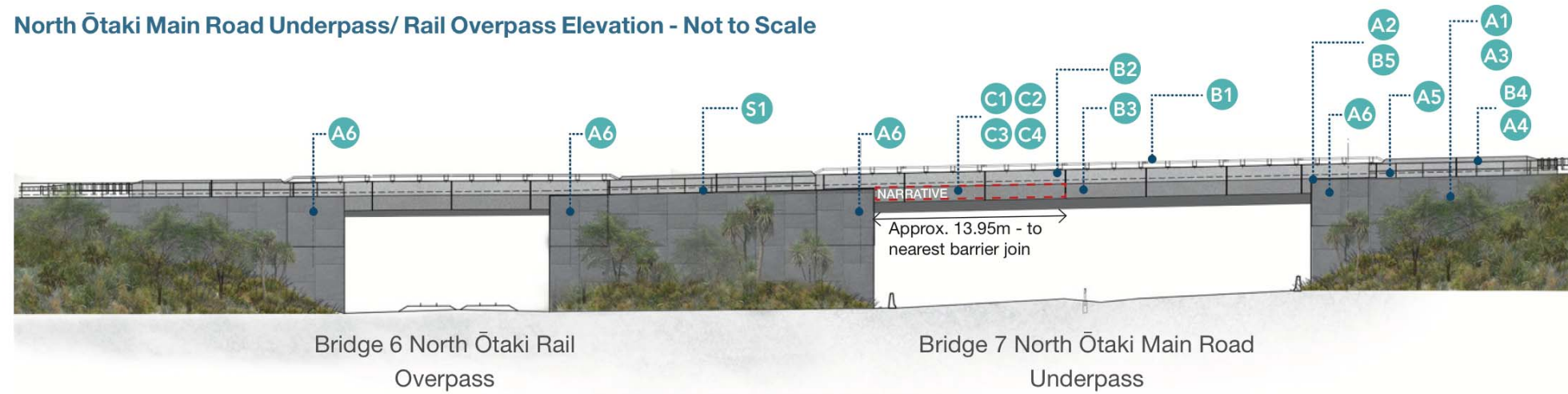


Figure 75. Bridge 1 location - Waitohu Stream Bridge



## 6.6.2 Bridge 2 & 3 - North Ōtaki Main Road Underpass/ Rail Overpass

North Ōtaki Main Road Underpass/ Rail Overpass Elevation - Not to Scale



North Ōtaki Main Road Underpass/ Rail Overpass Plan 1:400

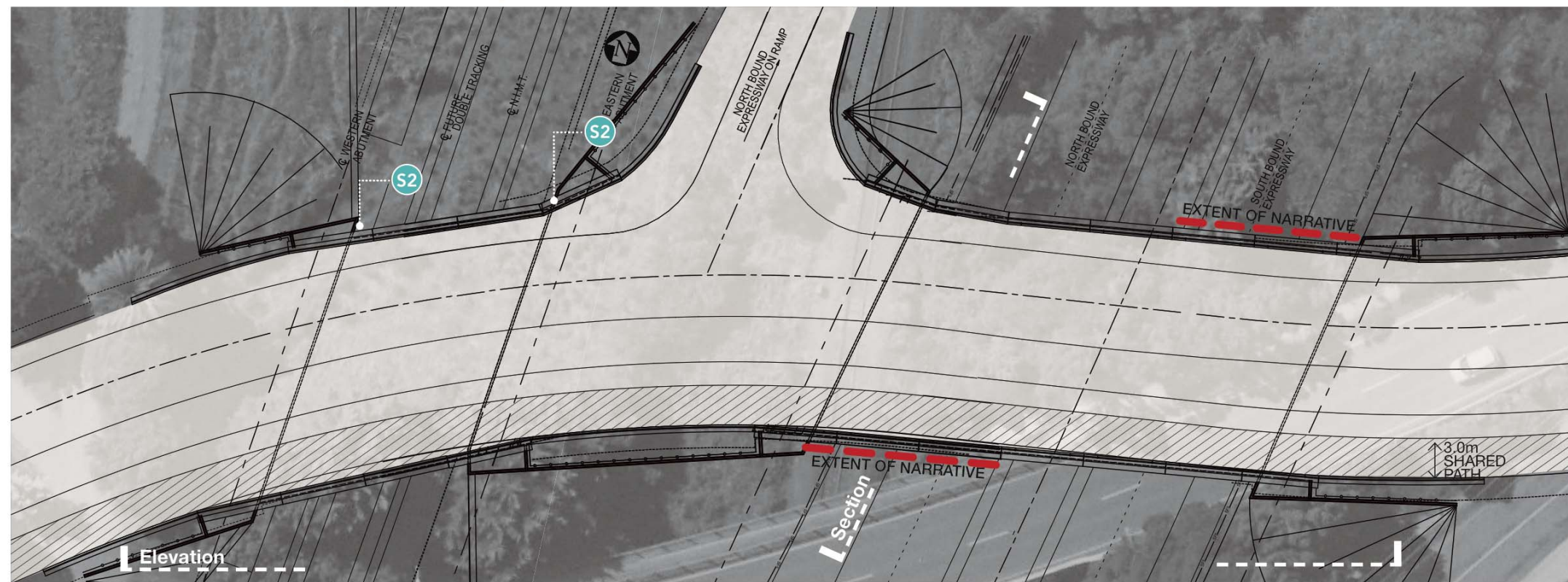


Figure 77. North Ōtaki Main Road Underpass/Rail Overpass Elevation and Plan

### Specific Objectives

- S1 Central RE wall to align with barrier crease either side of wall.
- S2 No corner panels required to certain RE walls due to a lack of visibility from expressway.
- S3 North Bound Expressway on-ramp

» Refer to section 6.3 *Bridge Assemblage* for general objectives key



### North Ōtaki Main Road Underpass Cross Section 1:200

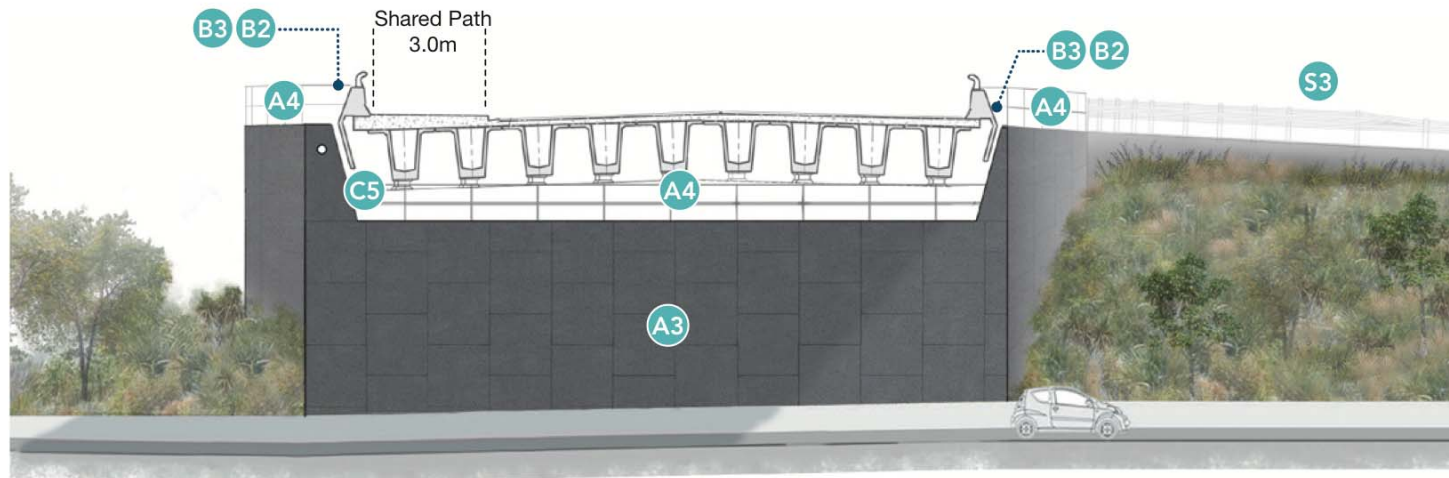
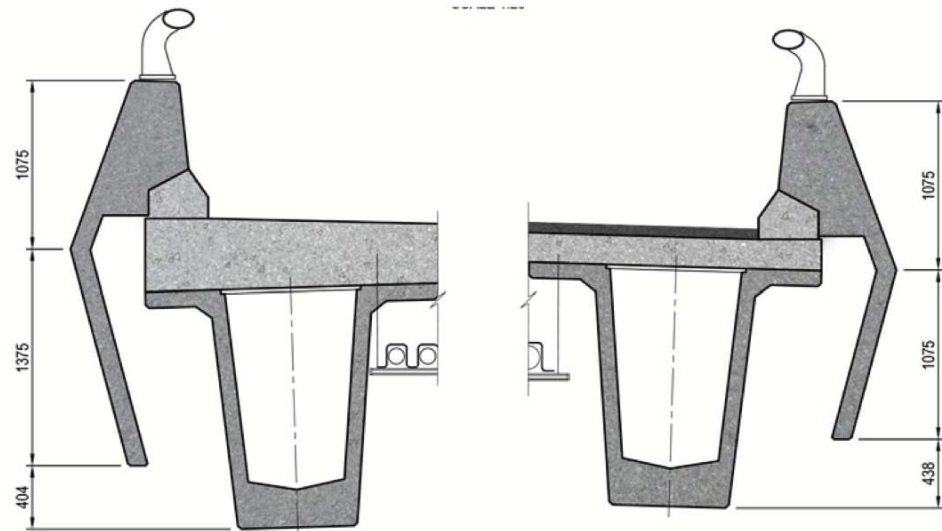


Figure 80. North Ōtaki Main Road Underpass/Rail Overpass Elevation (bridge 3 similar)

### North Ōtaki Main Road Underpass Cross Section 1:50



### North Ōtaki Rail Overpass Cross Section 1:50

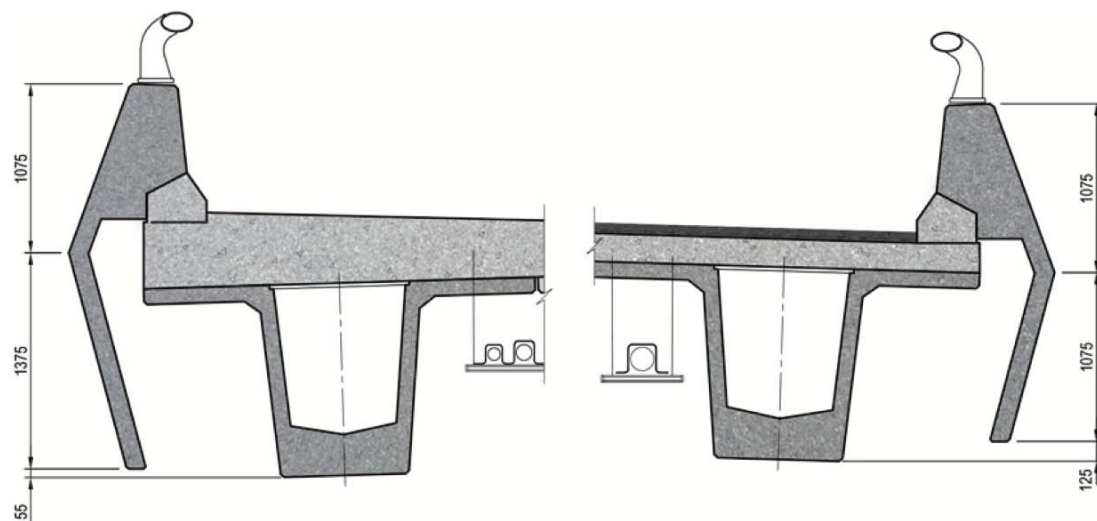


Figure 78. North Ōtaki Main Road Underpass/Rail Overpass Cross Sections

### Material Palette



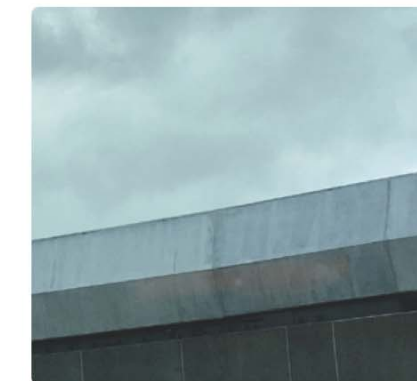
Abutment RE Wall Panels



Safety Handrails

**A3** Panels are structural 2.0x2.0m square panels with an NZ Transport Agency approved graffiti coating.

**A4** To be installed to the top edge of the RE wall as necessary as a barrier form fall -black finish.



Bridge Barrier

**B2** Simple horizontal element. Finish is off the form concrete with a selected NZ Transport Agency approved graffiti coating.

**B3** is off the form concrete with a selected NZ Transport Agency approved graffiti coating.

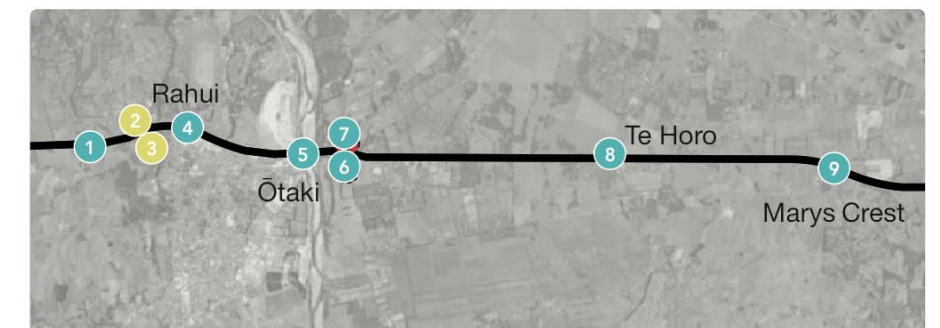
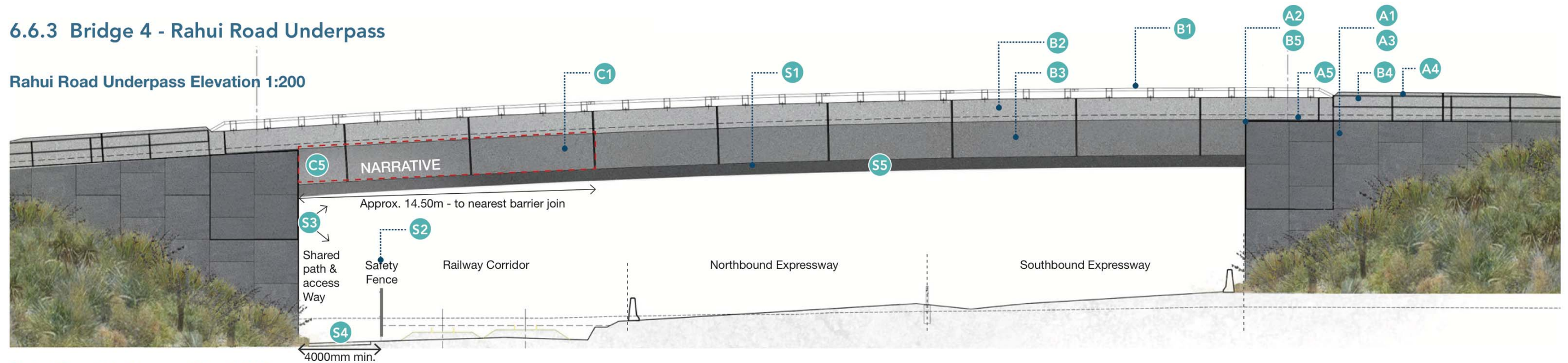


Figure 79. Bridges 2 & 3 locations - North Ōtaki Main Road Underpass & Rail Overpass

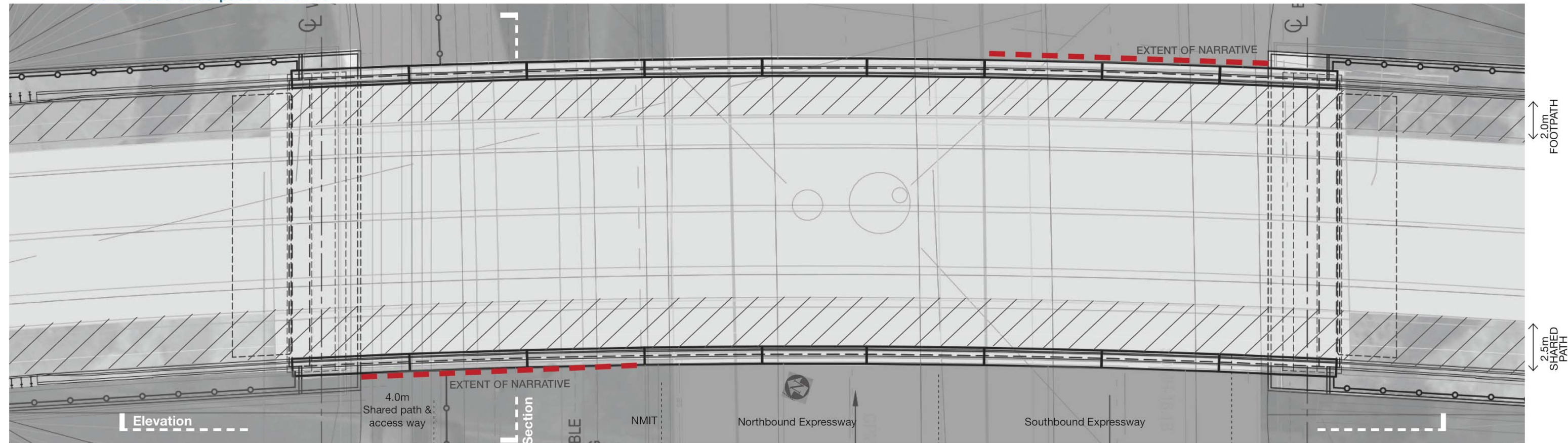


### 6.6.3 Bridge 4 - Rahui Road Underpass

Rahui Road Underpass Elevation 1:200



Rahui Road Underpass Plan 1:200



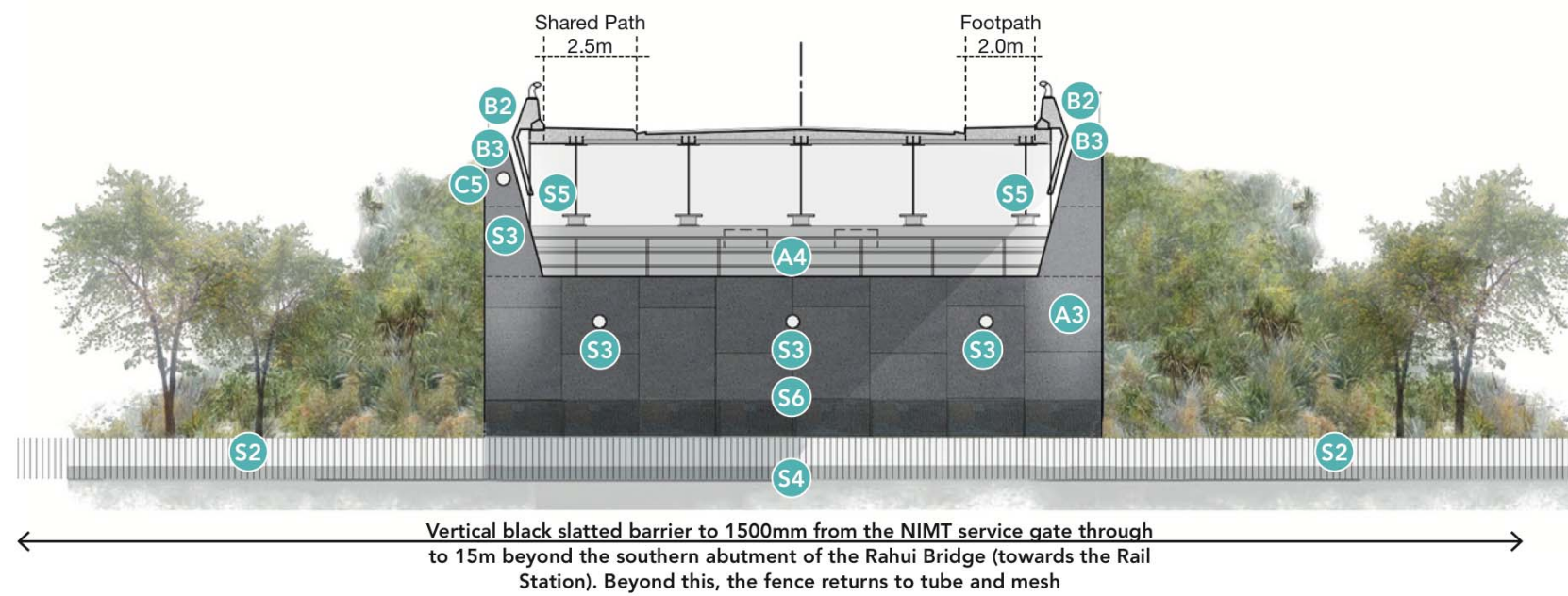
#### Specific Objectives

- S1** Steel bridge to allow a greater span with no piers, minimising the width of the bridge and opening the undercroft of the bridge below for expressway user views.
- S2** NIMT safety fence between railway and shared path to provide safe access under bridge.
- S3** Space underneath the bridge is to be lit with down lights to improve pedestrian safety (subject to CPTED audit findings).
- S4** Asphalt footpath to access way.
- S5** Steel structure painted in a dark recessive colour.
- S6** The Rahui Road access way is to feel safe, secure and a pleasant environment. This is to be achieved with a consistent ground surface finish between the safety fence and the R.E wall. Lighting to the access way is to illuminate both the narrative to the side of the bridge barrier and the space below the undercroft (design team to consider position and height of this space lighting).
  - » Refer to section 6.3 *Bridge Assemblage* for general objectives key

Figure 81. Rahui Road Underpass Elevation and Plan



### Rahui Road Underpass Bridge Cross Section 1:200



The lighting specification for under the bridge will be developed through detailed design in response to the CPTED report with the following objectives:

- Provide lighting under the bridge to deter anti-social behaviour
- Provide sufficient lighting to light faces, but not to encourage people to use this route after dark. Therefore consider minimising lighting between the rail station and bridge
- Ducting to be provided to allow upgrade for future upgrades if Pare-o-Matangi is to be lit to a safe standard.

### Rahui Road Underpass Bridge Cross Section 1:50

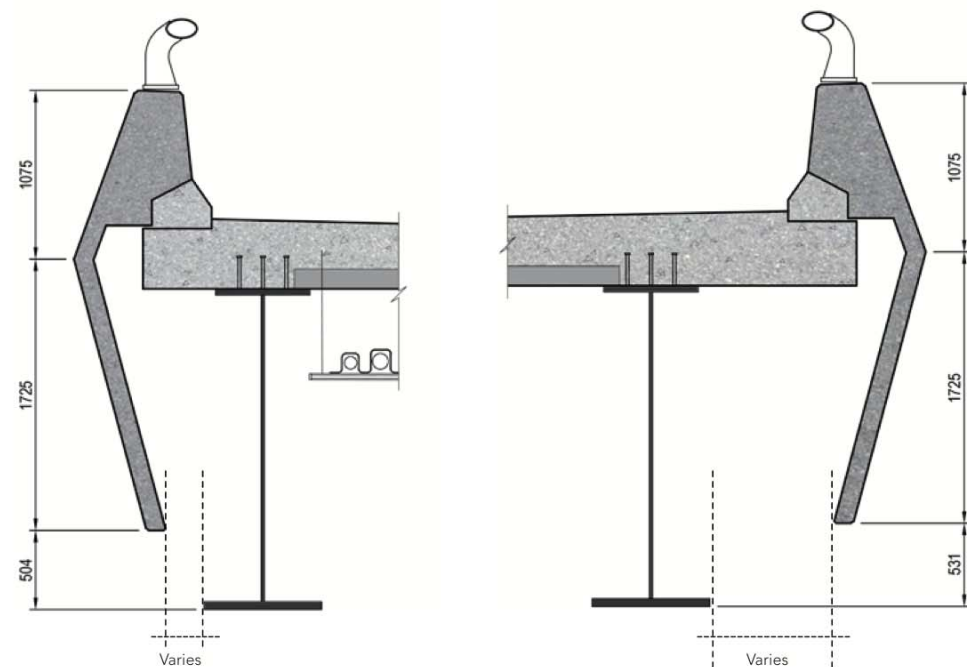


Figure 82. Rahui Road Underpass Cross Sections

### Material Palette



Abutment RE Wall Panels

- A3 Panels are structural 2.0x2.0m square panels with an NZTA approved graffiti coating.



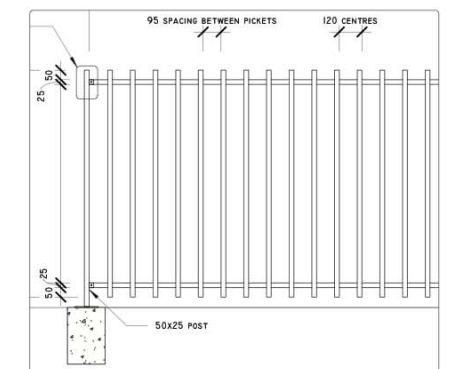
Bridge Barrier

- B2 Simple horizontal element.
- B3 Finish is off the form concrete with a selected NZTA approved graffiti coating.



Safety Handrails

- A4 To be installed to the top edge of the RE wall as necessary as a barrier form fall -black finish.



NIMT Fence below bridge

- S2 Vertical black slatted barrier to 1500mm from the NIMT service gate through to 15m beyond the southern abutment of the Rahui Bridge (towards the Rail Station). Beyond this, the fence returns to tube and mesh

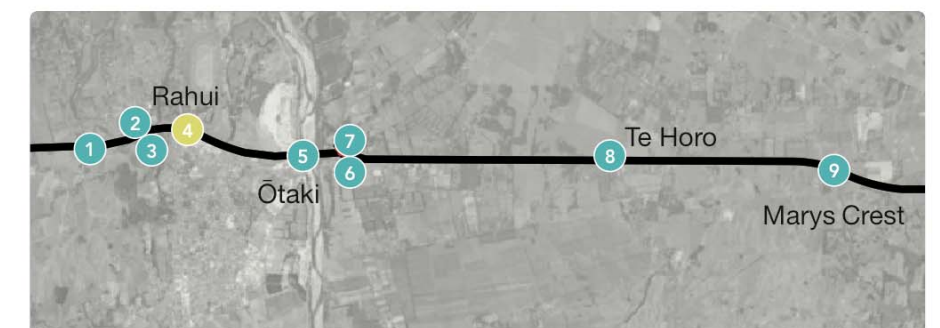


Figure 83. Bridge 4 location - Rahui Road Underpass



Rahui Road Underpass Access way Perspective

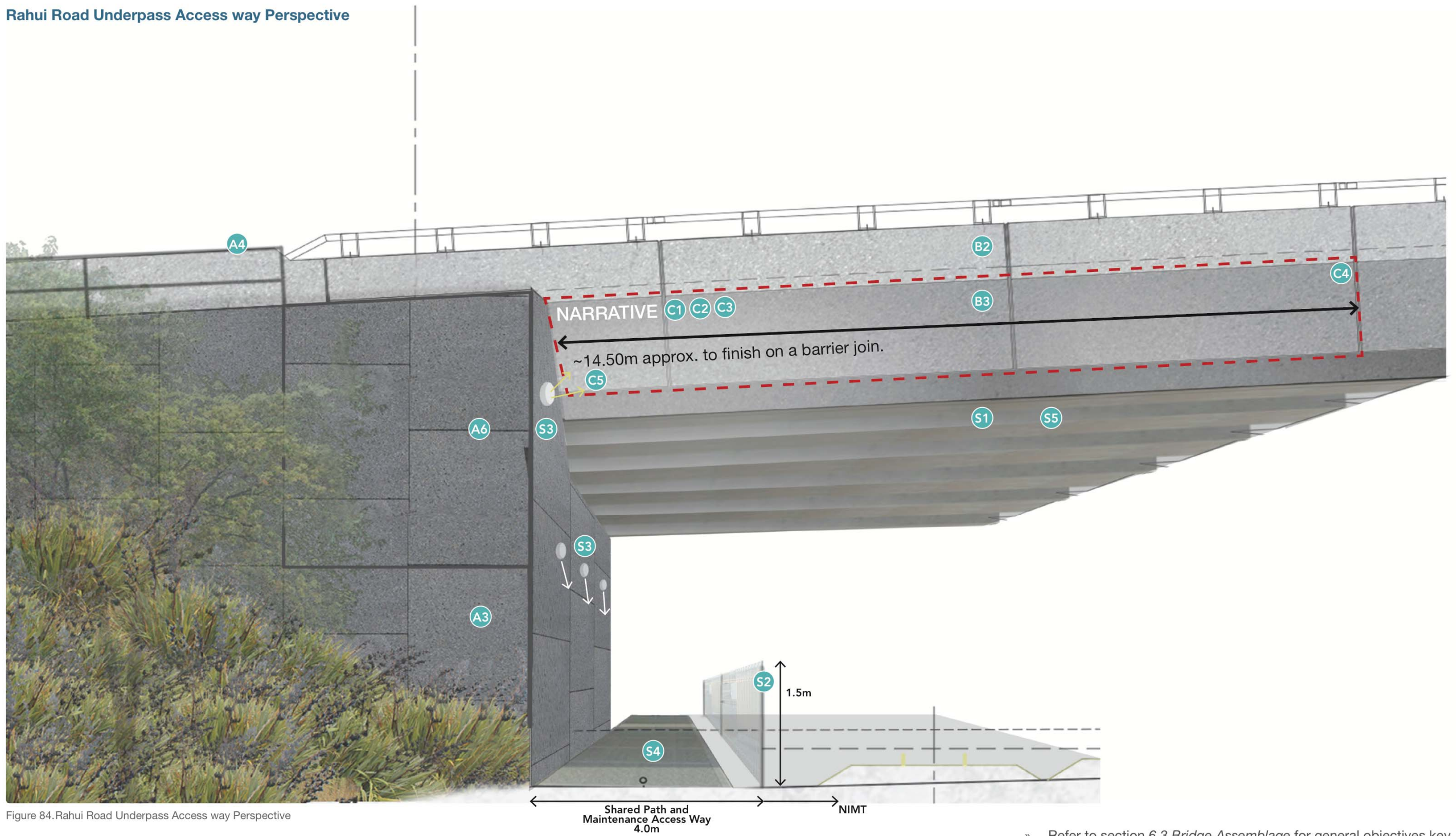


Figure 84. Rahui Road Underpass Access way Perspective

» Refer to section 6.3 *Bridge Assemblage* for general objectives key



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## 6.6.4 Bridge 5 - Ōtaki River Bridge

### Ōtaki River Bridge Elevation 1:1000

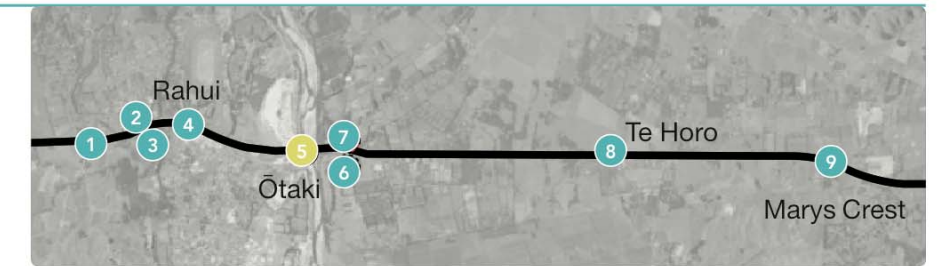
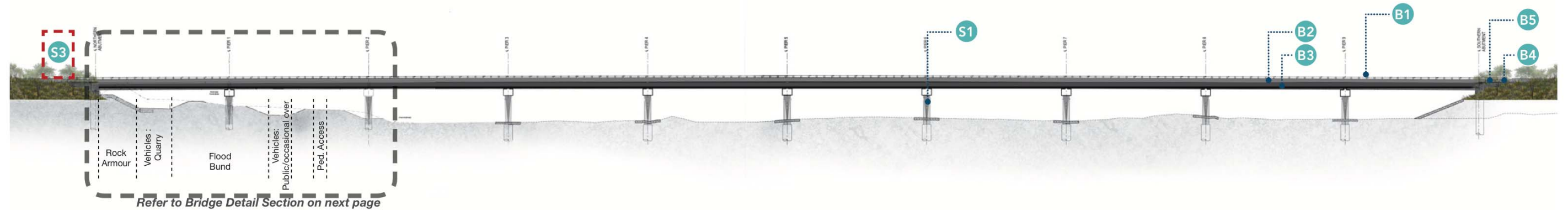


Figure 86. Bridge 5 location - Ōtaki River Bridge

### Ōtaki River Bridge Plan 1:1000

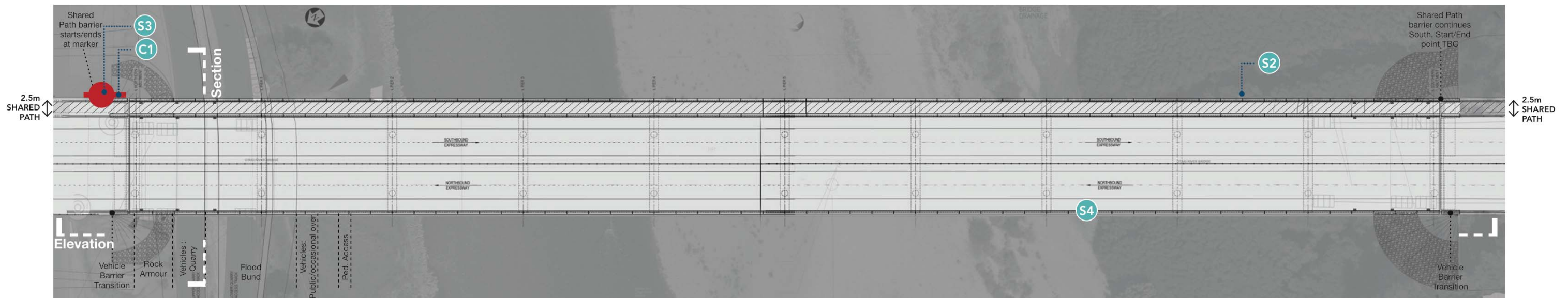


Figure 85. Ōtaki River Bridge Elevation and Plan

Ngā Hapū o Ōtaki regard the bridge as an opportunity to express manaakitanga to people visiting the area. The relationship between iwi, maunga, awa, moana and other local landmarks is integral within Māori value systems. Connectivity to these features engage users in the ever changing state of their environment. It is therefore considered paramount that the visual connection to the river, mountains and sea when driving over the bridge is maintained and enhanced. The slatted steel and lower concrete barriers of the bridge will allow these view shafts to be framed.

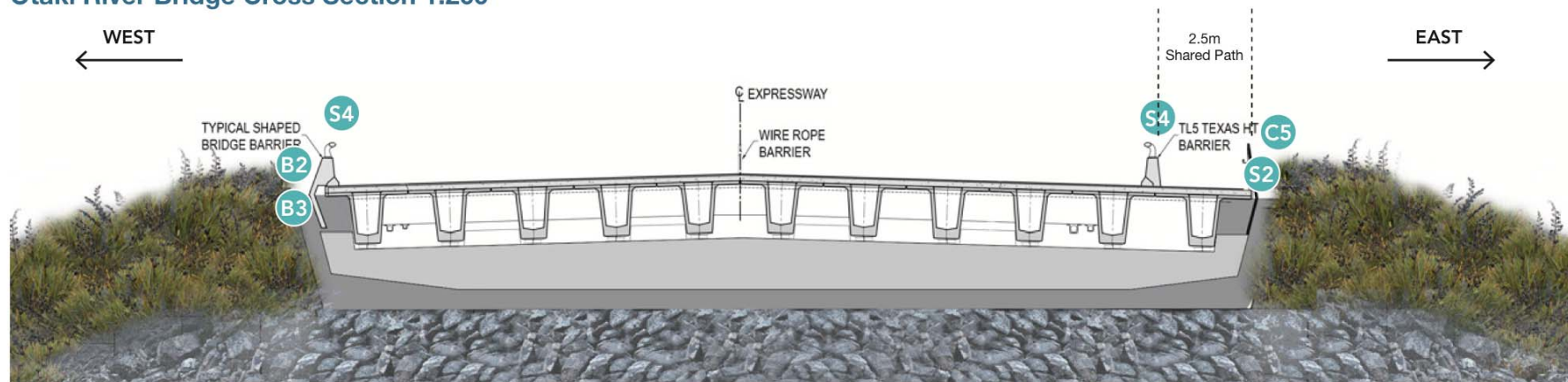
» Refer to section 6.3 *Bridge Assemblage* for general objectives key

#### Specific Objectives

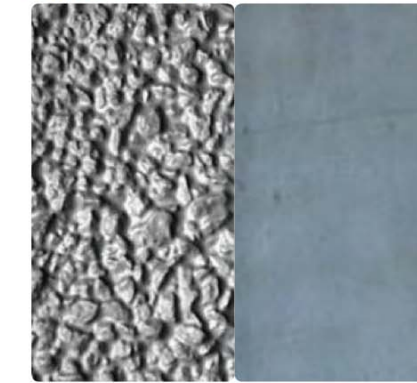
- S1 Ōtaki River and Waitohu Stream piers to be the same profile, with a triangular face to the outside edge of a circular column, facing away from the bridge. The triangular profile is to have a textured finish. Refer to section 6.6.4.4 for the river bridge pier profile.
- S2 The shared path is to be located on the eastern side of the bridge at 1.4m high, fabricated from metal flat bars in a slatted formation. With a folded creased profile, black finish and integrated lighting it will read similar to M2PP foot bridges. Refer to section 6.6.4.2 for the shared path barrier profile.
- S3 The Ōtaki River is significant to the people. This significance is to be recognised in a vertical marker which is to be integrated at the northern end of the shared path barrier. The markers singular location sits as a transition between concrete and steel barriers of the bridge. Refer to section 6.6.4.3 for the vertical marker profile.
- S4 The crash rail on both sides of the bridge and shared path barrier are to be finished in the same black paint.



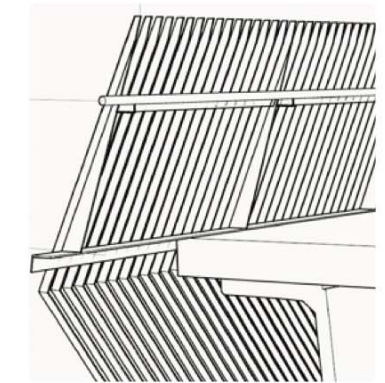
### Ōtaki River Bridge Cross Section 1:200



### Material Palette



Pier Finish



Metal Barrier

**S1** Textured Form liner finish to triangular face. Off the form standard concrete finish to the remaining structure.

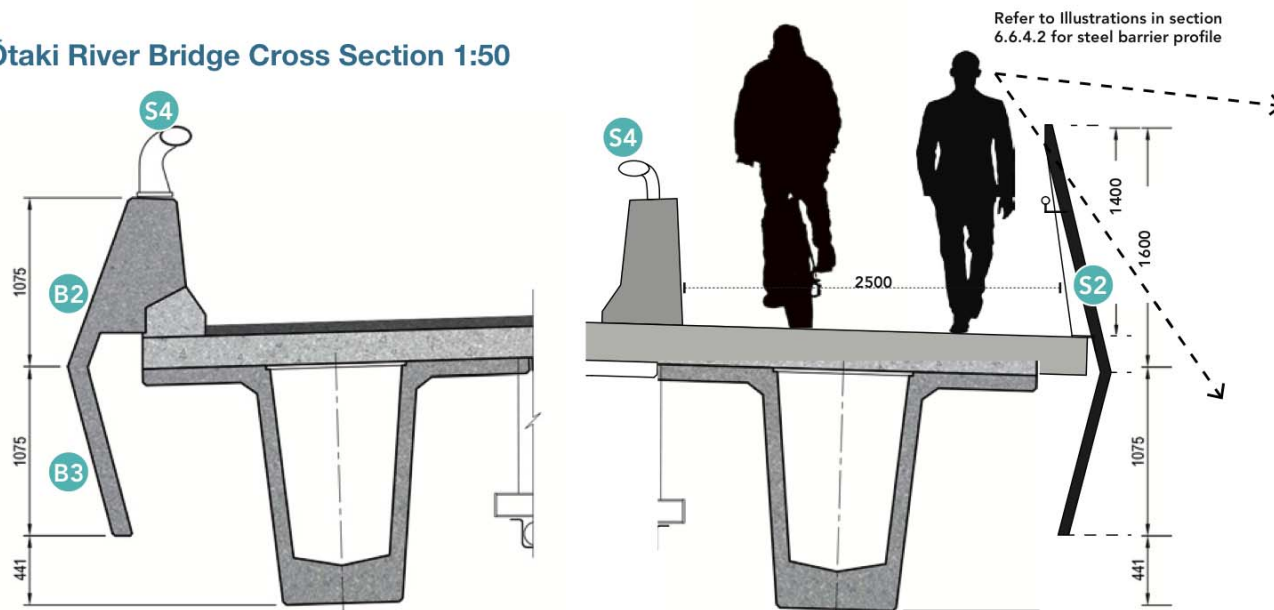
**S2** Metal barrier - profiled metal slatted barrier with lighting to handrail.



Bridge Barrier

**B2** Simple horizontal element. Finish is off the form concrete with a selected NZTA approved graffiti coating.  
**B3**

### Ōtaki River Bridge Cross Section 1:50



### Ōtaki River Bridge Detail Section NTS

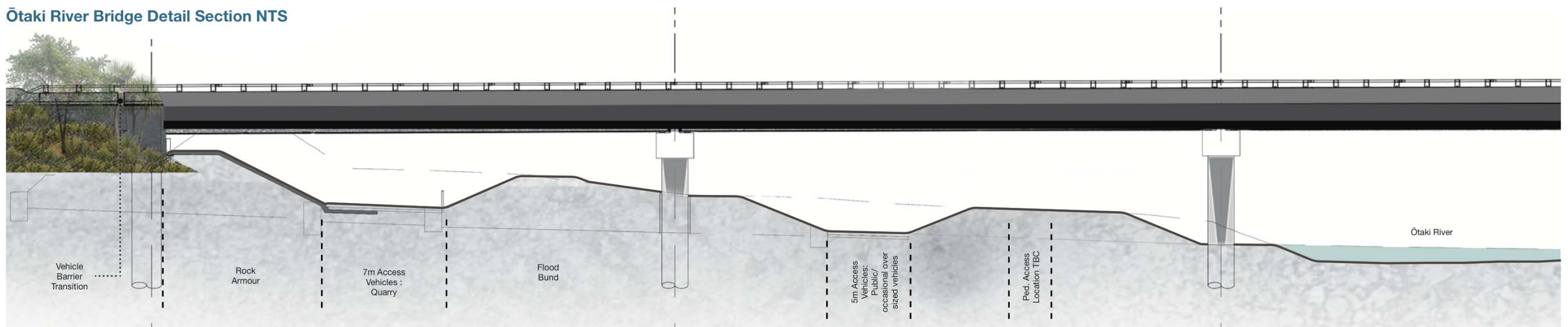


Figure 87. Ōtaki River Bridge Sections



### 6.6.4.1 The naming of local rivers

Haunui-a-Nanaia was a great-grandson of Kupe, and Nanaia was his mother. His father Popoto came to Aotearoa in the Kurahaupo waka, along with Whatonga, according to Ngati Kahungunu sources. Hau left his wife Wairaka at Mahia and returned to Hawaiki with his elder brothers. He returned after some time to find she had been carried away by two servants, Kiwi and Weka, towards Pukerua Bay, near Paekakariki. Haunui is said to have crossed to Whanganui and then headed south, naming the rivers and other waterways as he crossed them. At Pukerua he finally caught up with his wife Wairaka and her lovers. They were killed by his incantation, and she was turned to stone, remaining a lonely sentinel at Pukerua to this day.

*Kapua mai e Hau ko te one ki tōna ringa,  
Ko te tokotoko, ka whiti i te awa,  
Ka nui ia, ko Whanganui  
Tiehutia te wai, ko Whangaehu  
Ka hinga te rakau, ko Turakina  
Tikeitia te waewae, ko Rangitikei  
Ka tatu e hine, ko Manawatu  
Ka rorowhio ngā taringa, ko Hokio  
Waiho te awa iti hei ingoa mōna, ko Ohau  
Takina te tokotoko, ko Ōtaki  
Kāmehameha e hine, ko Waimea  
Ka ngahae ngā pi, ko Waikanae  
Ka tangi ko te mapu e hine  
Ka kite koe ia Wairaka  
Matapoutia; poua ki runga poua ki raro  
Ka rarau, e hine.*

Hau took up some sand in the palm of his hand, and his staff.  
When he crossed over the river,  
Finding it was wide he called it Whanganui  
Splash the water, that will reach Whangaehu  
The length of a fallen tree, is Turakina  
Having many times lifted up his feet, Rangitikei  
When his heart sank within him, Manawatu  
When the wind whistled past his ears, Hokio  
The small river he called, Ohau  
**When he carried his staff in a horizontal position, Ōtaki;**  
When he prayed, O daughter, it was Waimea  
When he looked out of the corner of his eye, Waikanae  
When he became weary, my daughter, he reached Wairaka  
He repeated an incantation,  
**She became fixed above, and fixed below,  
And she remained immovable.**

(Excerpt from *Ko te popo a Te Rangitakoru mo tana tamahine, mo Wharaurangi*. In *Te Ika a Māori, or New Zealand and its inhabitants*, Chap X Songs. Rev R. Taylor, Wertheim & Macintosh, 1855, London. [www.nzetc.victoria.ac.nz](http://www.nzetc.victoria.ac.nz))

Note that Haunui's descendants are Ngati Kahungunu, and Ngati Raukawa through Mahinarangi, the mother of Raukawa.

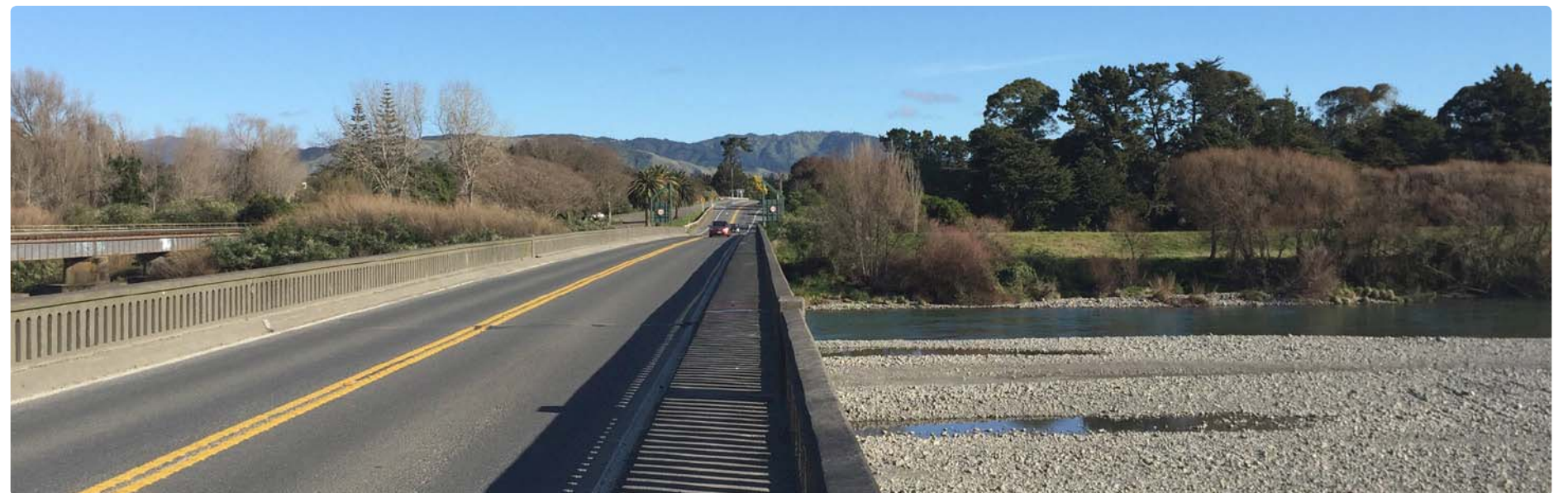


Figure 88. Current Ōtaki River Bridge



### 6.6.4.2 Shared Path

The shared path barrier is to be fabricated from metal flat bars in a slatted formation, with a folded creased profile, similar to the concrete barriers and similar to the M2PP foot bridges. The barrier is to have a height from deck level of 1.4m and is to be a black finish, similar to the M2PP foot bridges. Pedestrian lighting will be incorporated into a handrail structure.

#### Shared Path Perspective

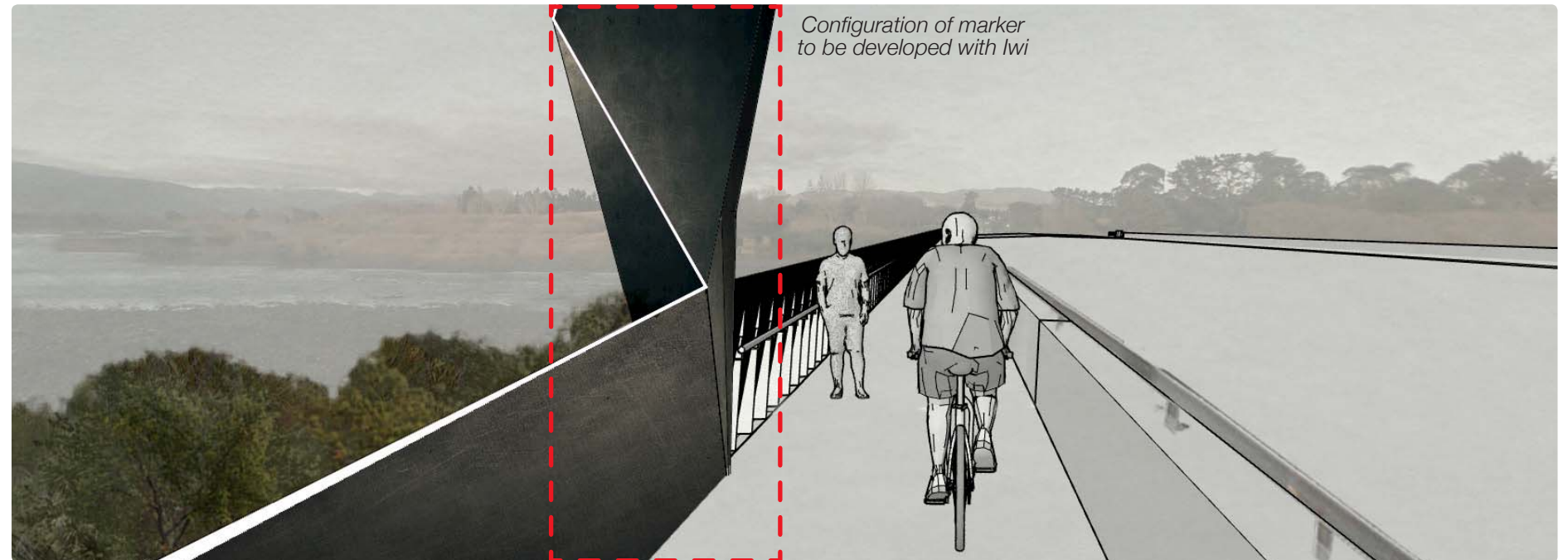
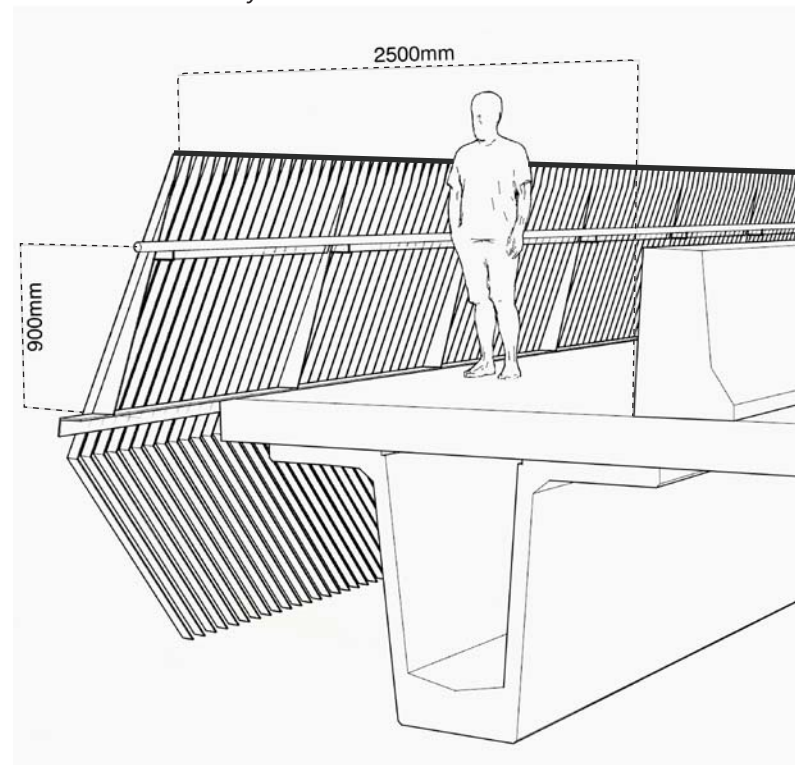
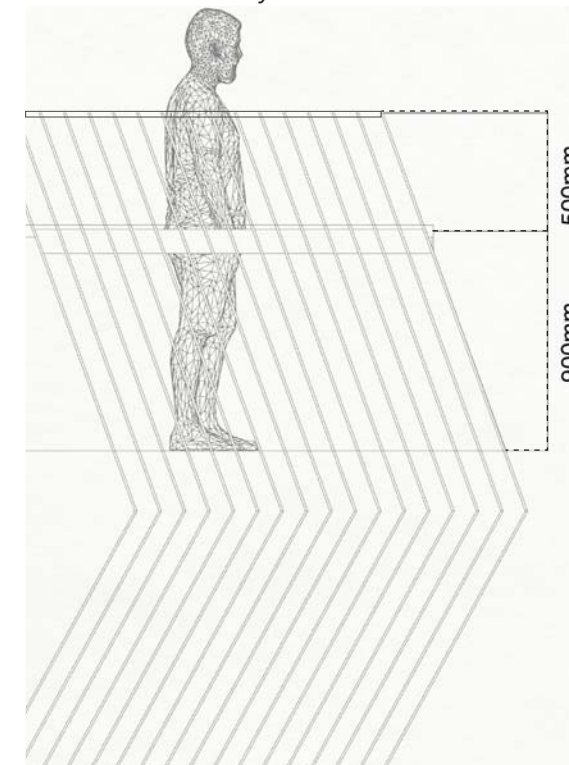


Figure 89. Ōtaki River Bridge shared path perspective - Illustrative only

#### Cross Section Perspective- Handrail & Barrier NTS - indicative only



#### Elevation - Handrail & Barrier NTS - indicative only



#### Section - Handrail & Barrier NTS - indicative only

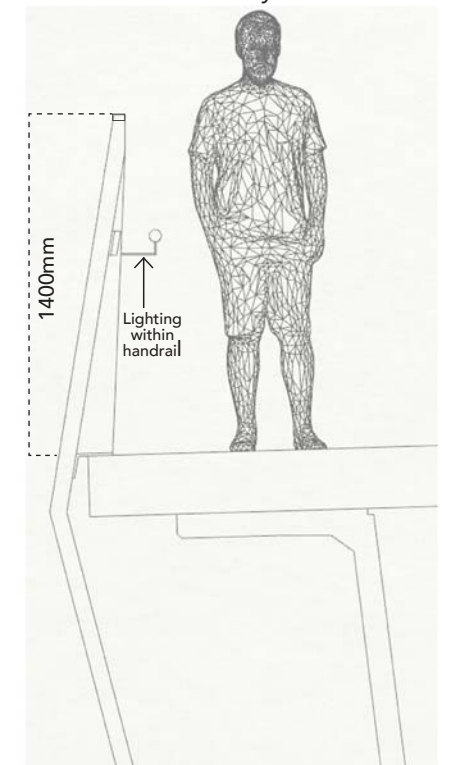


Figure 90. Ōtaki River Bridge Details - Illustrative only



### 6.6.4.3 Vertical Marker

The Ōtaki River is significant to the people. This significance is to be recognised in an illuminated vertical marker which is to be integrated with the shared path barrier at the northern end of the bridge, adjacent to the proposed GWRC recreation area. The shared path barrier is located on the eastern side of the bridge. Further consultation with iwi, Ōtaki Community Board and NZ Transport Agency is required to define the form of the marker.

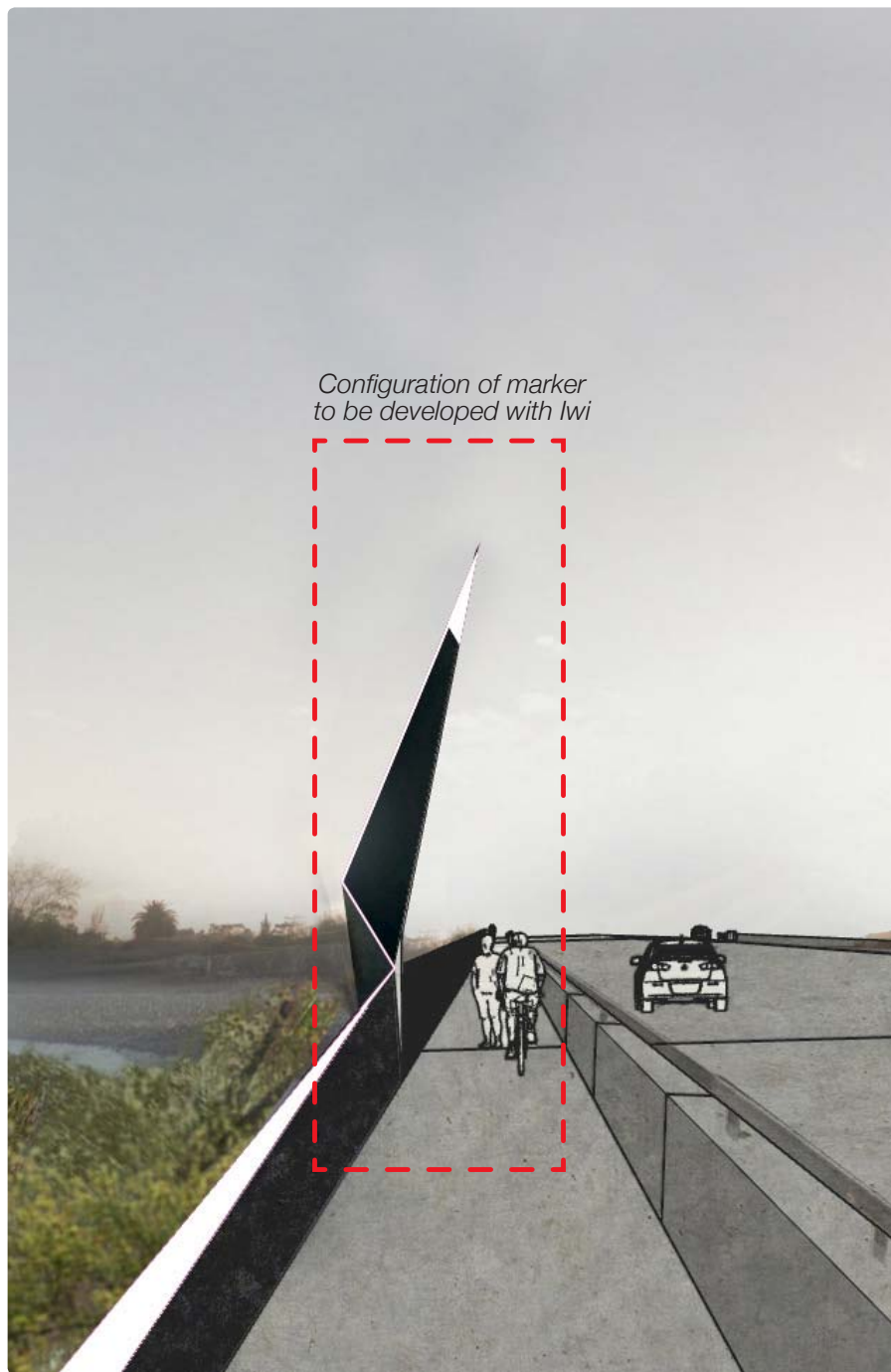


Figure 91. Ōtaki River Bridge shared path and vertical marker - Illustrative only

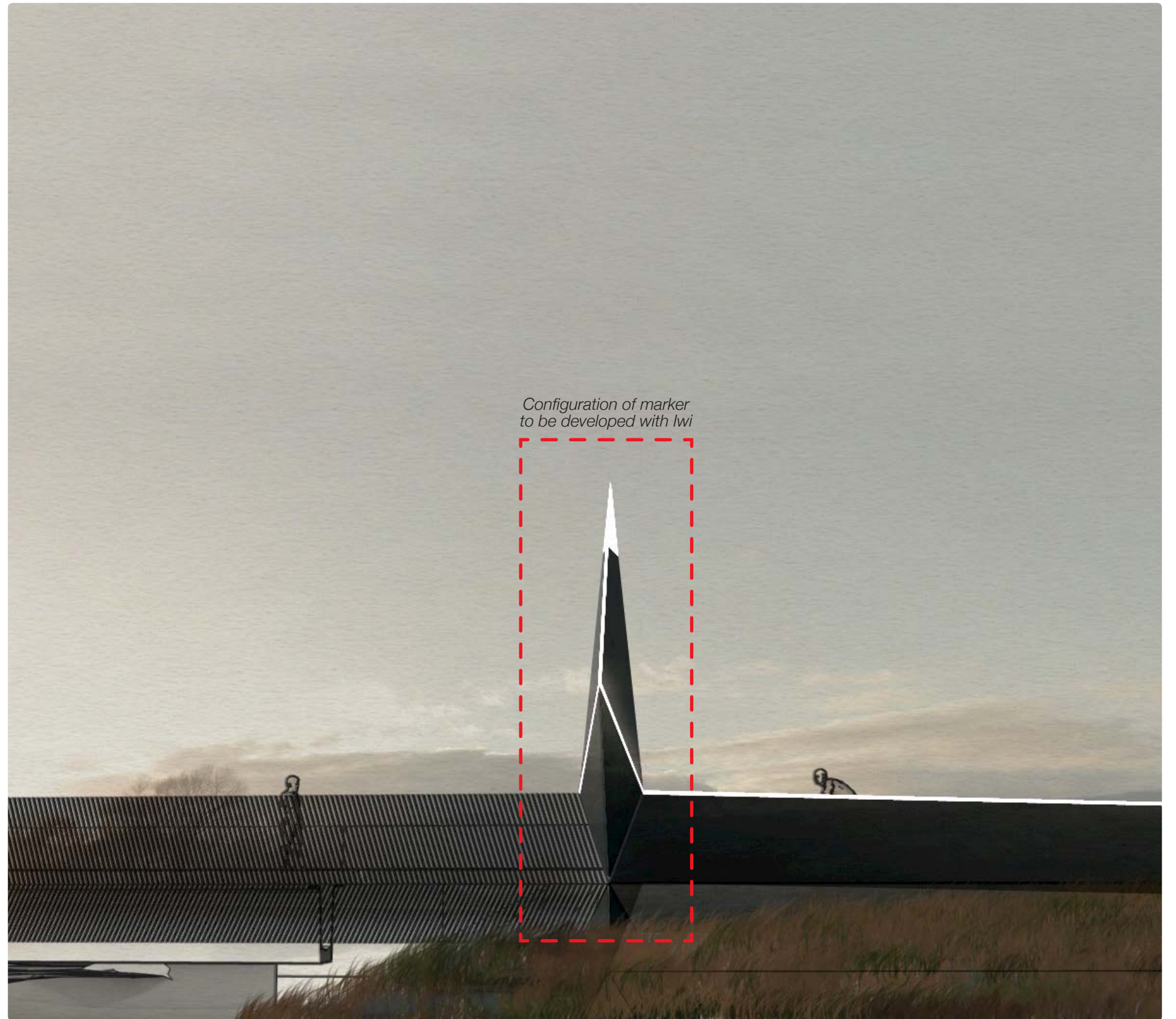


Figure 92. Ōtaki River Bridge vertical marker perspective - Illustrative only



#### 6.6.4.4 Pier Profile

##### Bridge 5 & 1 - Ōtaki River & Waitohu Stream Bridge Pier Profile

The Ōtaki River and Waitohu Stream piers are to be the same profile, with a triangular face to the outside edge of a circular column, facing away from the bridge. This allows the square, horizontal top of the triangle to sit up adjacent to the underside of the square crosshead. The triangular profile is to have a textured finish, achieved with an exposed aggregate form liner.



Figure 93. Ōtaki River Bridge piers - Illustrative only (Note: accessways under bridge have not been shown in this image).



Bridge 5 & 1 - Ōtaki River & Waitohu Stream Bridge Pier Profile

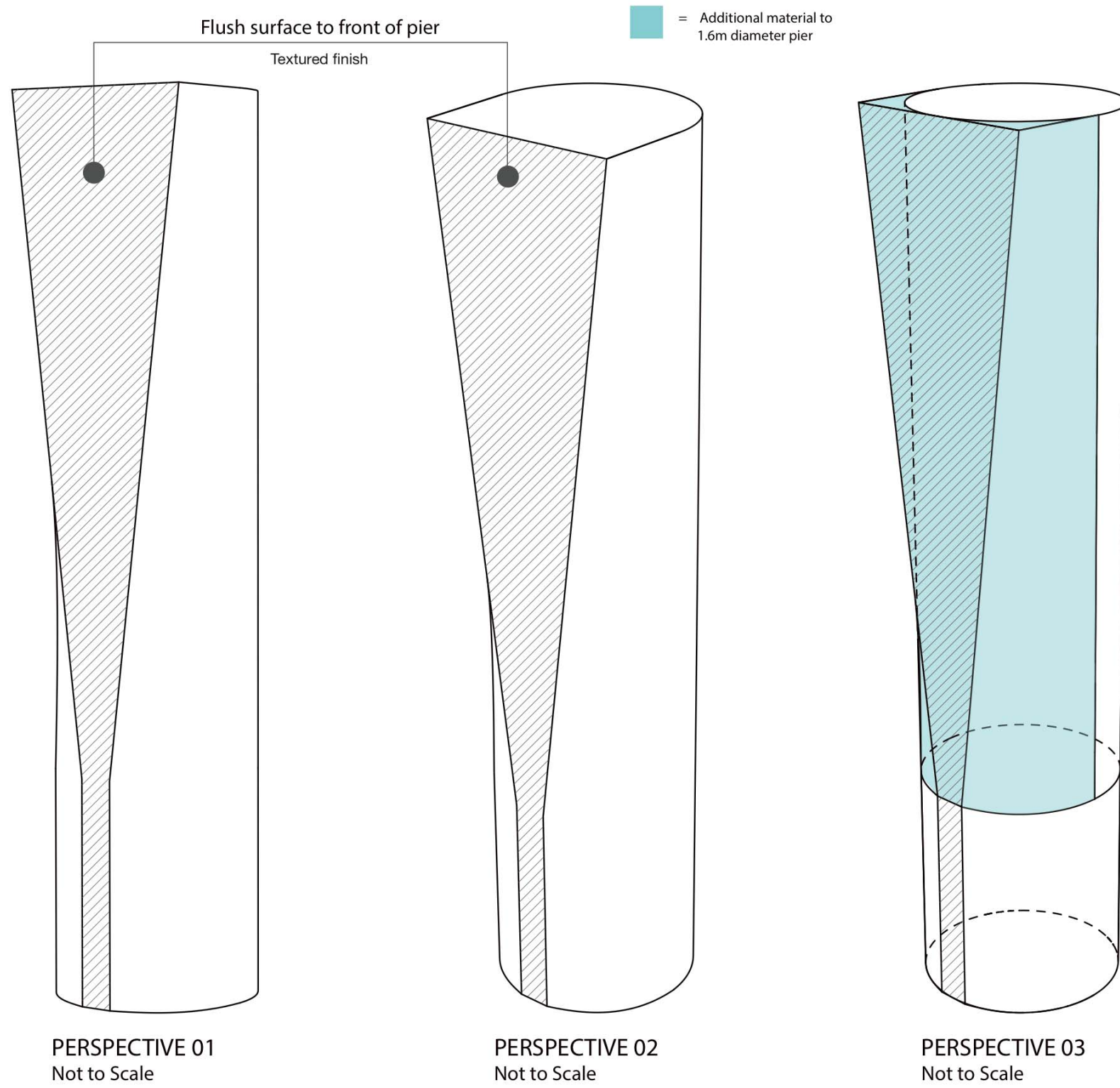
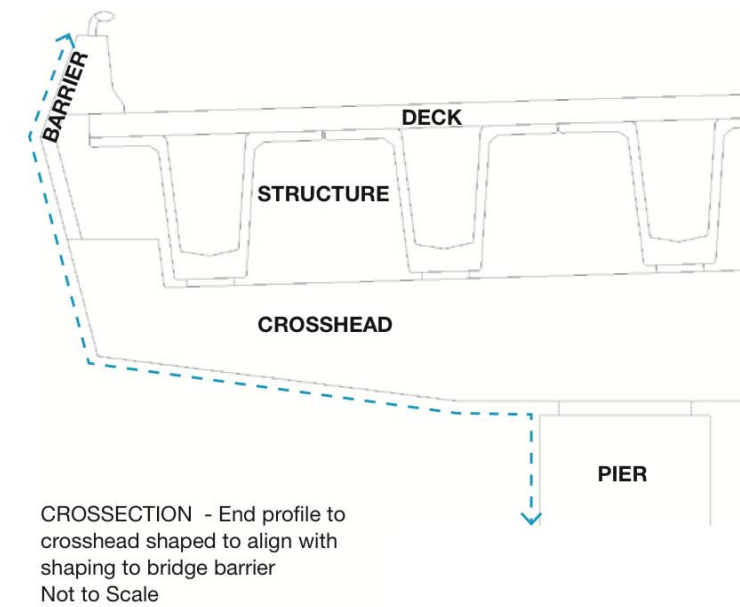
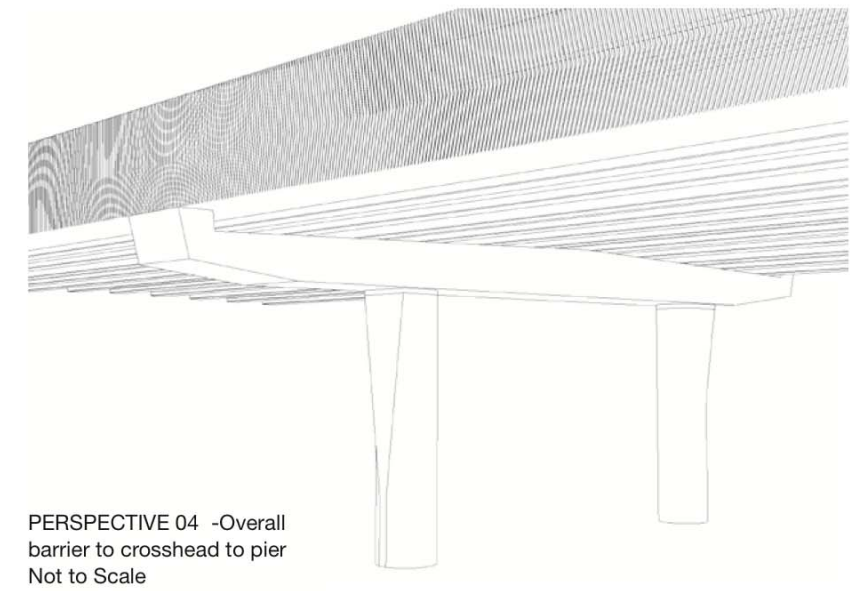
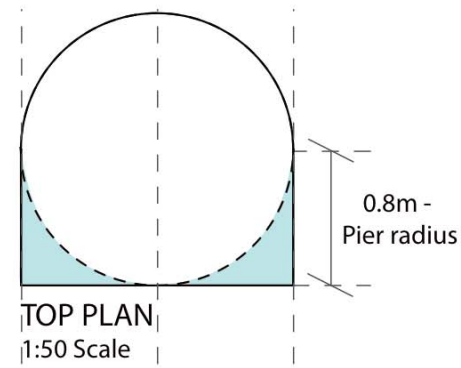


Figure 94. Bridge 5&1 Ōtaki River & Waitohu Stream Bridge Pier Profile





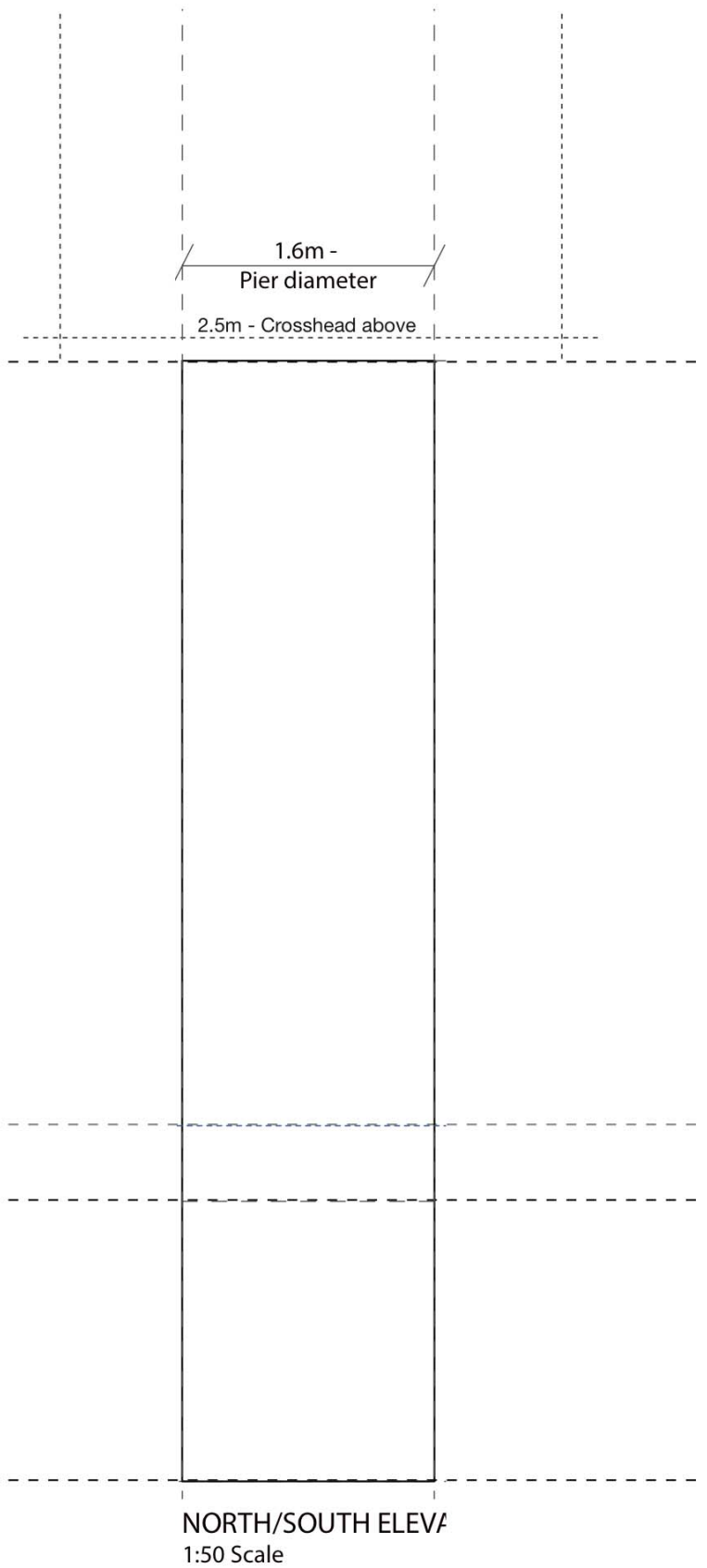
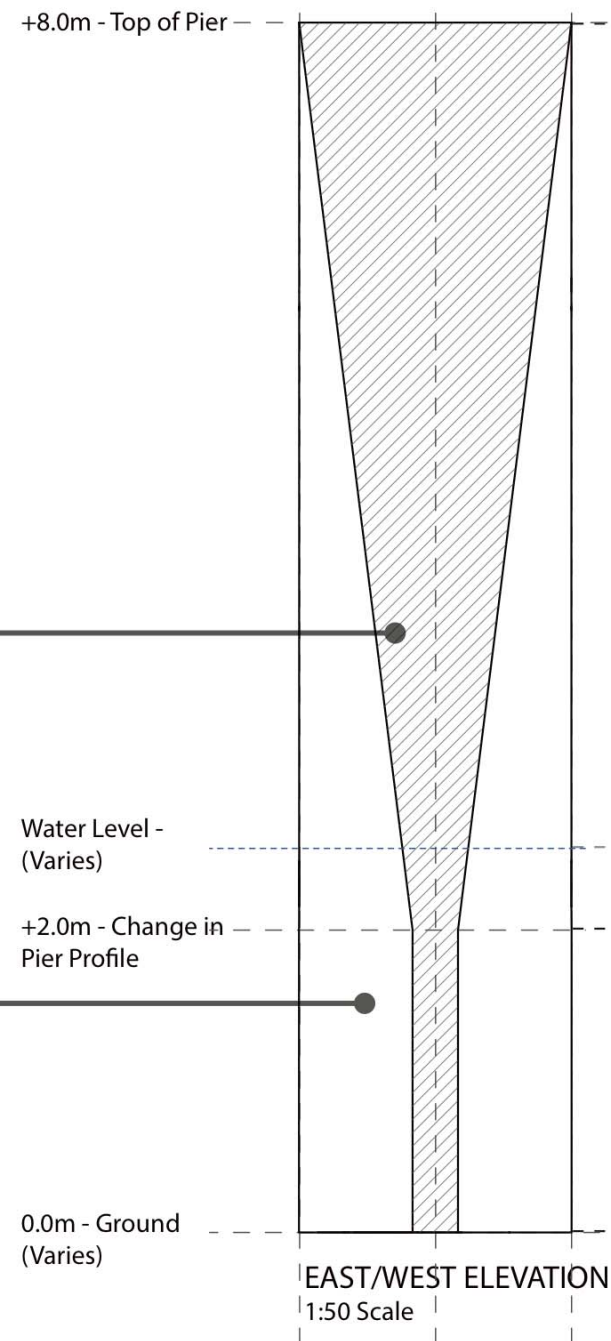
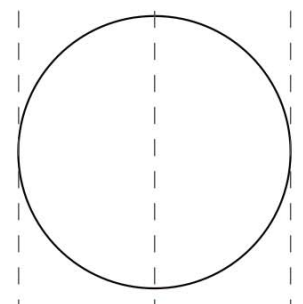
Bridge 5 & 1 - Ōtaki River & Waitohu Stream Bridge Pier Profile



Illustrative - exposed aggregate textured appearance, achieved with a formliner to the triangular face



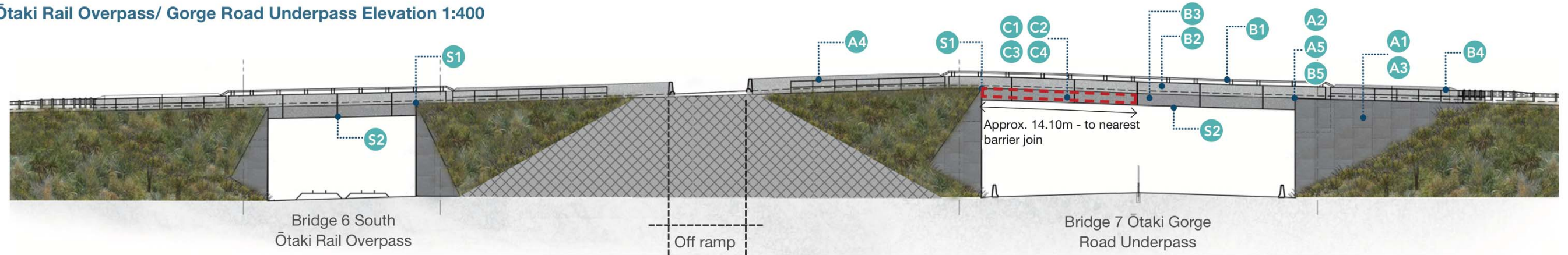
Illustrative - Off the form standard concrete finish to pier profile





## 6.6.5 Bridges 6 & 7 - South Ōtaki Rail Overpass/ Ōtaki Gorge Road Underpass

South Ōtaki Rail Overpass/ Gorge Road Underpass Elevation 1:400



South Ōtaki Rail Overpass/ Ōtaki Gorge Road Underpass Plan 1:400

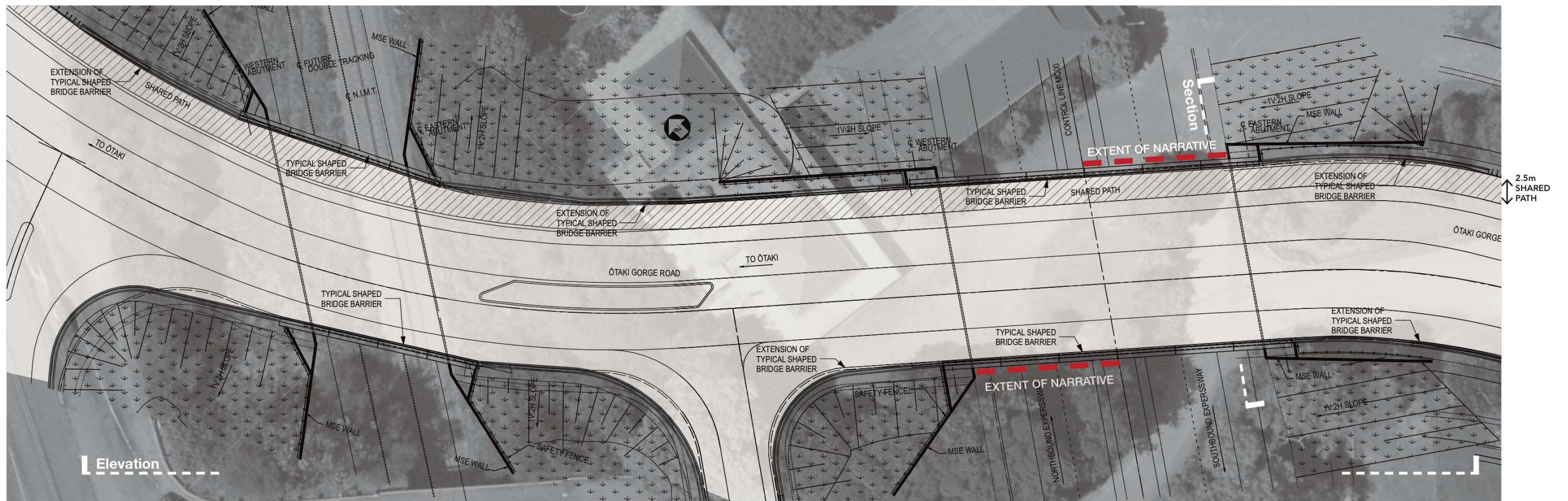


Figure 95. South Ōtaki Rail Overpass & Ōtaki Gorge Road Underpass Plan and Elevation

### Specific Objectives

- S1 Central RE wall to align with barrier crease either side of wall.
- S2 Bottom edge of barrier to align between bridges

» Refer to section 6.3 *Bridge Assemblage* for general objectives key



### Bridge 7 Ōtaki Gorge Road Underpass Cross Section 1:200

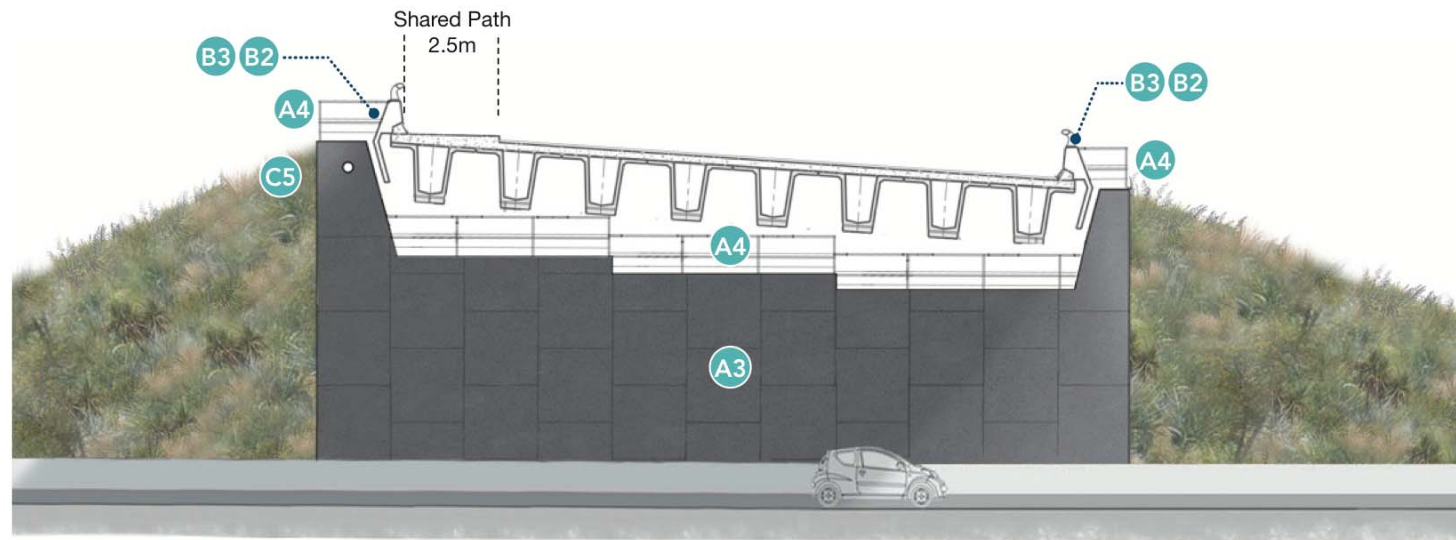
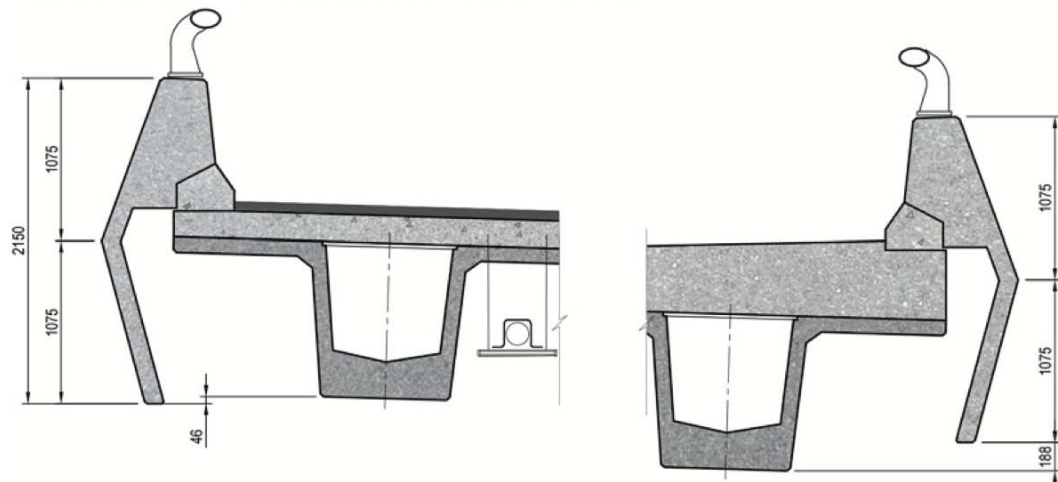


Figure 98. North Ōtaki Main Road Underpass/Rail Overpass Elevation and Plan

### South Ōtaki Rail Overpass Cross Section 1:50



### Ōtaki Gorge Road Underpass Cross Section 1:50

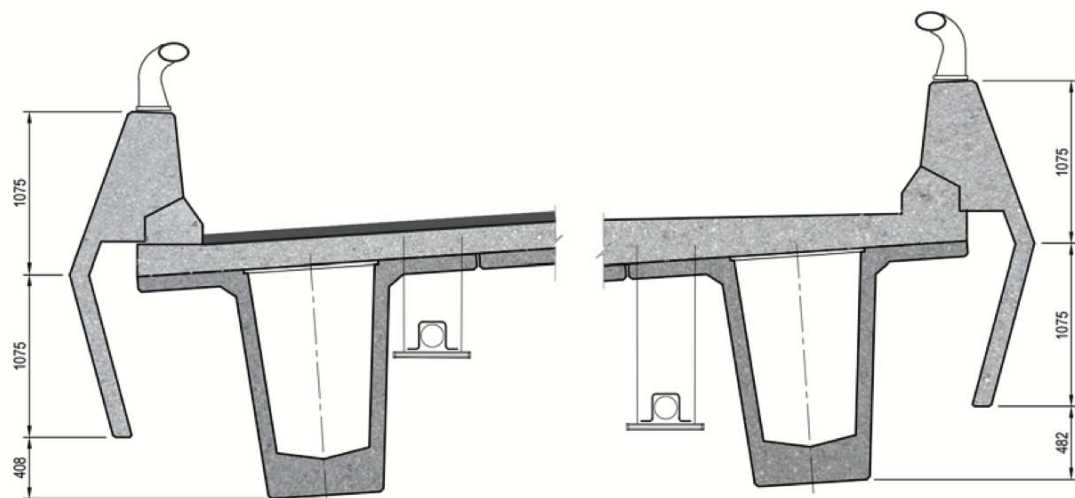


Figure 97. South Ōtaki Rail Overpass & Ōtaki Gorge Road Underpass Cross sections

### Material Palette



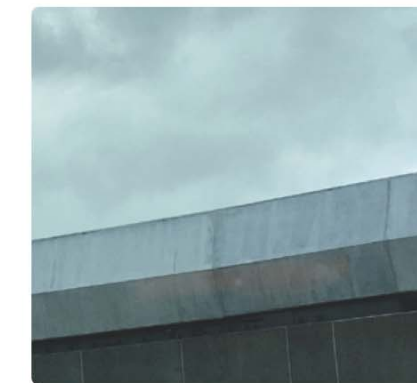
Abutment RE Wall Panels



Safety Handrails

**A3** Panels are structural 2.0x2.0m square panels with an NZ Transport Agency approved graffiti coating.

**A4** To be installed to the top edge of the RE wall as necessary as a barrier form fall -black finish.



Bridge Barrier

**B2** Simple horizontal element. Finish is off the form concrete with a selected NZ Transport Agency approved graffiti coating.

**B3** is off the form concrete with a selected NZ Transport Agency approved graffiti coating.

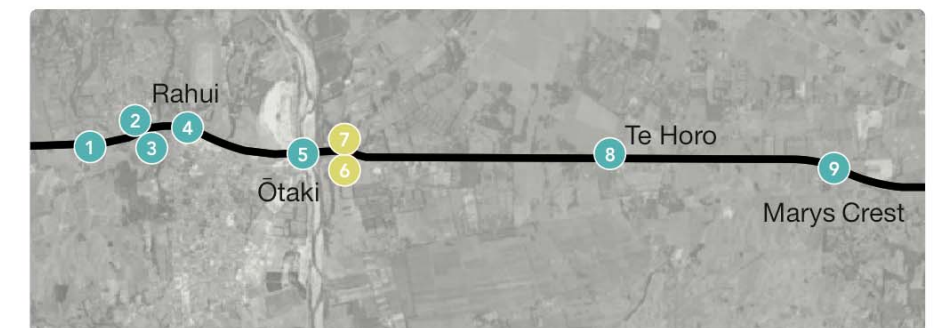
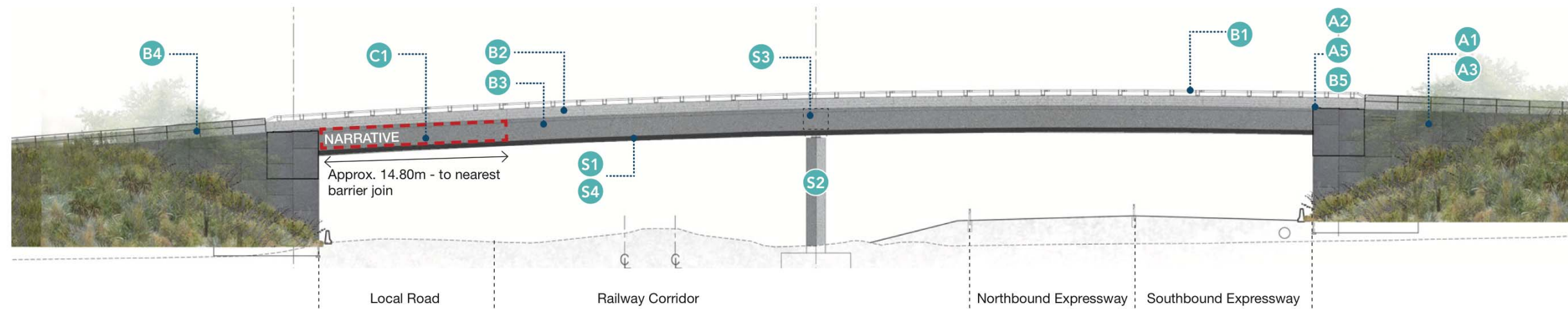


Figure 96. Bridges 6 & 7 locations - South Ōtaki Overpass & Ōtaki Gorge Underpass



## 6.6.6 Bridge 8 - School Road Underpass

### School Road Underpass Elevation 1:400



### School Road Underpass Plan 1:400

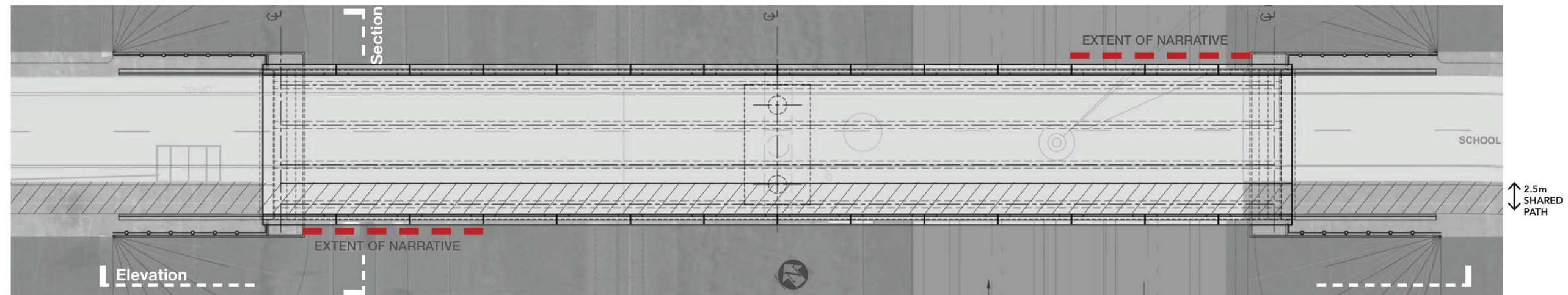


Figure 99. School Road Underpass Elevation and Plan

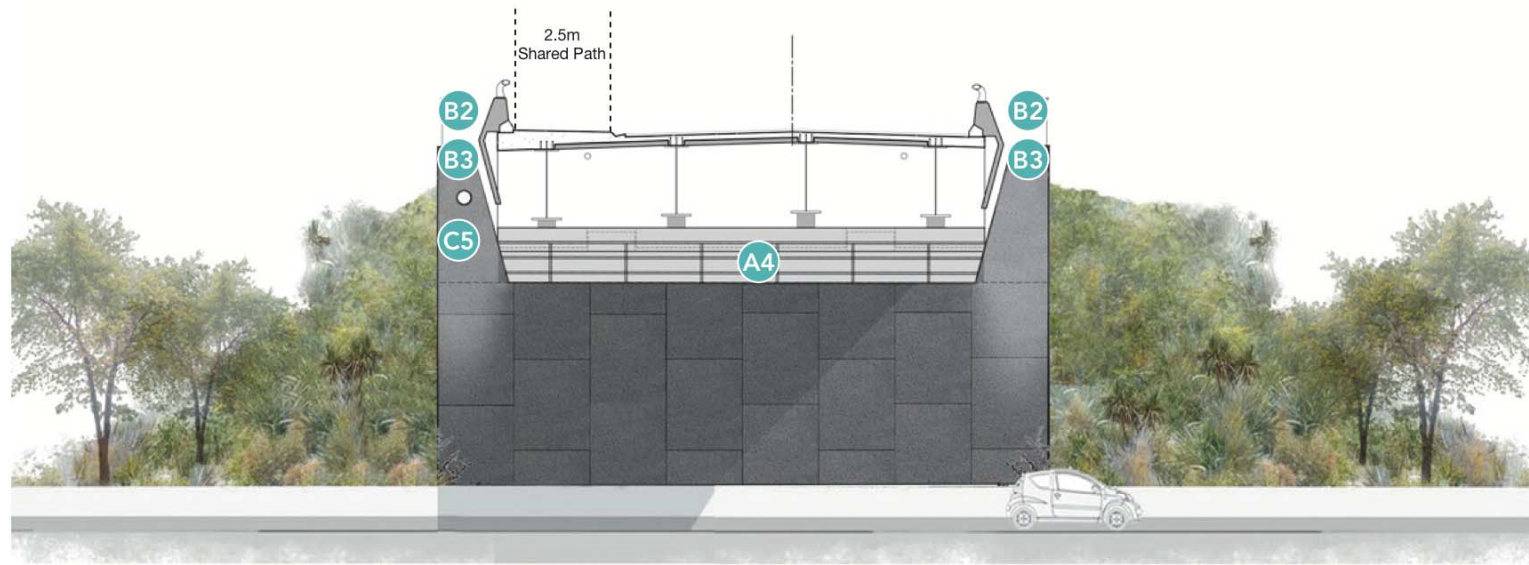
### Specific Objectives

- S1 Steel bridge to allow a greater span, minimising the width of the bridge and reducing the number of piers.
- S2 Reduce number of piers to open the view below the bridge for expressway users. Piers have a diamond profile in plan - refer section 6.6.6.1 for pier profile.
- S3 Integrated structural crosshead within depth of steel structure, allowing bridge form to be the prominent bridge element – emphasising its horizontal and slender form (no crosshead below structure).
- S4 Steel structure painted in a dark recessive colour.

» Refer to section 6.3 *Bridge Assemblage* for general objectives key



**School Road Underpass Cross Section 1:200**



**School Road Underpass Cross Section 1:50**

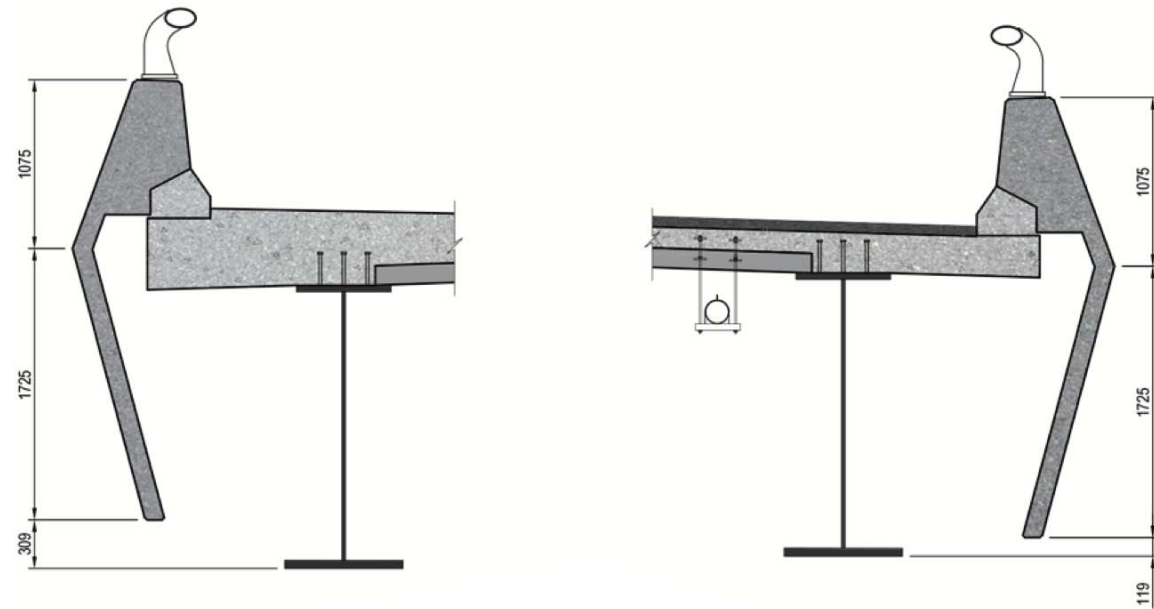


Figure 100. School Road Underpass Cross Sections

**Material Palette**



Abutment RE Wall Panels

**A3** Panels are structural 2.0x2.0m square panels with an NZTA approved graffiti coating.



Safety Handrails

**A4** To be installed to the top edge of the RE wall as necessary as a barrier form fall -black finish.



Bridge Barrier

**B2** Simple horizontal element. Finish is off the form concrete with a selected NZTA approved graffiti coating.  
**B3**



Pier Finish

**S2** Exposed concrete finish with a selected NZTA approved graffiti coating.

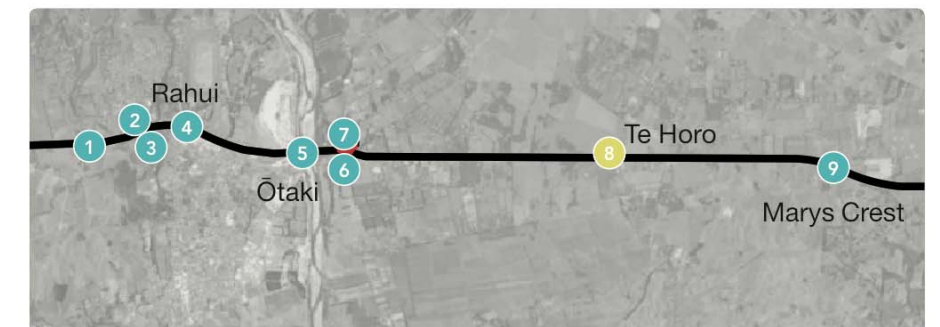


Figure 101. Bridge 8 location - School Road Underpass



### 6.6.6.1 Pier Profile

School Road pair of piers has a diamond profile in plan, mimicking the diamond pier to the Leinster footbridge. The finish is to be an exposed aggregate concrete finish, similar to the adjoining RE walls, making the pier appear more recessive and visually disconnected from the horizontality of the bridge barriers.

#### School Road Underpass Diamond Pier Studies

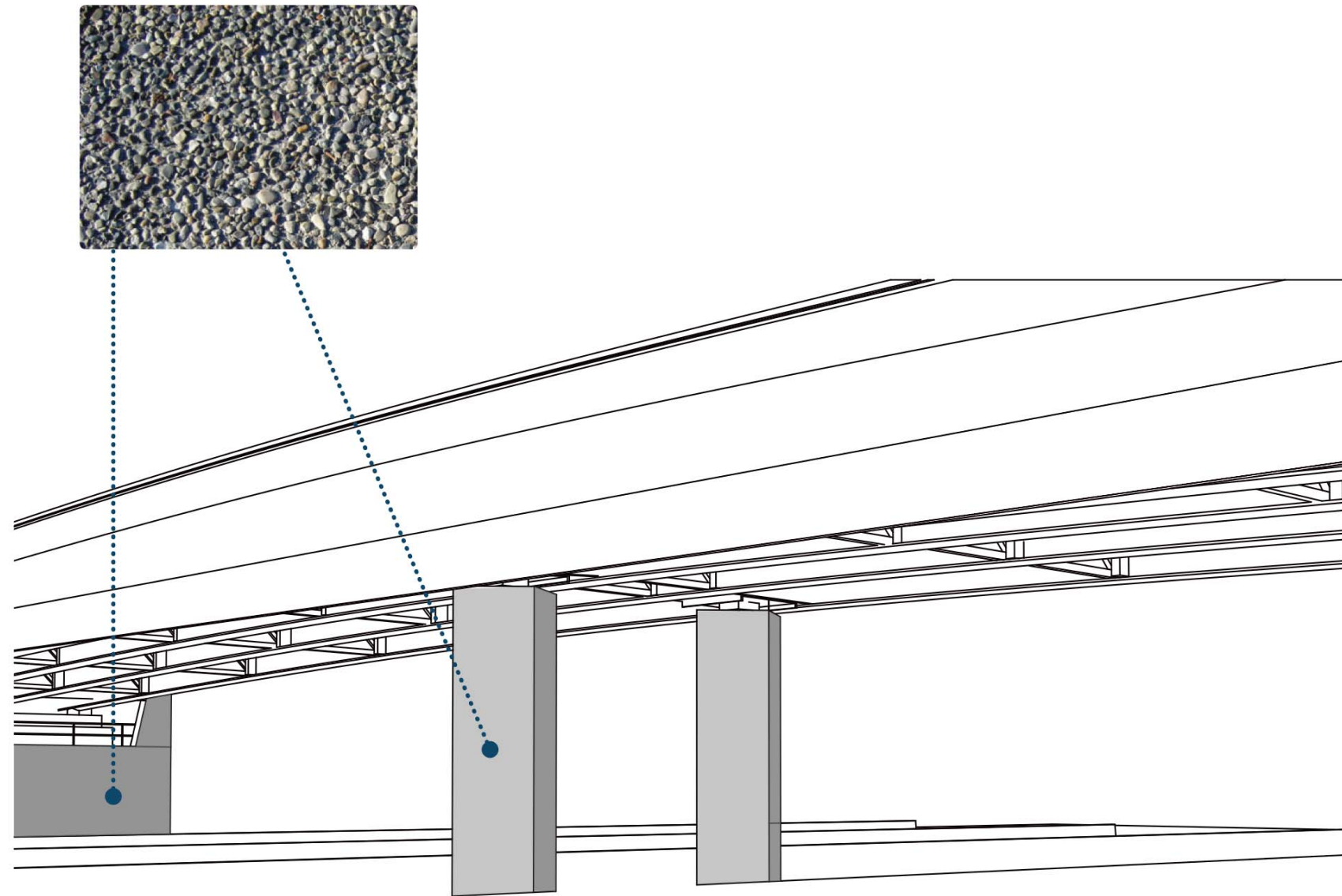
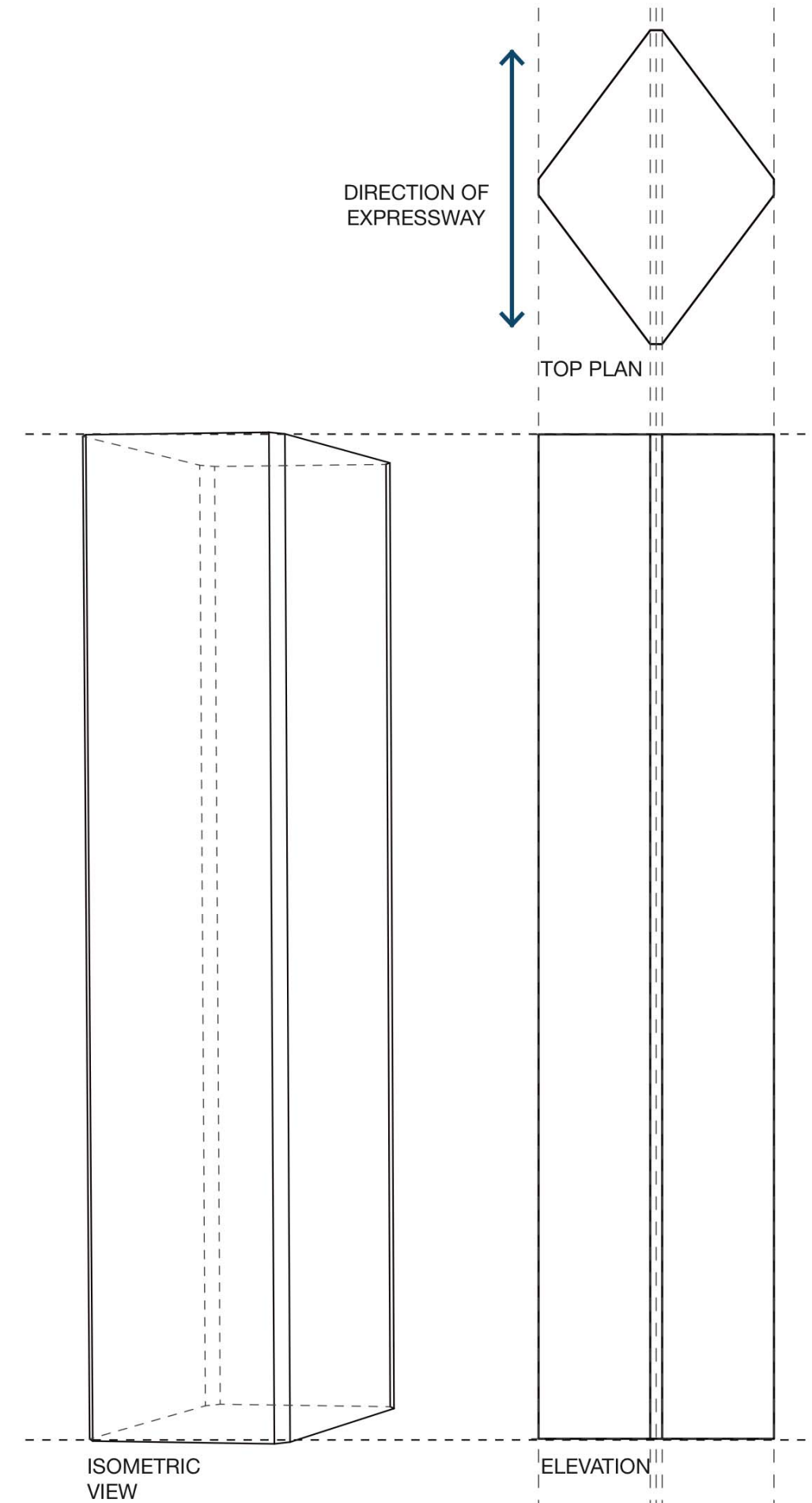


Figure 102. School Road Underpass Diamond Pier Studies





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## 6.6.7 Bridge 9 - Makahuri Rail Overpass

### Makahuri Rail Overpass Plan 1:500

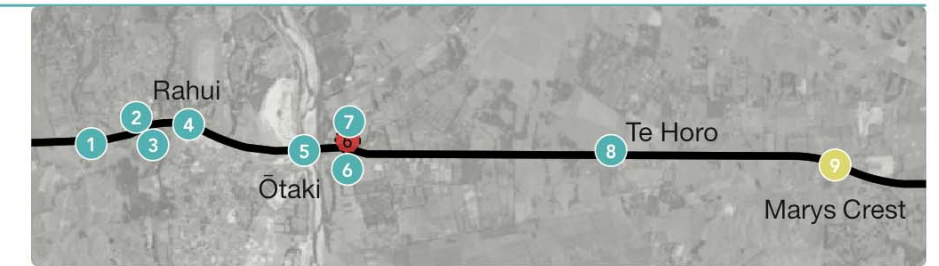
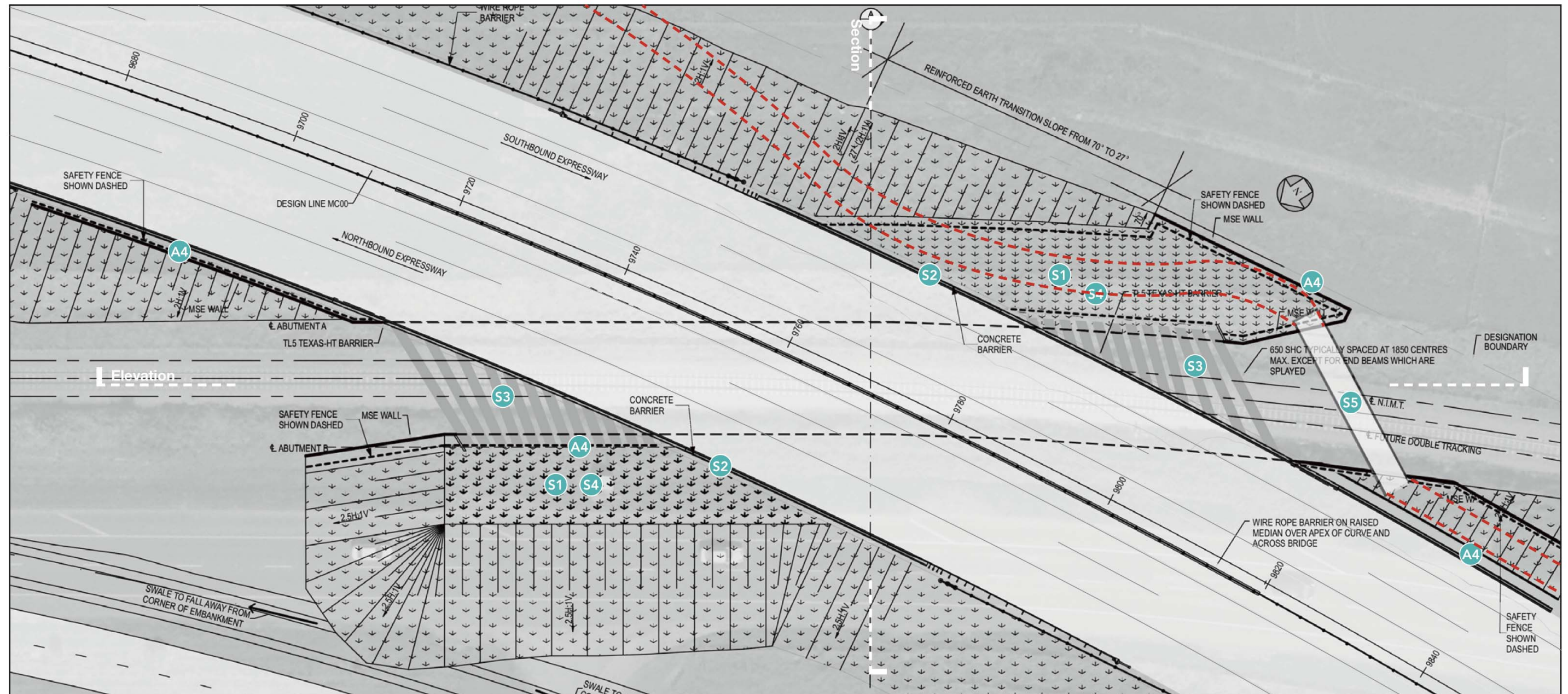


Figure 103. Bridge 9 location - Makahuri Overpass



### Specific Objectives

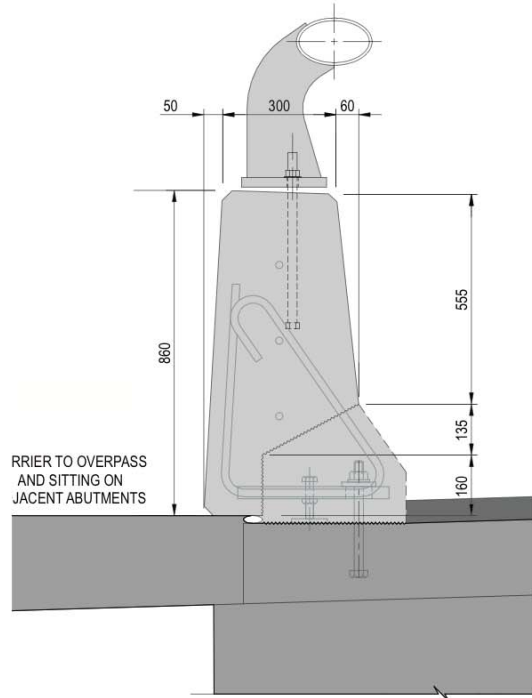
- S1** The experience of the expressway user is for long views out to the hills and to Kāpiti, with low planting.
- S2** The barriers are kept as low as practicable to maximise views from the expressway.
- S3** The concrete beams support the deck of the overpass and spanning between the R.E walls. They are splayed to minimise the size of the abutments, finish off the form concrete with a fall to the top face for water runoff.
- S4** Planting to continue to top of embankments.
- S5** 3.0m Potential Shared Path and pedestrian bridge to eastern side of the bridge (indicative location only) Barrier to be similar in design to the slatted metal shared path barrier on the Ōtaki Bridge.

Options have been considered for the potential addition of a potential shared path bridge over the NIMT at Bridge 9 in the future. The design allows for provision of separate 3m wide shared path bridge to the eastern side of the proposed bridge. The potential shared path bridge will be similar in design to the M2PP pedestrian bridges. The eastern abutment has been extended to the south to allow for this provision.

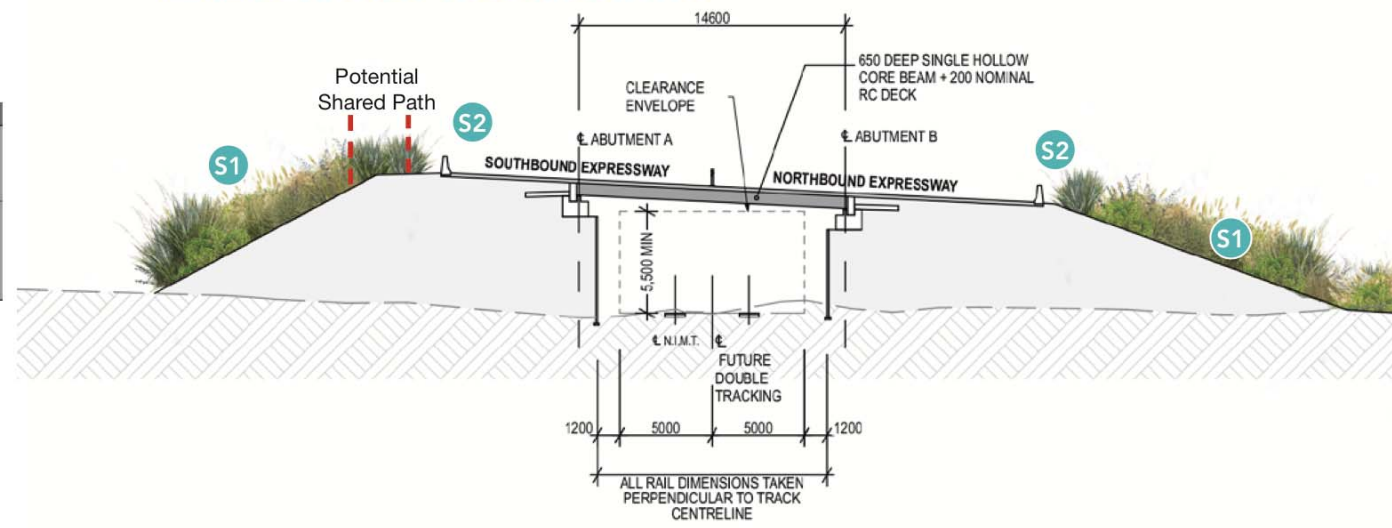
The independent shared path bridge is the preferred urban design solution as it provides for a better pedestrian and cycle experience, rather than crossing directly adjacent to expressway traffic. The separation of the shared path bridge also allows for the alignment to frame views of the ecological enhancement at Makahuri and beyond to Kāpiti Island.



**Makahuri Overpass Barrier**  
Cross Section 1:20



**Makahuri Overpass Cross Section 1:400**



**Material Palette**



Abutment RE Wall Panels



Safety Handrails

**A3** Panels are structural 2.0x2.0m square panels with an NZTA approved graffiti coating.

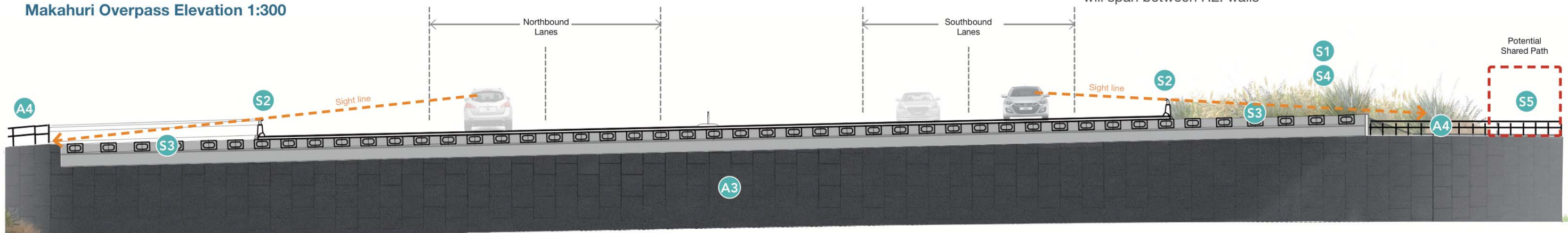
**A4** To be installed to the top edge of the RE wall as necessary as a barrier form fall -black finish.



Potential Shared Path Bridge

**S5** Barrier to bridge 9 potential shared path pedestrian bridge be similar in design to the M2PP Pedestrian Bridges, and will span between RE. walls

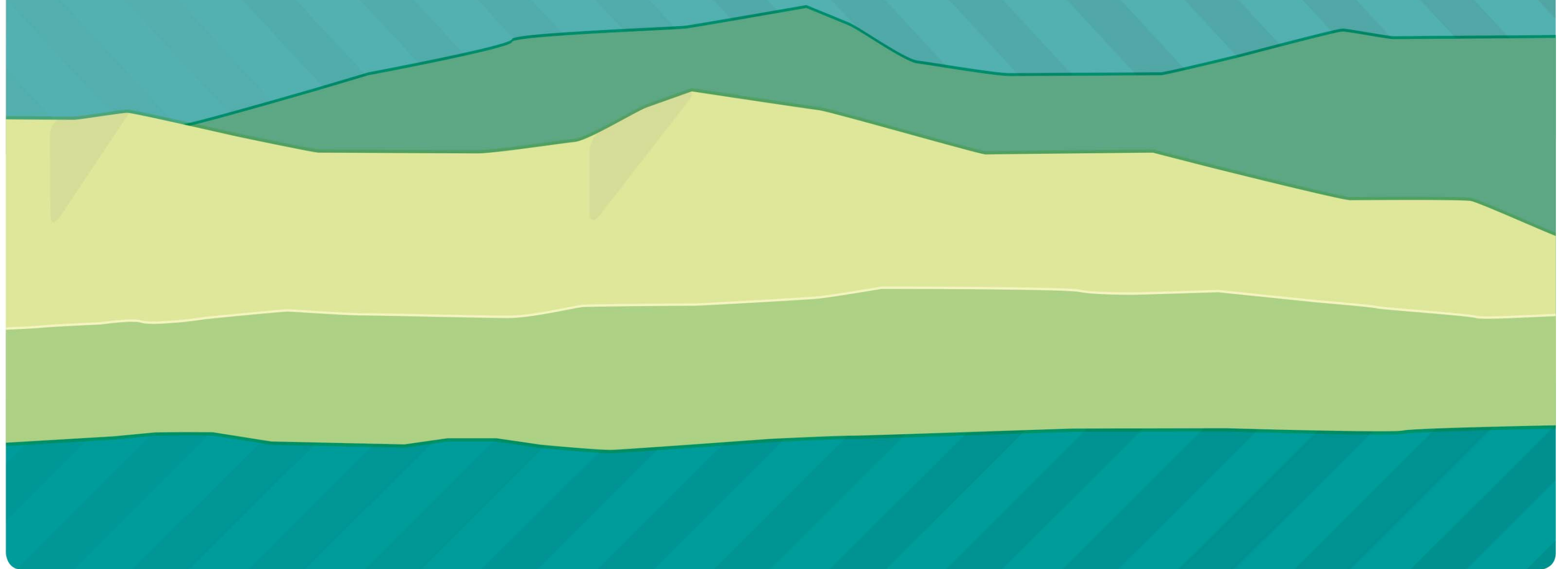
**Makahuri Overpass Elevation 1:300**





07

# Pare-o-Matangi Reserve





## 7.1 Introduction

Pare-o-Matangi reserve is a major cultural and community facility for Ōtaki and is of significance to Ngā Hapū o Ōtaki. The name Pare-o-Matangi relates to a larger block of land named for Ngāti Mai Ōtaki Rangatira Matangi.

The proposed expressway will affect the size of the reserve, but also provides the opportunity to improve its connection to the community and provide greater public amenity.

The reserve is managed and maintained by Kapiti Coast District Council who are the asset owner. It also has significant community guardianship in terms of the Keep Ōtaki Beautiful (KOB) group who initiated the process which secured the land in public ownership. KOB have invested significant time in planting the reserve, maintaining the plantings, and holding regular events including community working bees.

## 7.2 Design Methodology - A Community Lead Approach

As guided by the consent conditions, the detailed design for Pare-o-Matangi reserve will be undertaken in consultation with Ngā Hapū o Ōtaki, Keep Ōtaki Beautiful and the Kapiti Coast district Council.

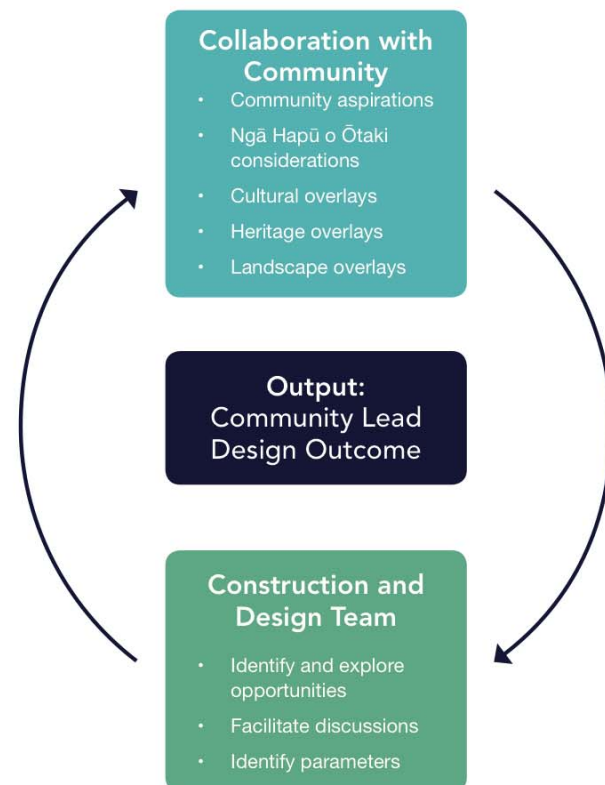


Figure 104. Design process

## 7.3 Design Principles

The reserve shall provide for both active and passive recreation, provide visual amenity from local roads and the expressway, and be a significant connection node in Ōtaki's recreational Shared Path network.

The following set of design principles have been developed through stakeholder consultation and will guide the detailed design of the reserve:

- Provide spaces that are suitable for both active and passive recreation in the reserve.
- Design with the community, for the community
- Reflect the cultural importance of the area, and provide opportunities for expressing the history of the reserve.
- Allow connection to the Mauri of the area
- Support a high level of landscape amenity, good ecological outcomes, and educational opportunities through planting design, the provision of specimen trees and harvest species, bilingual signage, and opportunities for safe interaction with the Mangapouri stream.
- Build on the existing qualities of the reserve established by 'Keep Ōtaki Beautiful' through extensive native planting
- Recognise the role of the reserve as a bird corridor through this area
- Provide strong links so that the reserve is well connected as part of a wider network for walkers, cyclists and vehicular transport.
- Improve the safety of the reserve in accordance with CPTED principles.

Further ideas for consideration that have been expressed through consultation to date are:

- The design of an arboretum for native species
- Planting of Rongoa species for harvest and educational purposes
- Incorporation of low maintenance fruit and nut trees to expand on existing community gardens to help sustain the community
- Opportunity to include local sculptures/artworks

Note: the Mangapouri stream corridor that runs through the reserve is maintained by GWRC. Access to the stream will need to be agreed with GWRC and will be addressed through detailed design.

“ Pare-o-Matangi Reserve is an important open space within Ōtaki, both culturally and in terms of urban design. Through consultation the design of the reserve will be developed as part of the detailed design process. Planting and landscape treatments will be developed to enhance and support community, Iwi, and Keep Ōtaki Beautiful aspirations.



Figure 105. Existing Pare-o-Matangi Specimen Trees



## 7.4 Design Elements in Pare-o-Matangi Reserve

### Active and Passive Recreation

The reserve will provide spaces that are suitable for both active and passive recreation:

- Active recreation - in the area on the south side of the Mangapouri stream. A mix of recreational activities will be explored through detailed design.
- Passive recreation - in the area on the north side of the Mangapouri stream there will be more of a focus on enjoyment of open lawn spaces and planted areas including specimen trees. Opportunities to recreate the feeling of the scale and space of the existing park will be explored through the detailed design of this area.

### Specimen Trees

A review of all vegetation that is to be removed, relocated or retained has been completed for the project. The process and results of this are summarised in the Environmental Management Plan (EMP) and in section 5.16-5.18 of this document (LUDP).

A majority of the existing vegetation within the reserve will be retained. This includes the avenue of Pohutukawa trees, the vegetation bordering the Mangapouri Stream and about half the trees along the embankment below existing State Highway 1.

Approximately 15 specimen trees within the existing reserve will need to be removed to facilitate construction of the expressway, rail and new main north road. An assessment has determined that it is not practical to relocate these trees, predominantly due to the underlying ground conditions.

In order to minimise the impacts of this removal, a larger number of specimen trees will be planted within the reserve. These will be of as large a grade as can be practically and commercially sourced and planted.

### Specific Design Requirements

Specific requirements for the Pare-O-Matangi reserve that will be incorporated in the detailed design include:

- The car park provided off Rahui Road shall be no smaller than the existing car park and the parking area shall be hard surfaced.
- Pedestrian and Cycling – Pathways and cycleway shall:
  - » be a minimum 2.5m wide and hard surfaced
  - » provide continuity to link with external shared path routes
  - » have a gradient of no more than 8% with a mean of 5%
- Maintenance Access – the design shall provide for service vehicle access of not less than 4m wide to both the northern and southern portions of the reserve in a controlled manner, with vegetation placement coordinated to ensure safe access from the roadway. As a minimum, lockable barriers or bollards shall be provided for control;
- All access ways shall comply with the standards set out in “Guidelines for visibility at driveways RTS 6” as provided by the Land Transport Safety Authority (May 1993) available from NZTA.
- Appropriate way-finding, signage and pavement markings shall be provided.
- Barriers and fencing shall:
  - » Be attractive, effective, and consistent with any designs proposed for the reserve and pre-approved by the manager
  - » Be provided around the perimeter, in accordance with KCDC standards (fencing)
  - » Be provided between the car park and the reserve (barriers);
  - » Be provided along the perimeter of Rahui Road (barriers)
  - » Be provided for a minimum of 3m either side of the northern access way
- Planting – plants provided shall be of a species and grade/size pre-approved by the Council’s Parks and Recreation Manager
- Planting shall not compromise sight lines for pedestrians and cyclists or obstruct pedestrian and cycleways



Figure 106. Existing Pare-o-Matangi pathways



Figure 107. Existing Pare-o-Matangi pathways



### Crime Prevention through Environmental Design

The reserve has been designed with consideration of CPTED principles in order to minimise potential safety hazards. These Principles include:

- Access – safe movement and path choice
- Surveillance and sightlines - opportunities to see and be seen and reducing access to
- areas of isolation
- Layout - clarity and logic behind the layout
- Activity mix – ability for public realm to provide ‘eyes on the street’
- Sense of ownership – knowing that the area is cared for and reducing areas for graffiti
- Quality environments - Reducing the maintenance requirement
- Physical protection – limiting access to areas where people do not need to be.

Through this process an issue has been identified with the connection from the railway station being well lit at night which may encourage people to use this route into the unlit park at night. The preference is to direct people from the railway station through the public streets where passive surveillance will be more obvious. To help encourage movement through the streets, the design philosophy is for the lights on the path between the station and under Rahui Road to be on controlled timers - this will be reviewed through detailed design. Refer to section 10.7 of this document (LUDP) for more information.



Figure 108. Existing Pare-o-Matangi lawn

## 7.5 Design Programme

The detailed design drawings and specifications for Pare-O-Matangi Reserve will be developed over a four month period as shown in Figure 109. The detailed design will develop and document the design that is presented in this LUDP. The detailed design process will centre around workshop sessions with the key design partners of KCDC, KOB, Fletcher Construction and Ngā Hapū o Ōtaki.

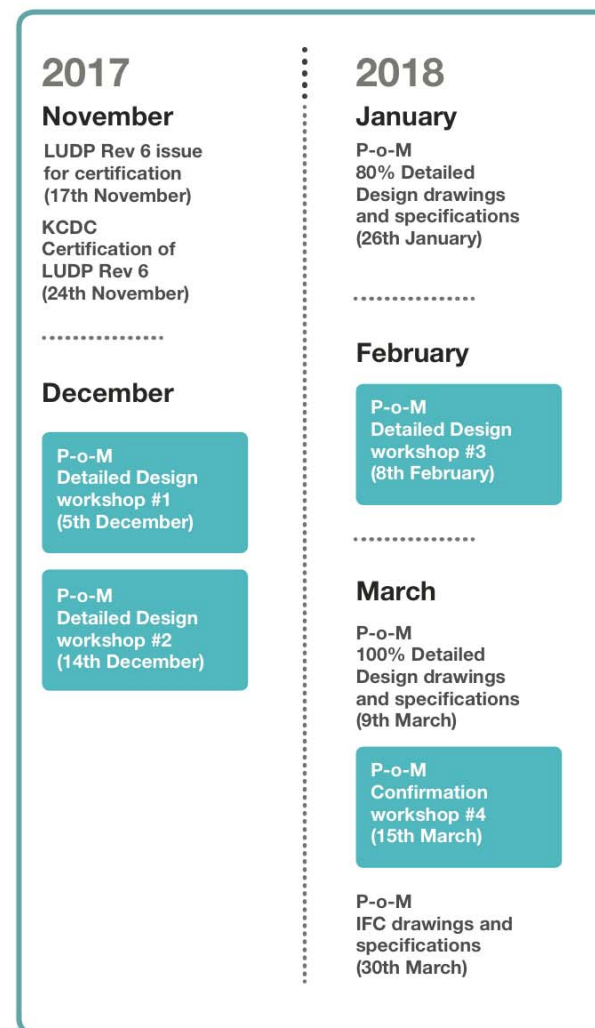


Figure 109. Pare-o-Matangi Programme

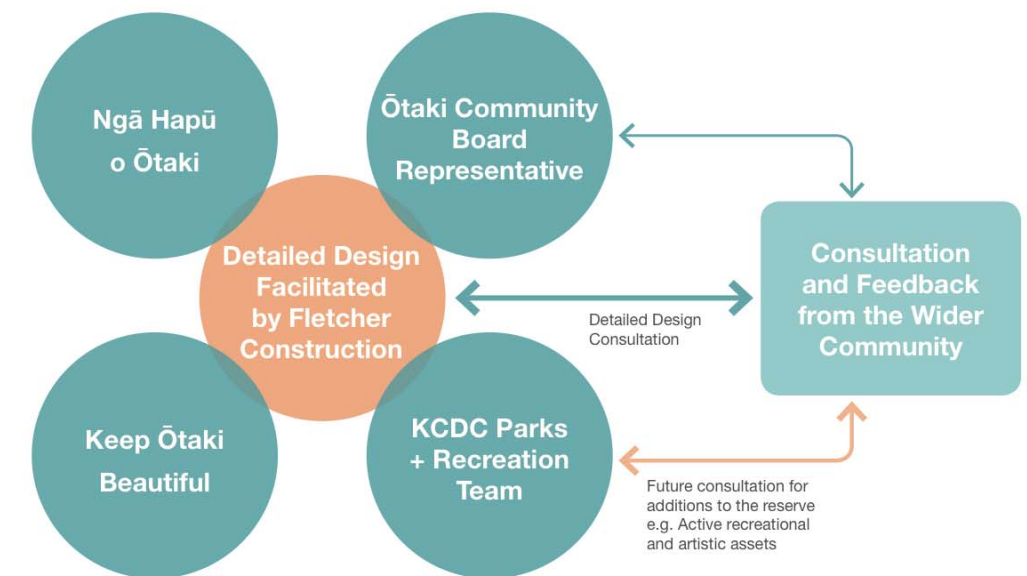


Figure 110. Pare-o-Matangi Detailed Design Relationships



## 7.6 Context and Connectivity

Ensuring Pare-o-Matangi reserve connects with its broader urban context is crucial to future enjoyment of the reserve by the community. There will be three key points of physical access to the reserve (as indicated in the adjacent plan). Visual connectivity from Ōtaki Main Road and Rahui Road is also provided.

Detailed design will include consultation and agreement with KCDC on the shared path layout, connectivity, and entrance details.

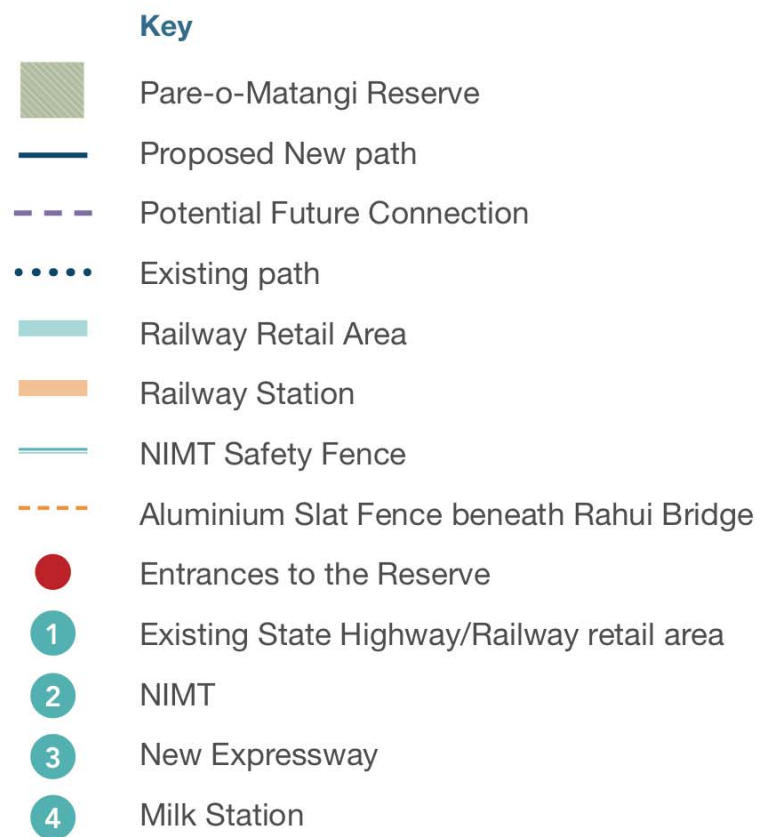


Figure 111. Pare-o-Matangi context





Figure 112. Proposed Pare-o-Matangi plan

## 7.7 Proposed Plan

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>1 New car park with 0.9 metre timber post and rail fence (final position &amp; configuration to be confirmed through the consultation process)</li> <li>2 Existing vegetation retained</li> <li>3 New 2.5 metre wide wooden foot bridge</li> <li>4 New 2.5 metre asphalt footpath (smooth for scooting/bikes/maintenance)</li> <li>5 New 4.0 metre asphalt footpath (smooth for scooting/bikes/maintenance)</li> <li>6 Access to stream for fauna feeding and maintenance. To be confirmed through detailed design</li> <li>7 4 metre wide asphalt entrance path with lockable bollards</li> </ul> | <ul style="list-style-type: none"> <li>8 Gateway fencing to Northern entrance of reserve with 4m wide maintenance access</li> <li>9 N.I.M.T fence — — —</li> <li>10 1.5m high black aluminium slat fence from N.I.M.T gate to 15m beyond the southern abutment of Rahui Bridge — — —</li> <li>11 Motel flood bund</li> <li>12 Motel boundary fence (if required)</li> <li>13 Open up visual connections to Pare-o-Matangi</li> <li>14 Protect/relocate existing stone and plaque</li> </ul> | <ul style="list-style-type: none"> <li>15 Planting of new specimen trees. Number and species to be confirmed through detailed design.</li> <li>16 Area of land that may be swapped with area 17 if owners approve</li> <li>17 Area of land that may be swapped with area 16 if owners approve</li> </ul> <p><small>*Note: Reserve Areas.</small></p> <p><small>- Landscape area of reserve excluding embankments for Rahui/NIMT is as per Notice of Requirement to KCDC for alteration to designation DO109.</small></p> <p><small>-Total landscape area that includes the reserve and proposed screen planting on adjacent embankments and adjacent to Main North Road is 2.02ha.</small></p> |
|---|---|--|



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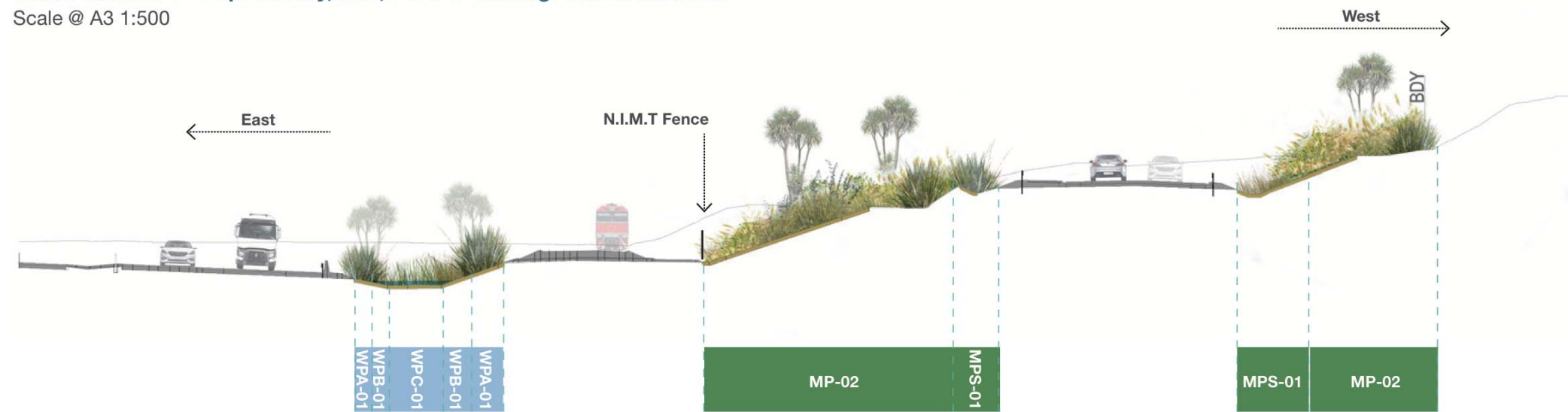
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## 7.8 Cross-Sections

### Cross Section 1 – Expressway, Rail, Pare-o-Matangi and Local Road

Scale @ A3 1:500



### Cross Section 2 – Rail, Pare-o-Matangi and Local Road

Scale @ A3 1:500



#### Key

MP-02	Massed Planting
MPS-01	Massed Planting - Steep Sites
WPA-01	Wetland Planting - A
WPB-01	Wetland Planting - B
WPC-01	Wetland Planting - C

» Refer to section 5.13 *Planting Lists* for planting mixes

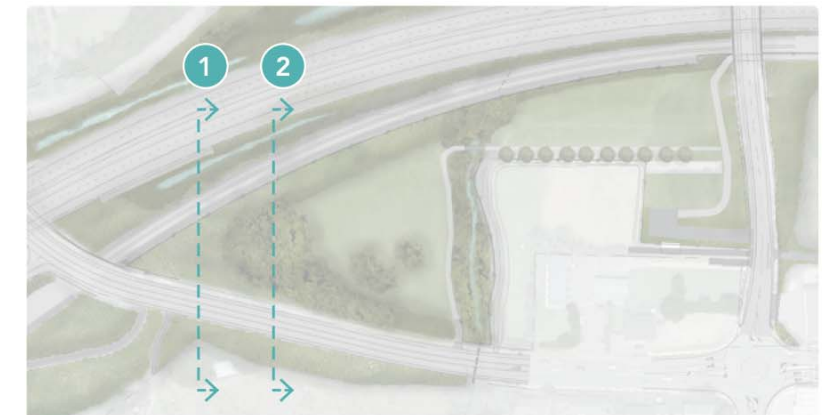
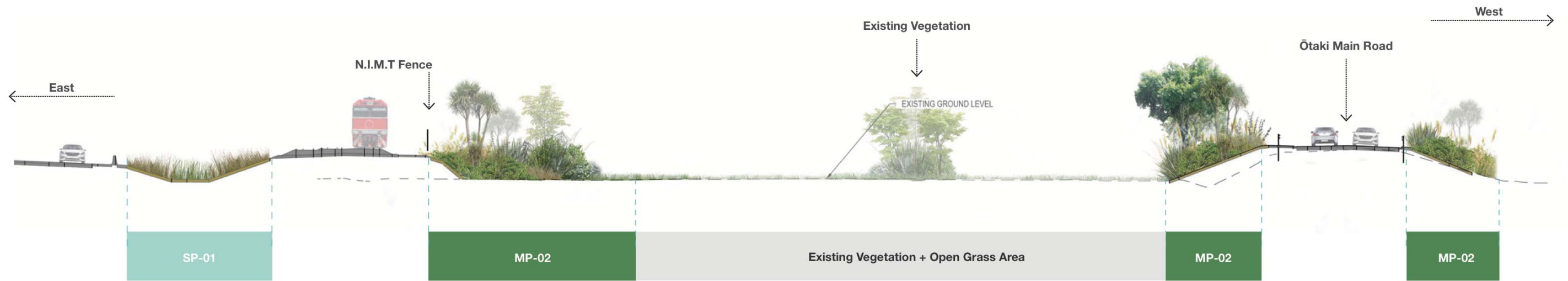


Figure 113. Cross sections through proposed alignment in the Ōtaki region



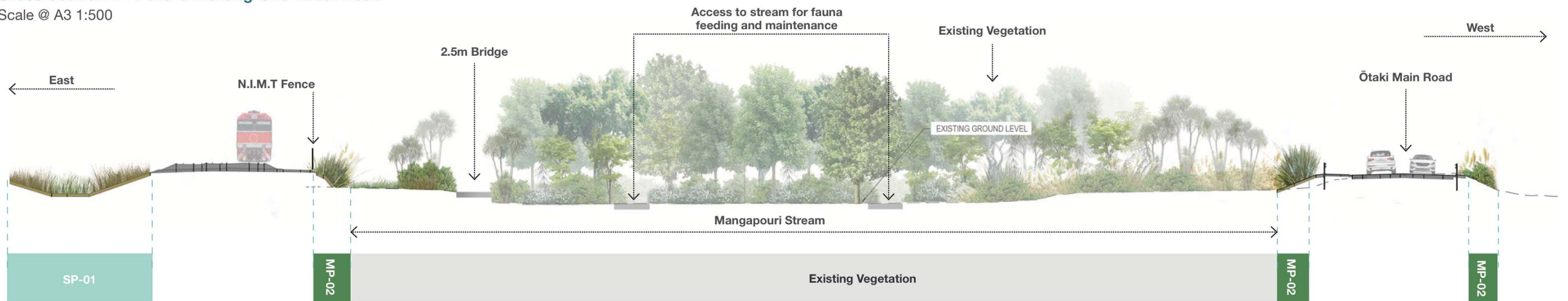
### Cross Section 3 – Rail, Pare-o-Matangi and Local Road

Scale @ A3 1:500



### Cross Section 4 – Pare-o-Matangi and Local Road

Scale @ A3 1:500



#### Key

- MP-02 Massed Planting
- SP-01 Swale Planting

» Refer to section 5.13 *Planting Lists* for planting mixes

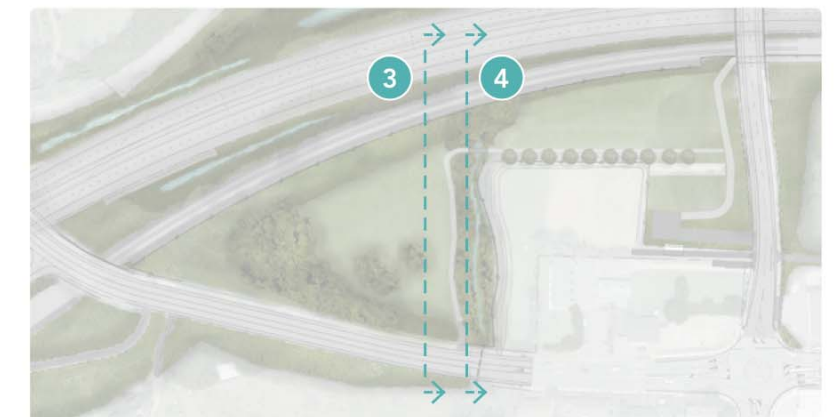
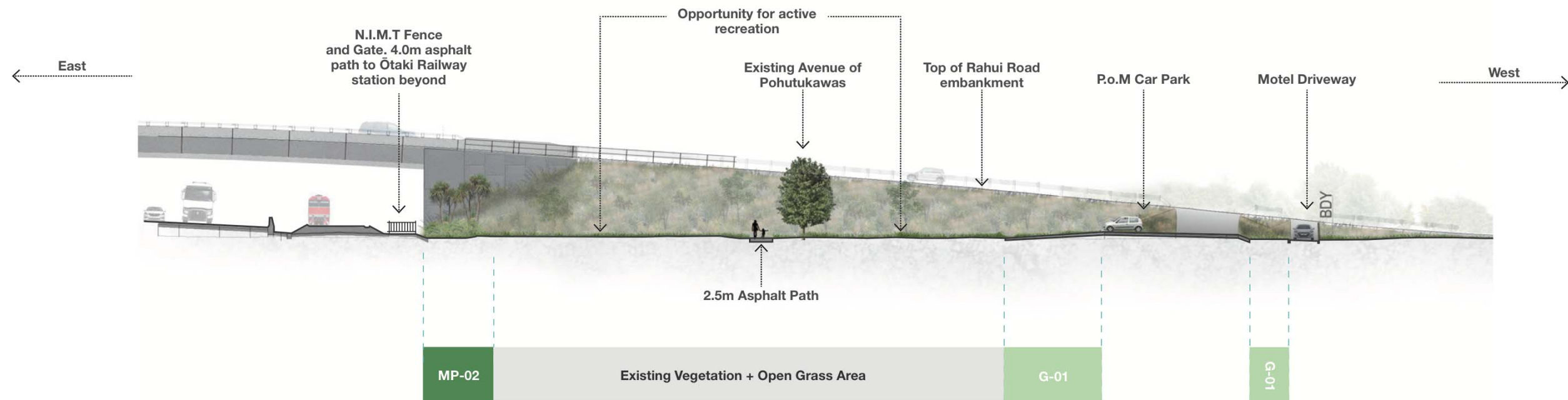


Figure 114. Cross sections through proposed alignment in the Ōtaki region



**Illustrative Sectional Elevation 5 – Expressway, Rail, Pare-o-Matangi and Ōtaki Motel**

Scale @ A3 1:500



**Key**

- MP-02 Massed Planting
- G-01 Grass

» Refer to section 5.13 *Planting Lists* for planting mixes

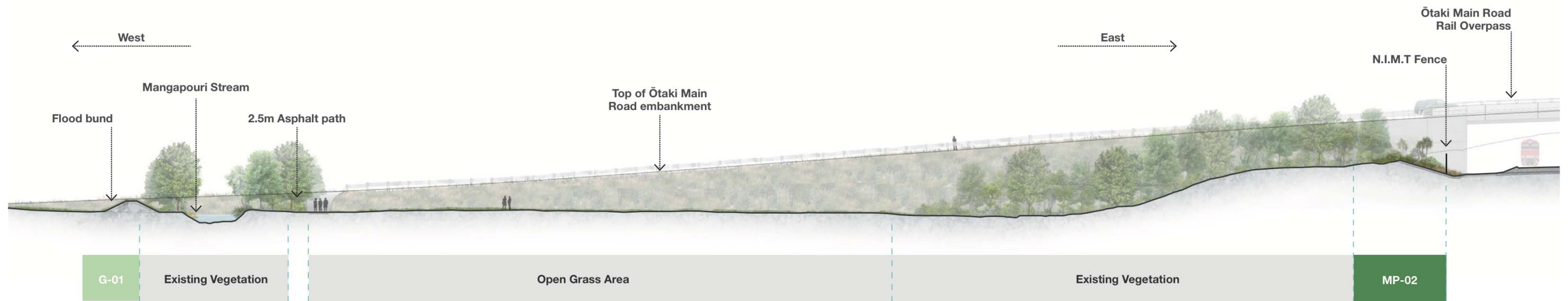


Figure 115. Cross sections through proposed alignment in the Ōtaki region



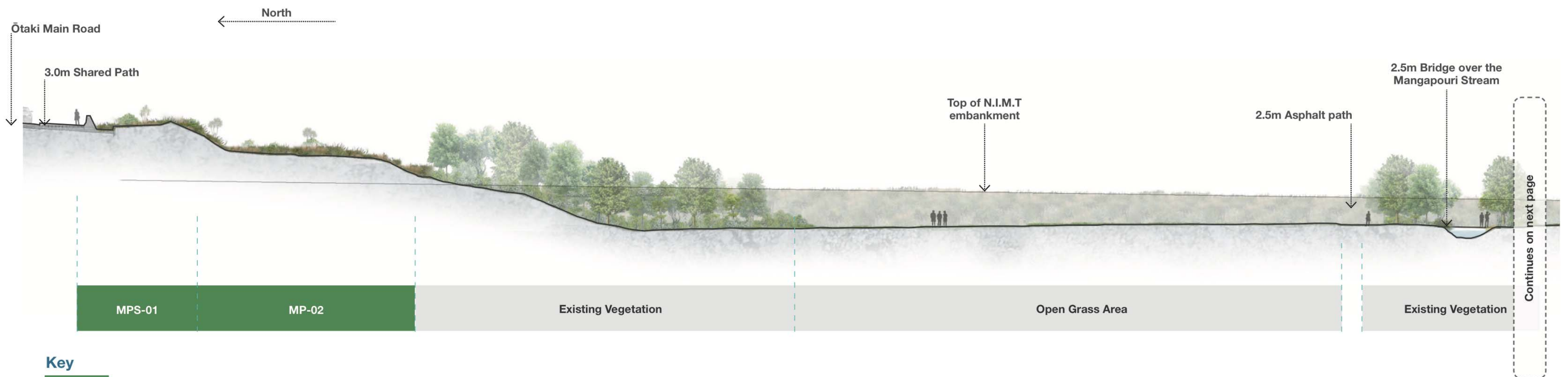
### Illustrative Sectional Elevation 6 – Towards Ōtaki Main Road

Scale @ A3 1:500



### Illustrative Sectional Elevation 7 – Towards N.I.M.T Embankment

Scale @ A3 1:1000



#### Key

- MP-02 Massed Planting
- MPS-01 Massed Planting
- G-01 Massed Planting



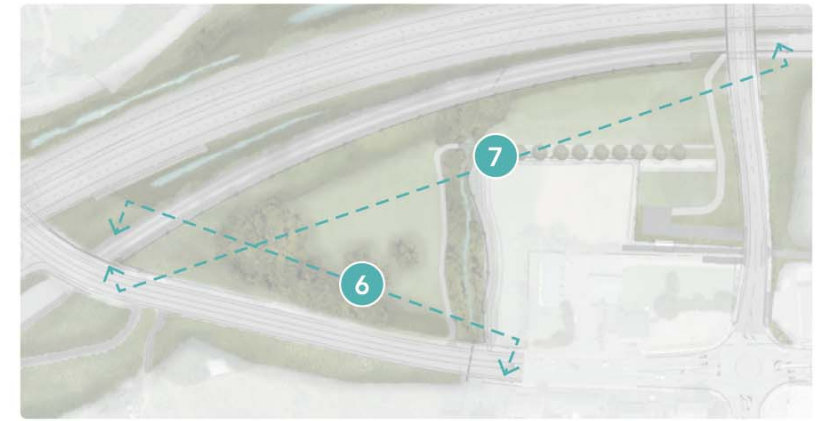
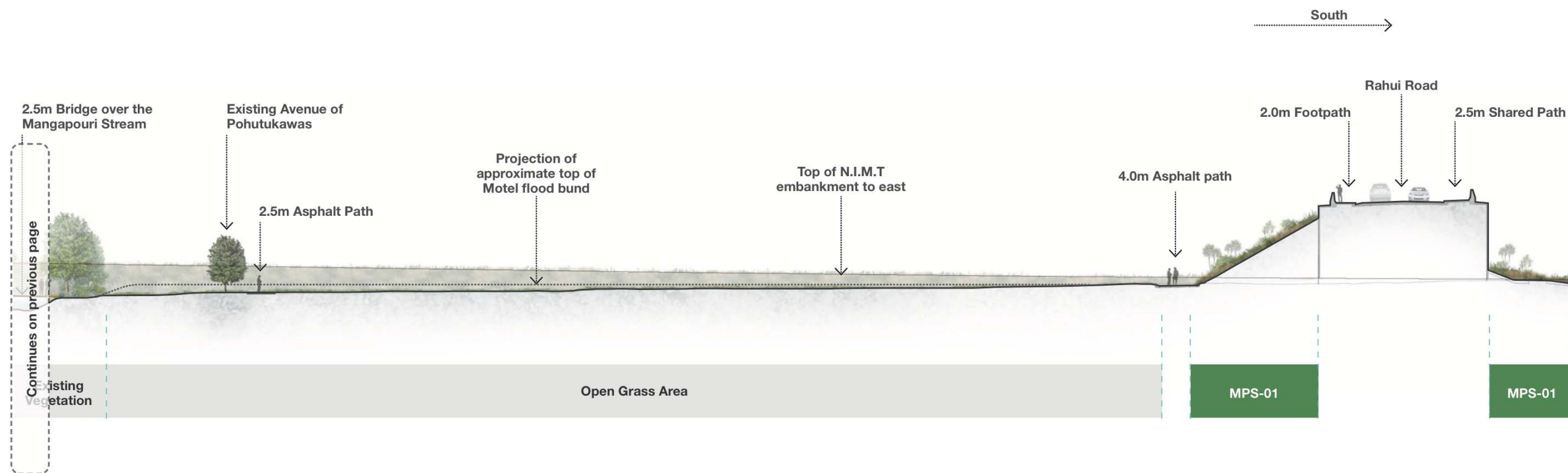


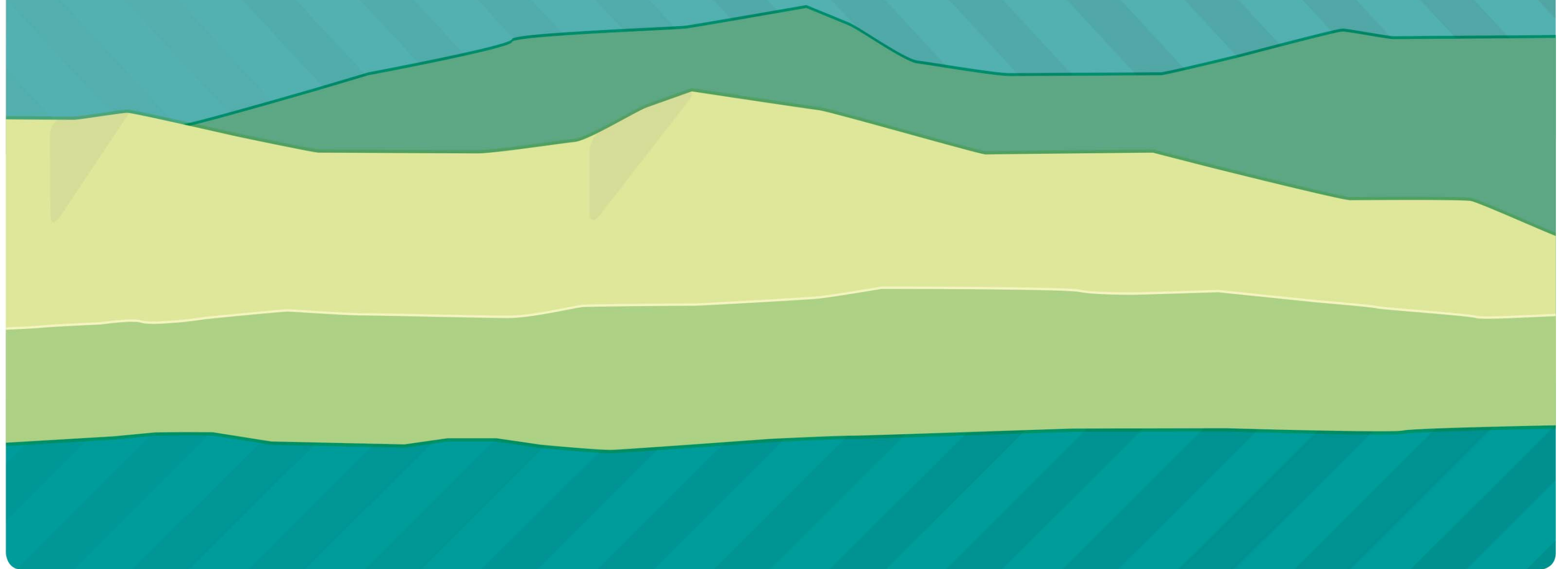
Figure 116. Cross sections through proposed alignment in the Ōtaki region





08

# Gateways





## 8.1 Gateways, Landscape Plan and Design Methodology

The Ōtaki Gateway treatments at the northern and southern ends of the Ōtaki township provide an opportunity to reinforce the unique identity of the local culture, history, people and landscape, into a memorable and distinctive gateway experience. Building legible gateways into the corridor infrastructure and landscape is central to the ongoing vitality of local communities. Informing expressway users of access points to Ōtaki with visual cues is a key design objective.

The gateways will be designed in detail in consultation with KCDC, the Ōtaki Community Board and Ngā Hapū o Ōtaki.

The design approach is that the landscape experience is gradated for the corridor length so that the gateway areas, whilst distinct, are the culmination of planting and landscape strategies that signal Ōtaki as a destination. The design of the gateways play a crucial part not only in the arrival and departure experience for Ōtaki but also for the Kāpiti region.

The below points are opportunities to explore with the local stakeholders:

- The opportunity exists to create physical markers, designed in collaboration with the community, to highlight the entrance points to Ōtaki to encourage visitors into the township
- The Gateway Character Areas are to be representative of the local community and culture, amplifying the existing landscape
- The proposed gateways should be clear and legible from afar for vehicles travelling at speed on the expressway
- Integrate with signage to provide clear visual markers of access points to Ōtaki
- Potential to use waterways at north and south of township to influence the design and location of the gateways

The developed gateway design will be iterative and ongoing through a consultation process. The Gateway output consists of the following:

1. Gateway marker (Northern end only)/Gateway Character Area
2. Gateway destination signage



Figure 117. Gateway relationships



### GATEWAY MARKER/GATEWAY CHARACTER AREA



Northern Gateway

### DESTINATION SIGNAGE



GATEWAY MARKER/GATEWAY CHARACTER AREA



Southern Gateway

DESTINATION SIGNAGE

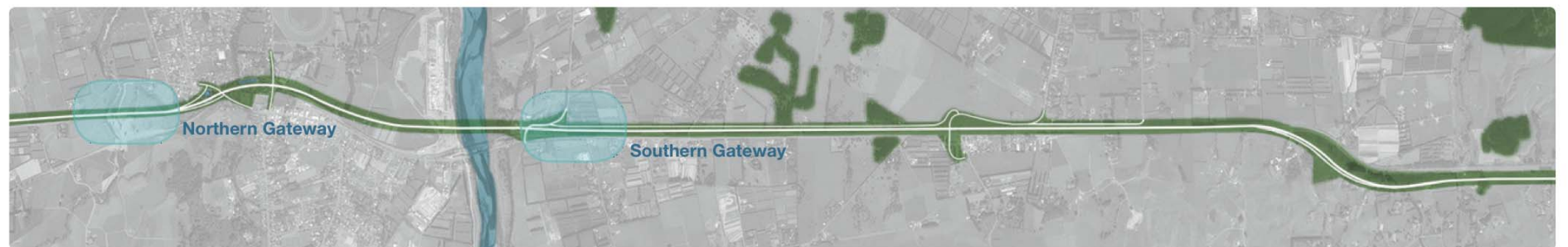


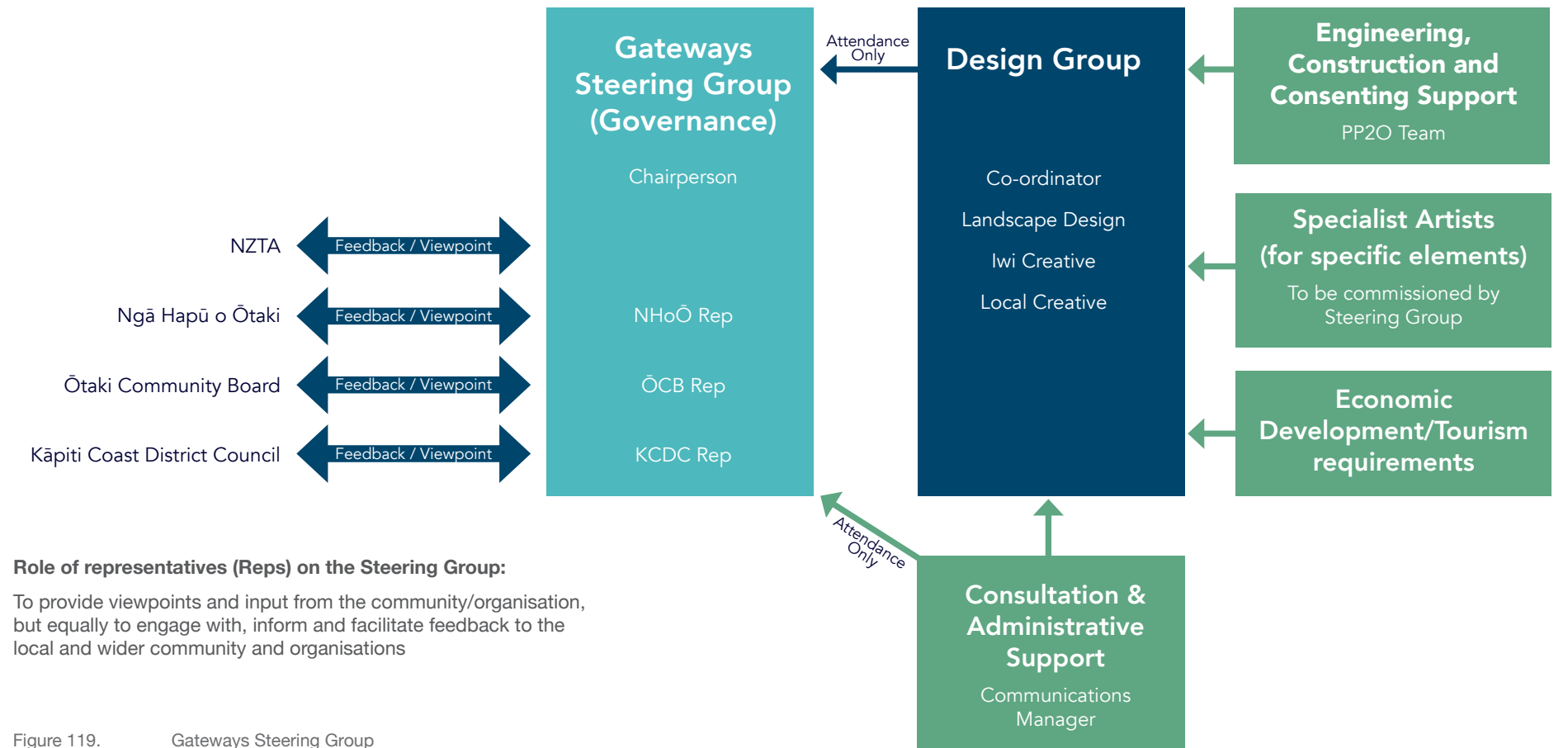
Figure 118. Gateway Marker and Character Locations



## 8.2 Steering Group Key Principles

Key principles to be upheld by the Gateways Steering Group include:

- to act in an advisory capacity, representing the interests of the community
- to consult with the wider NhoŌ, OCB and KCDC groups, as appropriate
- to draw on multi-cultural influences of the Ōtaki region
- to provide access to informed story telling resources reflective of the range of cultural backgrounds in the area
- to have a clear and strong connection to the design elements of the new Ōtaki River Bridge
- to consider tourism and economic development in support of the design initiatives
- to strive for excellence and produce an outcome that is aspirational for the local community
- to appoint a design team who can develop options in line with the key principles
- to provide fair consensus throughout the project life-cycle





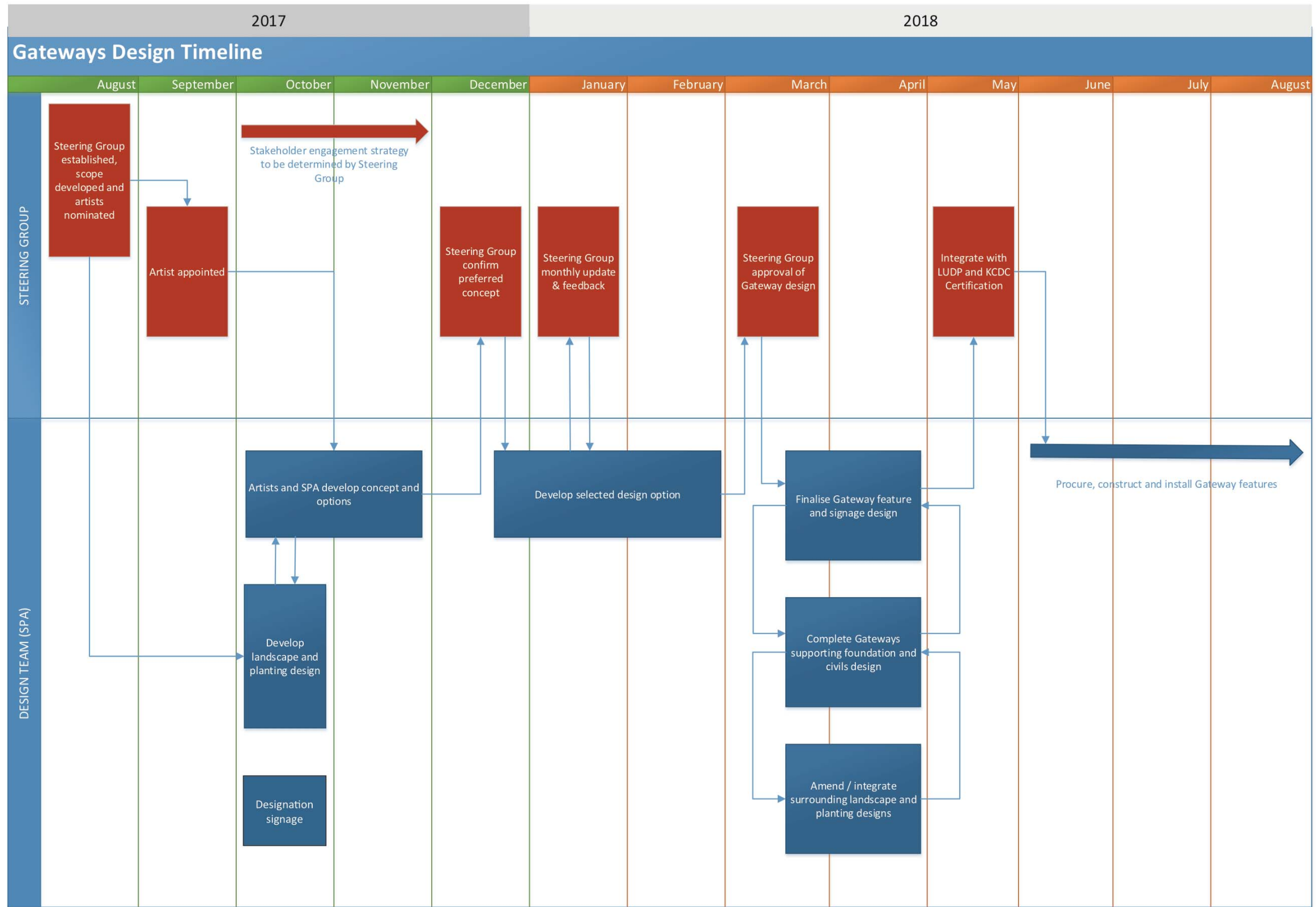
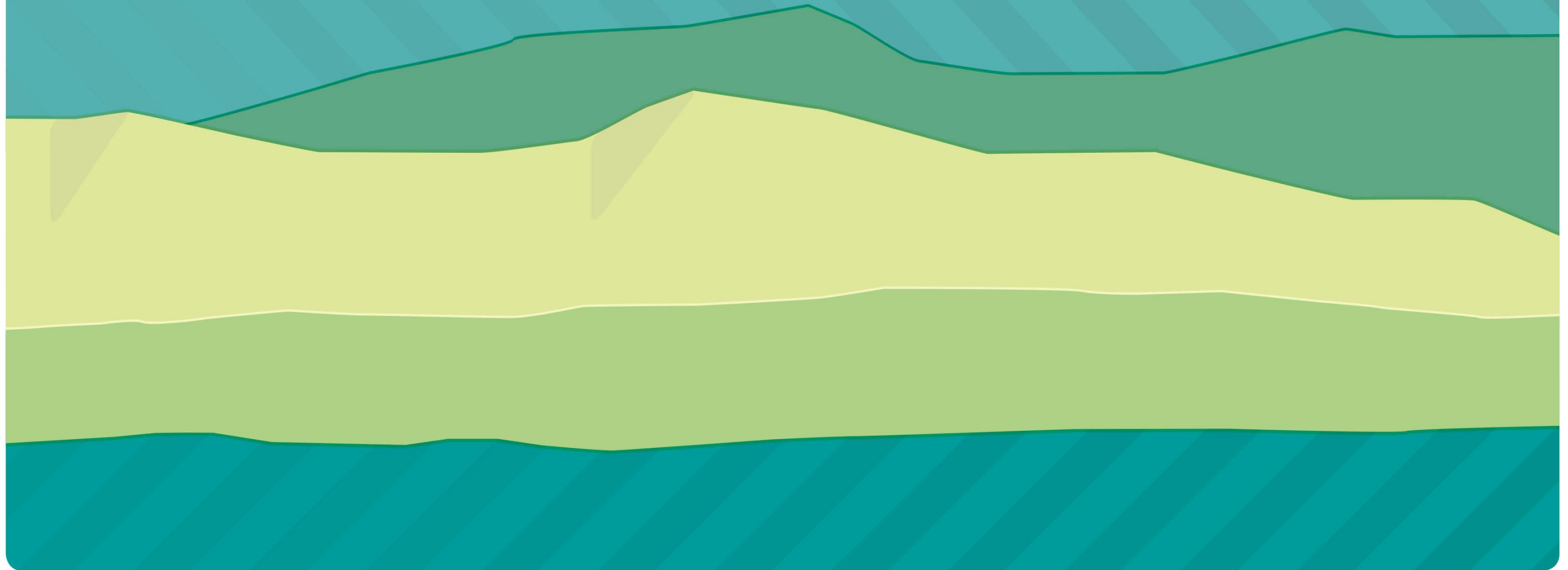


Figure 120. Gateways Programme



09

# Milk Station





## 9.1 Landscape Plan and Design Methodology

A landscape plan for the area between the Milk Station boundary and Rahui Road has been developed in consultation with the Milk Station owners.

The design intent is to extend the Milk Station aesthetic into the space to improve the visitor experience whilst satisfying maintenance and servicing constraints, and tying into the wider expressway development.

- 1 Low retaining wall - finished to match Milk Station walls
- 2 Planted batter slope
- 3 Avenue of Olive Trees to line road
- 4 Potential for additional parallel parking
- 5 Milk Station entrance
- 6 Engineered batter slope with Duramesh rock baskets
- 7 Existing fibre optic cabinet retained
- 8 Muehlenbeckia complexa in garden beds to climb Duramesh wall
- 9 Potential visitor parking
- 10 Stormwater culvert below
- 11 Existing Olive Trees retained if possible, or replaced
- 12 Milk Station service entrance

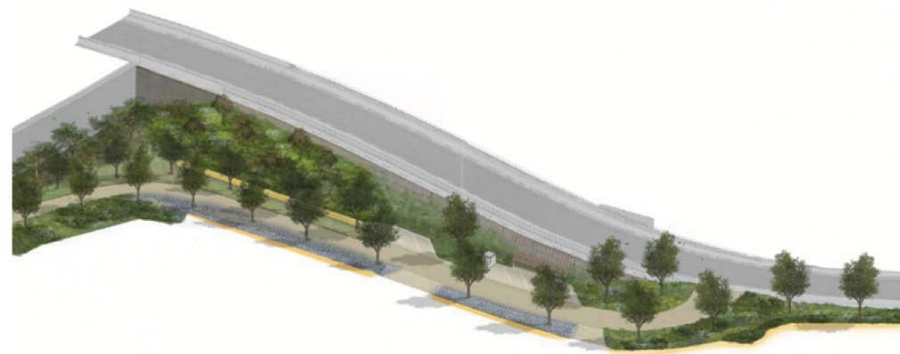


Figure 121. Milk Station Perspective



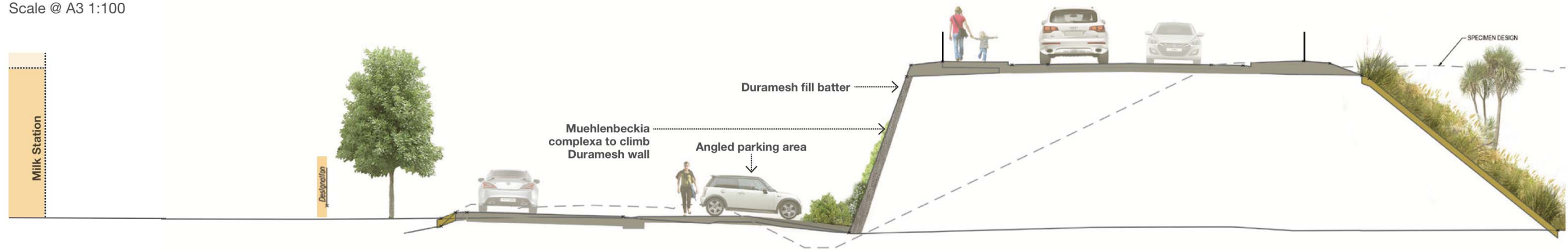
Figure 122. Milk Station Plan



## 9.2 Cross-Sections

### Cross Section A

Scale @ A3 1:100



### Cross Section B

Scale @ A3 1:100



### Cross Section C

Scale @ A3 1:100

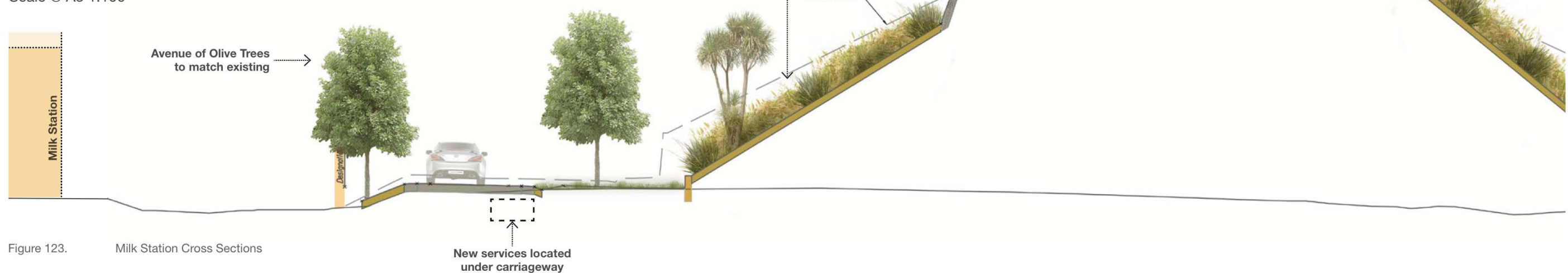


Figure 123. Milk Station Cross Sections



### 9.3 Hardscape and Planting Palette

Mix of native species for embankments:



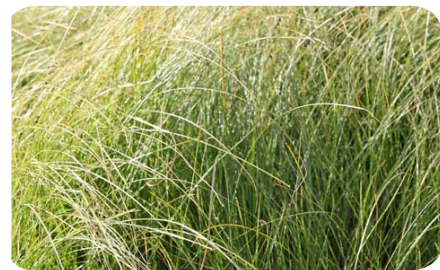
*Cordyline australis*



*Coprosma robusta*



*Anemanthele lessoniana*



*Carex secta*



*Kunzea erricoides*



*Leptospermum scoparium*



*Hebe stricta*



*Muehlenbeckia complexa*



*Phormium tenax*



*Olearia paniculata*

Milk Station Verge Trees:



*Olea europaea* (Olive)



Gravel beneath Olive trees in verge



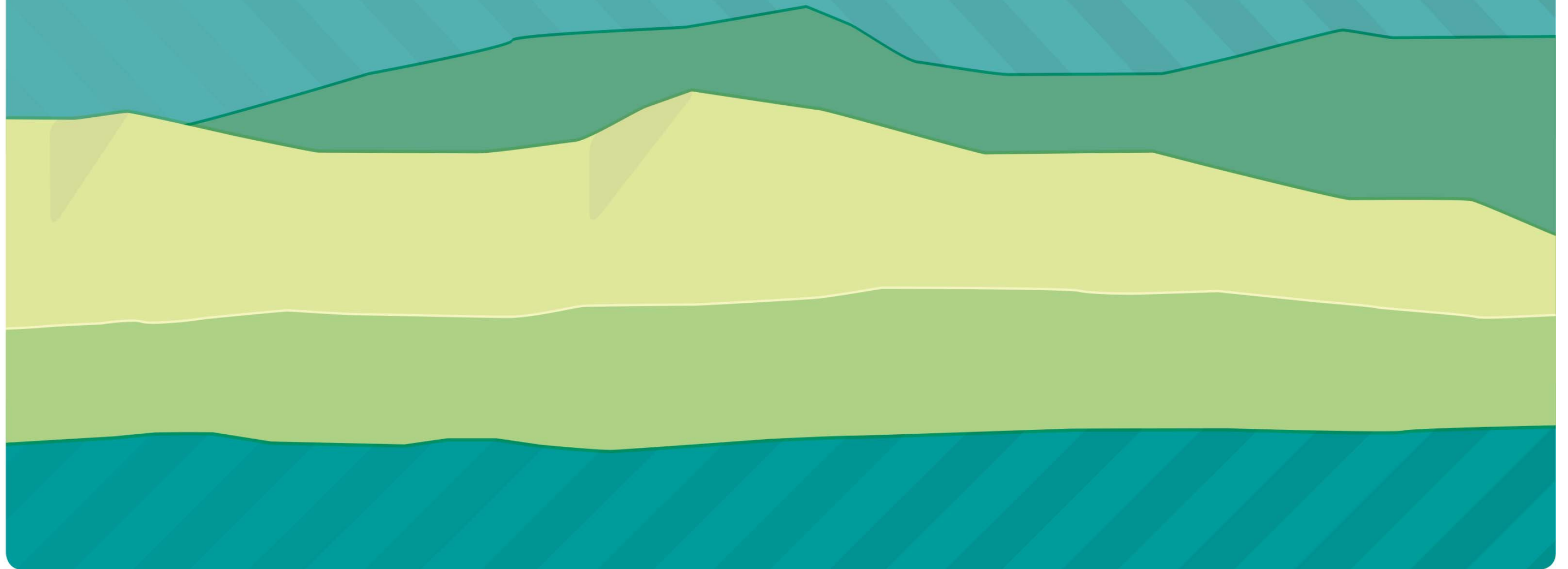
Dura mesh rock baskets

Figure 124. Milk Station Palette



10

# Implementation





## 10.1 Lighting

Street lighting for the expressway and new local roads will be in accordance with the Principal Requirements for the project.

Amenity lighting is also proposed for shared paths through urban areas, to highlight artwork on bridges and gateways, and where required for CPTED purposes. A 30% concept design for lighting has been developed and will inform the detailed design process.

In accordance with consent condition DC79 lighting of the Project shall be designed and screened to minimise the amount of lighting overspill and illumination of residential areas. All Project lighting will be designed in accordance with "Road Lighting Standard AS/NZS1158", and in accordance with the relevant rules of the District Plan.

## 10.2 Furniture

No specific street furniture is currently proposed for the project.

## 10.3 Signage

Clear and legible signage will provide coherent way finding for vehicles and pedestrians throughout the project and will be developed to meet all relevant safety and route information requirements. Signage will highlight points that will inform public where they have arrived at between and including Peka Peka, Te Horo and Ōtaki e.g. Te Horo Beach, Ōtaki Forks, Ōtaki Town Centre, Ōtaki retail and outlet stores.

Wayfinding and signage will be developed in consultation with NZTA and KCDC, details will be approved through Network Integration Plans.

Gateway destination signage at the Northern & Southern off ramps will be developed in parallel with the Gateway Steering Group Committee. Refer to Section 8.1 and Figure 102 for the programme.

## 10.4 Noise Mitigation Structures

The ULDF noted that the recommendation by the project noise specialist is to use OGPA (low noise) road surfaces at key locations along the route. It is expected that walls and bunds will not be required for noise mitigation, although landscape bunding for screening or flood protection will have some benefits to noise levels.

Separate management plans address how noise effects will be monitored and mitigated. Should this process identify any structures or other physical mitigation these will be developed in association with the urban design through detailed design.

## 10.5 Safety

The analysis of CPTED and Safety in Design will be ongoing through the design development process to ensure a safe and well designed expressway corridor. A summary of key responses to CPTED within the conceptual design are as follows:

- **Safety of Underpasses:** have been designed to be light with good visibility to discourage inappropriate behaviour and personal safety risks.
- **Safety of Shared Use Paths:** Provision of wayfinding signage, lighting, CCTV (if required), maximising sight lines and providing safety barriers/fencing where required. Signage for shared use paths will be clear to ensure safety of all users.
- **Rocks:** Loose rock material within the landscape corridor will generally be avoided around structures where they could be thrown from to reduce the risk.
- **Graffiti:** Design elements such as bridge barriers, abutments and underpasses will be designed to prevent vandalism, with anti-graffiti coating used where necessary.
- **Concealment:** The proposed design will ensure areas of concealment are avoided for safety. Low planting will be used at interfaces to ensure openness and clear sight lines.
- **Lighting:** General provisions for the carriageway and intersections will be designed to achieve the required lighting levels. Additional lighting will be designed to create well-lit underpasses and highlight design elements, encouraging use of all modes of transport after daylight hours. Lighting is especially important for the local road access that passes under the expressway at Makahuri.

## 10.6 Whole of Life

All urban and landscape design works have been designed to have a minimum design life of 50 years unless otherwise stated in the Principals Requirements. Design works will be designed to require minimal maintenance for the first 20 years beyond the Defects Liability and Maintenance Period of the project. Selection of materials and finishes will be considered to avoid the risk of graffiti and other forms of vandalism.

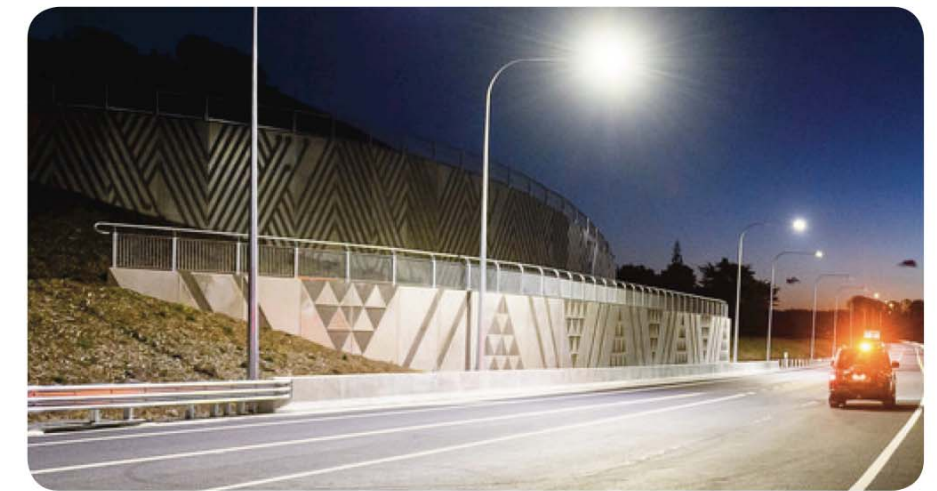


Figure 125. M2PP street lighting and decorated retaining walls



Figure 126. M2PP wayfinding signage



Figure 127. Existing Ōtaki road signage



## 10.7 CPTED

An independent Crime Prevention through Environmental Design (CPTED) review was carried out at 80% design and published on 24th September 2017. The review focused on two main areas of crime prevention: firstly, personal safety – the sense of safety for people passing through and across the corridor (specifically cyclists and pedestrians as distinct from people in vehicles who's safety is considered by NZTA's road safety audit), and secondly, areas where anti-social behaviour and damage can occur.

The following principles (outlined in the Ministry of Justice CPTED principles) were applied:

- Access – safe movement and path choice
- Surveillance and sightlines - opportunities to see and be seen and reducing access to areas of isolation
- Layout - clarity and logic behind the layout
- Activity mix – ability for public realm to provide 'eyes on the street'
- Sense of ownership – knowing that the area is cared for and reducing areas for graffiti
- Quality environments - Reducing the maintenance requirement
- Physical protection – limiting access to areas where people do not need to be

The review identified the following locations where CPTED needed to be considered:

- Shared path along the length of the expressway
- Underpasses
- Hard surfaces which are targets for graffiti vandalism
- Lighting for pedestrians / cyclists
- Area around Ōtaki Train Station
- Pare-o-Matangi Reserve
- Fences and noise barriers

A number of positive elements in the design were identified in the review, with a general comment that the safety responses outlined in section 10.xx above are well founded and appropriate. The review identified three key points for consideration in the development of the LUDP, all of which have been addressed in this revision (Rev 6) of the LUDP:

- For Rahui Road Underpass provide down lighting for amenity lighting with white light (instead of proposed uplighting). This has been accepted. Refer section 6.6.3 of this document (LUDP)
- Provide clear sightlines into the Pare-o-Matangi Reserve with species selected to support passive surveillance. This has been accepted and will be further addressed in the detailed design of the reserve with regard to species selection and placement. Refer section 7.4 in this document (LUDP)

- Avoid providing amenity lighting to Pare-o-Matangi Reserve at night and the path to the Ōtaki Rail Station, or place existing lights on a timer so they turn off when there will be little surveillance. The benefits and dis-benefits of amenity lighting in this location have been well discussed within the design team and with KCDC. Currently lighting will be provided under Rahui Road Underpass to deter anti-social behaviour. The preference is to direct people from the railway station through the public streets at night where passive surveillance will be more obvious. To help encourage movement through the streets, the design philosophy is for the lights on the path between the station and under Rahui Road to be on controlled timers - this will be reviewed through detailed design. The provision to light this path in the future will be maintained, and the issue of lighting Pare-o-Matangi reserve will be addressed at detailed design. Refer section 7.4 in this document (LUDP)

## 10.8 Methods and Specification

A detailed landscape specification has been developed in line with standard specifications for highway landscape treatments.

Associated with this specification are landscape plans and plant schedules specific to the PP2Ō project that include design and quantitative information and should be read in conjunction with the standard specification at all times.

General planting methods include:

- Planting shall be undertaken during the three month planting window only (beginning June until the end of August). Planting may be carried out during a two week shoulder period either side of this but it will depend on environmental conditions. No planting shall be undertaken outside the June – August planting window unless approved by Project Landscape Architect.
- Planting substrate to engineered areas shall be a minimum of 300mm deep, consolidated, and free from rilling and erosion before mulch placement .
- Organic mulch shall be placed over the area to be planted at least two weeks prior to planting to allow for settlement. Note: organic mulch shall not be used within the areas of stormwater treatment that are subject to temporary or permanent inundation. For these areas, alternative plant protection techniques will be used (e.g. staking and proprietary matting mechanisms).
- No planting shall be undertaken until site is approved by Project Landscape Architect to be free of aggressive pest plant species. Planting shall be delayed in areas where aggressive pest plants are detected until these are removed or sufficiently controlled.
- All indigenous plant set out and groupings to be random, but reflecting natural assemblages as directed by Project Landscape Architect for the relevant mitigation requirements.
- Plant selection shall take into account engineering and service constraints. All planted areas shall be temporarily fenced to assist with plant protection.

## 10.9 Planting Programme

In line with the current construction programme 90% of the total area of planting will be undertaken in the 2019 planting season (April – September) with the remainder planted in the first quarter of 2020 (April – June). Enrichment planting will occur in the second and third season after initial planting. All planting is subject to a 5 year maintenance period as required by the consent conditions.

Seed collection and propagation by the landscape sub-contractor and supplier is commencing in November 2017 to ensure all plants will be locally eco sourced.

## 10.10 Vegetation Clearance

Vegetation clearing may be undertaken for the following reasons:

- Clearance to enable construction works to be undertaken
- Clearance for safety, visibility and removal of hazards
- Clearance of exotic vegetation or pest plants to help reduce long-term maintenance costs and the spread of pest plants, especially within native regeneration planting.

All areas of clearing will be identified on the relevant drawings. Where clearing is associated with retained or existing vegetation, the constructor shall take all necessary measures to protect existing vegetation and habitat.

A full set of detailed landscape specifications have been developed and include details on:

- Vegetation clearance
- Ground preparation
- Topsoil supply & placement
- Plant supply
- Planting programme/staging
- Planting
- Maintenance
- Pest control
- Protection requirements
- Landscape and ecological success monitoring



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