


# Ecological Management Plan (EMP)

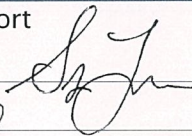
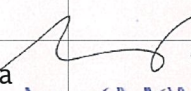
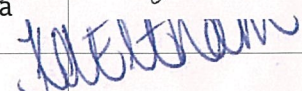
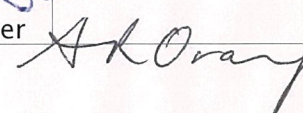
## Ecological Management Plan (EMP) Revision History

Revision N°	Prepared By	Description	Date
A	Matiu Park	Draft for Alliance Review	10 April 2013
B	Stephen Fuller and Matiu Park	Draft incorporating KCDC & GWRC review comments	14 April 2013
C	Stephen Fuller	Draft for Landscape Review	30 April 2013
D	Stephen Fuller	Final Draft	3 May 2013
E	Matiu Park and Stephen Fuller	Final for Certification following GWRC, NZTA and KCDC Comments	17 June 2013

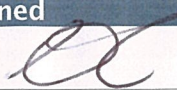
## Independent Review

Action	Name	Signed	Date
Reviewed by	Gerry Kessels for NZTA		June 2013

## Document Acceptance

Action	Name	Signed	Date
Prepared by	Stephen Fuller (EMP Overview)	Final Report 	3 May 2013
Reviewed by	Matiu Park		9 May 2013
Reviewed by	Kylie Eltham and Anna Lewis		18 June 2013
Approved by	Alan Orange Alliance Project Manager		18 June 2013


## Certification

Action	Name	Signed	Date
Regulatory Manager Approval on behalf of	Al Cross Greater Wellington Regional Council		20/8/13


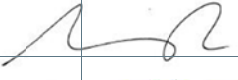
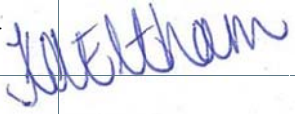

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on behalf of	Greater Wellington Regional Council		

## Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Purpose and objectives.....	1
<b>2</b>	<b>Summary of ecological values, effects and mitigation .....</b>	<b>2</b>
2.1	Terrestrial vegetation, rare plants and rare plant communities.....	2
2.2	Herpetofauna (lizards) .....	3
2.3	Avifauna (birds) including North Island Fernbird .....	3
2.4	Streams, rivers and freshwater habitat .....	4
2.5	Freshwater fauna (fish) .....	5
2.6	Wetlands.....	5
2.7	The coastal marine area including river mouths .....	6
2.8	Potential positive effects.....	6
<b>3</b>	<b>Consent conditions.....</b>	<b>7</b>
3.1	The EMP document.....	7
3.2	Ecological monitoring.....	9
3.3	Management triggers and adaptive management .....	12
3.4	Valued vegetation and habitats .....	13
3.5	Mitigation .....	14
3.6	The SSEMP's .....	15
3.7	Environmental awareness training.....	16
3.8	Management plan linkages.....	17
3.9	Other .....	19
<b>4</b>	<b>Roles and responsibilities .....</b>	<b>19</b>
4.1	Ecological specialists.....	19
4.2	Construction team .....	19
<b>5</b>	<b>Integration of ecology and landscape .....</b>	<b>25</b>
<b>6</b>	<b>Detailed design.....</b>	<b>26</b>
<b>7</b>	<b>Ecological management .....</b>	<b>26</b>
7.1	Valued vegetation and habitat.....	28
7.2	Herpetofauna.....	47
7.3	Avifauna - North Island Fernbird.....	52
7.4	Avifauna - Other Birds.....	58
7.5	Streams and aquatic habitat .....	61

7.6	Freshwater fauna .....	73
7.7	Valued wetlands and habitat .....	77
7.8	Estuarine/marine habitat.....	95
7.9	Mitigation sites and the SSEMPs .....	100
<b>8</b>	<b>Response to indicators of significant effects .....</b>	<b>116</b>
8.1	Adaptive management .....	116
8.2	Response to observed effects .....	117
8.3	Additional mitigation.....	118
<b>9</b>	<b>Reporting .....</b>	<b>118</b>
<b>10</b>	<b>Cultural .....</b>	<b>118</b>
10.1	Cultural values and consent requirements.....	118
10.2	Incorporation of cultural values in the EMP and SSEMPs .....	119
10.3	Environmental awareness training – cultural and ecological values.....	119
<b>11</b>	<b>Complaints .....</b>	<b>119</b>
<b>12</b>	<b>Plan reviews .....</b>	<b>120</b>
<b>13</b>	<b>References .....</b>	<b>121</b>

## Attachments

**Attachment 1: Indigenous Vegetation and Habitat Monitoring and Management Plan**

**Attachment 2: Lizard Monitoring and Management Plan**

**Attachment 3: Avifauna Monitoring and Management Plan**

**Attachment 4: Stream and Aquatic Habitat Monitoring and Management Plan**

**Attachment 5: Wetlands Habitat Monitoring and Management Plan**

**Attachment 6: Marine Habitat Monitoring and Management Plan**

## Appendices

**Appendix A – Independent Review Comments**

**Appendix B –GWRC Review Comments**

**Appendix C – KCDC Review Comments**

**Appendix D – Consultation Record**

## Maps

Map 1: Valued Vegetation - Raumati Kanuka .....	39
Map 2: Valued Vegetation - Mahoe vegetation along Drain 7 .....	40
Map 3: Valued Vegetation - Otaihanga Mahoe .....	41
Map 4: Valued Vegetation - Otaihanga Kanuka .....	42
Map 5: Valued Vegetation - Waikanae River riparian vegetation .....	43
Map 6: Valued Vegetation - Tuku Rakau Forest.....	44
Map 7: Valued Vegetation - Ngarara Mahoe .....	45
Map 8: Valued Vegetation - Kakariki Stream riparian vegetation.....	46
Map 9: Terrestrial Fauna - El Rancho Wetland (Weggery) Lizard Capture and Transfer Site .....	51
Map 10: Avifauna - North Island Fernbird Habitat and Restoration Site .....	57
Map 11: Freshwater Monitoring Sites .....	69
Map 12: Freshwater Monitoring – Drain 7 / Wharemauku .....	70
Map 13: Freshwater Monitoring – Waikanae / Muaupoko / Mazengarb.....	71
Map 14: Freshwater Monitoring – Kakariki / Smithfield / Paetawa / Hadfield. ....	72
Map 15: Valued Wetlands - Raumati Manuka Wetland .....	88
Map 16: Valued Wetlands - New Wetland at Waste Water Treatment Plant .....	89
Map 17: Valued Wetlands - Otaihanga Northern Wetland .....	90
Map 18: Valued Wetlands -Otaihanga Southern Wetland .....	91
Map 19: Valued Wetlands - Tuku Rakau Wetland .....	92
Map 20: Valued Wetlands - El Rancho Wetland (Weggery).....	93
Map 21: Valued Wetlands - Ngarara Wetland;.....	94
Map 22: Coastal Marine Area and River Mouths – Waikanae Estuary .....	99
Map 23: SSEMP Site No 1 - Raumati Manuka .....	107
Map 24: SSEMP Site No 2 - Drain 7 .....	108
Map 25: SSEMP Site No 3 - Otaihanga Wetlands .....	109
Map 26: SSEMP Site No 4 - Muaupoko Stream Diversion .....	110
Map 27: SSEMP Site No 5 - Kakariki / Smithfield .....	111
Map 28: SSEMP Site No 6 - Hadfield / Paetawa B .....	112
Map 29: SSEMP Site No 7 - Former Waikanae Oxidation Ponds (Potential Site).....	113



## Quick Reference Guide to Conditions

Condition Number	Condition Requirement	Comments	Key Final HSMP Reference
<b>Ecological Management</b>			
G.19	Certification and independent review requirements for EMP	Independent review comments are provided in Appendix A	Appendix A Section 5
G.33B	The potential for adverse effects on ecology shall achieve specified outcomes		Sections 1.1; 3.6; 5.9.1
G.34	Purpose, certification and information required within the EMP		Sections 1.1; 5; 2.2; 3.1; 6.3
G.35	EMP preparation requirements	This EMP has been prepared in accordance with the Wellington Conservancy Conservation Management Strategy; the Greater Wellington Regional Pest Management Strategy; and the NZTA Environmental Plan.	Section 3.1; 3.9
G.36	EMP shall be consistent with LMP	Liaison and coordination over the develop of the EMP and LMP	Sections 3.7; 5.1.4; 5.2.4; 5.3.4; 5.5.4; 5.7.4
G.37	Submission of EMP to KCDC for comment 15WD prior to submitting to GWRC for certification	KCDC comments are provided in Appendix B	Appendix B
<b>Ecological Monitoring General</b>			
G.38	Ecological monitoring requirements (general)		Section 3.2; 2; 5
G.38A	Ecological monitoring requirements (flowing water bodies)		Section 3.2; 2; 5
G.38B	Ecological monitoring requirements (wetland condition)		Section 3.2; 2; 5
G.38D	Mudfish survey requirements		Section 3.2; 2; 5

G.39	Submission of results of monitoring		Section 3.2; 2; 5
<b>Adaptive Management</b>			
G.40	Adaptive management principles and requirements		Section 6.1
<b>Valued Vegetation and Habitats</b>			
G.41	Preparation of detailed maps outlining information on relative values and protection requirements. Minimum requirements for ensuring extent of effects shall be minimised		Section 5.1.7, Map 1 – 8
G.41A	Fernbird habitat protection and vegetation clearance		Sections 2.3; 5.3 and Map 10
<b>Ecological Mitigation</b>			
G.42	Combined total of 40.7 ha of landscape and ecological mitigation required		Sections 2; 3.5; 5.9; 6.3
G.42A	Requirements for landscape and ecological mitigation		Sections 2; 3.5; 5.9; 6.3
G.42B	Staging of mitigation works		Sections 2; 3.5; 5.9; 6.3
G.43	Ecological mitigation protection on-going		Sections 2; 3.5; 5.9; 6.3
G.43A	Obtain any further resource consents required to implement any remedial or mitigation measures		Sections 2; 3.5; 5.9; 6.3
<b>Site Specific Ecological Management Plans (SSEMP's)</b>			
G.19A	SSMP's shall be prepared for Ecological Management and lodged in a staged manner		Sections 3.6 and 5.9
G.42C	Purpose of the SSEMP; what each SSEMP area must include; several design specifications; list of key stakeholders who must be consulted; and a summary of reporting requirements	Appended consultation table to record comments from the list of key stakeholders	Sections 3.6; 5.9; 7; and Consultation Table in Appendix C



Environmental Awareness Training			
G.11	Staff training covering a range of ecological issues (which are described in the EMP) to be carried out under the CEMP		Section 3.8
Management Plan Linkages – Generic			
G.1	Requires works to be in general accordance with the Application plan sets including Ecological Mitigation Sites (attached to the EMP)		Sections 3.7; 5.9.4
G.9	Procedures for responding to incidents including un-consented effects on ecological values (which are described in the EMP)		Sections 3.7; 5.1.4
G.15	Describes the application of management plans (including the EMP) and site specific management plans (including the SSEMP)		Sections 3.7; 5.9.4
EMP Linkages with Management Plans – Specific			
G.26A – G.28 and E.2 to E.11	Overlap with the Erosion and Sediment Control Plan (ESCP) as it relates to discharges to streams and coastal marine area	Liaison and coordination over the develop of the EMP and ESCP	Sections 3.7; 5.8.4
G.28A– G.29	Overlap with the Groundwater (Level) Management Plan (GMP) in relation to wetlands and stream flows.	Liaison and coordination over the develop of the EMP and GMP	Sections 3.7; 5.7.4
DC.53C to DC.58 and G.42C	Overlap with the Landscape Management Plan (LMP)	Liaison and coordination over the develop of the EMP and LMP	Sections 3.7; 5.1.4; 5.2.4; 5.3.4; 5.5.4; 5.7.4
E.1 to E.11	Overlap with the Construction Erosion and Sediment control plans (CESCPs) in relation to events such as exceedances of water quality triggers in streams or impacts on wetlands or the marine	Liaison and coordination over the develop of the EMP and CESCPs	Sections 3.7; 5.8.4; 5.7.4

	environment.		
WS.1A – WS.12	Overlap with conditions in relation to stream diversion and reclamation.	Liaison and coordination with the earthworks teams responsible for stream diversion and culvert installation	Sections 3.7; 5.9.4
GT.1 – GT.6	Overlap with conditions in relation to groundwater take where they relate to potential effects on streams and wetlands and necessary mitigation.	Liaison and coordination with the earthworks teams responsible for groundwater take	Sections 3.7; 5.5.4; 5.7.4
VC.1	Overlap with this condition, which identifies the maximum extent of consented vegetation removal from the beds of water bodies.	Liaison and coordination with the earthworks teams responsible for vegetation clearance	Sections 3.7; 5.5.4
WR.1	Overlap with this condition, which identifies the maximum extent of consented wetland reclamation.	Liaison and coordination with the earthworks teams responsible for wetland reclamation	Sections 3.7; 5.7.4

## Acronyms and Abbreviations Used

Acronym	Definition
AEE	Assessment of Ecological Effects
CESCP	Construction Erosion and Sediment Control Plans
CMA	Coastal Marine Area
CWB	Combined Cycleway/Walkway/Bridleway
EMP	Ecological Management Plan
ESCP	Erosion and Sediment Control Plan
GMP	Groundwater (Level) Management Plan
GWRC	Greater Wellington Regional Council
KDCC	Kāpiti Coast District Council
LMP	Landscape Management Plan
NTU	Turbidity
SSEMP	Site Specific Ecological Management Plan
SSLMP	Site Specific Landscape Management Plan
SSMP	Site Specific Management Plan
SSUDP	Site Specific Urban Design Plan
SEV	Stream Ecological Valuation
TR	Technical Report

# 1 Introduction

This Ecological Management Plan (EMP) is one of several management plans comprising the overall Construction Environmental Management Plan (CEMP) for the MacKays to Peka Peka Expressway Project (the Project).

The EMP is an overarching plan that will:

- Inform the detailed design process for vegetation clearance, revegetation, habitat creation, species transfers, stream diversions, monitoring and mitigation;
- Inform Site Specific Ecological Management Plans (SSEMP) for each restoration area; and
- Provide general guidance for development of those sections of the Project which have ecological value, but which are not covered by an SSEMP.
- The EMP draws on the Ecological Impact Assessment (Technical Report 26, Volume 3). The AEE and associated technical reports can be drawn on for additional detail of values, construction, and operational effects, and calculations of appropriate mitigation.

## 1.1 Purpose and objectives

The purpose of “management plans” is described in designation conditions as follows:

Condition	Condition Text
DC.7 e)	Management plans that are not site-specific management plans provide the overarching <b>principles, methodologies, and procedures</b> for managing the effects of construction of the Project to achieve the environmental outcomes and performance standards required by these conditions.

The objectives of the Ecological Management Plan (EMP) are described in the Consent Condition as follows:

Condition	Condition Text
G.33B	<p>a) In managing the construction of the Project and the potential for adverse effects on ecology, the Consent Holder shall achieve the following outcomes:</p> <ul style="list-style-type: none"> <li>i) Manage construction activities to adequately avoid, remedy and mitigate adverse effects on areas of Indigenous vegetation and habitat within the Designation Footprint;</li> <li>ii) Any adverse effects on Indigenous ecological features are adequately avoided, remedied or mitigated;</li> <li>iii) The potential for hydrological effects on wetlands outside the Designation Footprint are monitored and any adverse effects adequately avoided, remedied or mitigated;</li> <li>iv) Ensure that potential effects of sediment on water bodies and</li> </ul>

Condition	Condition Text
	<p>freshwater systems are monitored and any adverse effects adequately avoided, remedied or mitigated; and</p> <p>v) Monitor all ecological mitigation undertaken to ensure success is achieved and subsequent management actions are taken if mitigation is required.</p> <p>b) In achieving these outcomes, the Consent Holder shall, at the least, comply or be consistent with the management triggers and thresholds established in the relevant conditions and within the Ecological Management Plan.</p>

The EMP has dual requirements:

- Firstly to provide the basis for which the Site Specific Ecological Management Plans (SSEMPs) will be prepared; and
- Secondly because the SSEMPs are only required for the six<sup>1</sup> mitigation areas, to provide guidance to the design and construction activities for the remainder of the alignment where SSMP's are not required, but where potential ecological effects may still occur.

It is anticipated that the EMP will be a live document and will be updated and revised as the construction methodology, regulatory environment and requirements for managing ecological effects change over time.

*Note: the maps provided in this document are based on the Project layout as lodged with the AEE. This layout will be continually refined through the detailed design process and updated through preparation of the detailed SSEMP and SSLMPs.*

## 2 Summary of ecological values, effects and mitigation

The following sections describe the ecological values and management of ecological effects, avoidance, remedy, and mitigation under the following headings:

### 2.1 Terrestrial vegetation, rare plants and rare plant communities

The main alignment of the Project traverses a landscape that is largely urban fringe and rural. As a result, the vegetation is dominated by rough pasture, plantation forest, and weedland. There are however, eight small bush fragments typically of kanuka and mahoe scrub and low forest, which are scattered along the alignment. These fragments are potential refuges for native flora and fauna, and each is a potential nucleus for restoration activity, and are consequently of value.

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<sup>1</sup> Note: the six SSEMPs do not include the potential use of the former Waikanae Oxidation Ponds if any additional ecological mitigation is required.

The project as designed will result in the permanent loss of approximately 3.8 ha of these small bush fragments and other smaller areas of scattered indigenous vegetation or treeland that lies beneath the Project Footprint. Conditions prevent the removal of more than the 3.8 ha of terrestrial vegetation within the Project Footprint.

Conditions require that best endeavours are undertaken to avoid or minimise effects on the remaining 7.4 ha of these fragments that lie within the Project designation (outside of the Project Footprint).

As mitigation for the loss of 3.8 ha of indigenous vegetation and habitat, a minimum of 7.6 ha of terrestrial vegetation will be planted. This revegetation will be carried out in coordination with other planting planned for landscape mitigation, stream and wetland restoration at various locations within the Designation.

A number of consent conditions require monitoring of areas of indigenous vegetation and habitat, and development of an adaptive management regime where effects are observed during and post-construction. These values and protection requirements are discussed further in section 7.1 and the methods for monitoring and adaptive management are detailed in Attachment 1.

## **2.2 Herpetofauna (lizards)**

The lizard surveys carried out for this study only recorded one species, the common skink, out of the five native species that could be present based on habitat availability. No species of conservation concern were found, however, if present they are most likely to occur in the El Rancho Wetland (Weggery).

One condition (G.34 c)) requires development of a Lizard Management Plan that focuses on monitoring of the El Rancho Wetland (Weggery) site, including the preparation of a lizard capture and transfer plan in the event “Threatened” or “At-Risk” lizards are present, including obtaining necessary approvals permit from the Department of Conservation (DOC). This permit has been obtained and forms part of Attachment 2.

These values and protection requirements are discussed further in section 7.2 and the methods for monitoring are detailed in Attachment 2.

## **2.3 Avifauna (birds) including North Island Fernbird**

Of the 22 native species recorded along the Project alignment, two species are “Threatened” (bittern and pied shag) and three species are “At Risk” (pipit, black shag and fernbird).

The wetlands in the less developed area adjacent to and including the Project north of Te Moana Road (comprising the wider Te Harakeke/Kawakahia Wetland, Ti Kouka Wetland, Ngarara Wetland and Nga Manu Nature Reserve area) provide the best quality habitat for freshwater bird species due to the extent and diversity of habitat types present. This area is of particular importance to Threatened and At Risk avian species in the Kāpiti district.

The estuary and stream mouths downstream (including the Whareroa, Wharemauku, Waikanae, Waimeha, and Hadfield / Kowhai estuaries) provide habitat for estuarine and coastal bird species.

A generic condition (G. 34 i)) relates to avoidance of effects on these Threatened or At Risk species during breeding season

Of particular concern is a very small population of North Island fernbird near Nga Manu Nature Reserve.

A number of conditions require monitoring of this wider area and development of an adaptive management plan in the event of adverse effects on this population during and post-construction. These values and protection requirements are discussed further in sections 7.3 (Fernbird) and 7.4 (other birds) and the methods for monitoring and adaptive management are detailed in Attachment 3.

## **2.4 Streams, rivers and freshwater habitat**

The aquatic fauna and physical habitat of most waterways traversed by the Project are somewhat degraded due to historical modification (predominantly construction of drainage) and current land use, although they still retain value as habitat and corridors for freshwater fauna. The Waikanae River is considered to be of high (regional) value in terms of presence of important fauna species and habitat integrity. Accordingly, the maintenance of water quality and ecological diversity in the lower reaches of the Waikanae system and associated tributaries is of high importance.

In total, the project will cross 15 perennial waterways. The total length of affected waterway is 3,120 m of which 1,123 m will be lost to culverts, 1,525 m will be reclaimed and diverted to new 'constructed' channels, and 472 m will be affected by channel stabilisation (e.g. riprap) associated with bridge formation. These actions will result in modification or permanent loss of freshwater habitat, riparian margins, and the fauna resident in these streams.

Even though the waterways traversed by the Project are typically highly modified, the scale of habitat loss requires comprehensive mitigation. As mitigation for the 3.1 km of stream loss or modification, a minimum of 6.6 km of stream is to be enhanced or created as part of stream diversions and associated restorative works. This restoration is to include a minimum of 17.7 hectares of riparian planting and associated enhancement. A range of consent conditions relate to the location, design, implementation, and monitoring of these stream restoration areas.

There is also the risk of increased sediment discharge from the Project construction phase to streams and wetlands downstream with potential impacts on water and habitat quality, and effects on sensitive taxa.

A number of consent conditions require monitoring of sediment discharges and adaptive management where effects are observed during and post-construction. These values and



protection requirements are discussed further in section 7.6 and the methods for monitoring and adaptive management are detailed in Attachment 4.

## **2.5 Freshwater fauna (fish)**

Despite the degraded quality of the waterways traversed by or located downstream of the Project, they still contain diverse populations of native fish, a number of which are threatened or at risk. The proposed waterway works have the potential to impact on fish passage (culverts), significantly reduce habitat (stream reclamations) and cause deaths of large numbers of fish during in stream works.

There are a number of conditions that relate to the maintenance of fish passage, to the rescue and relocation of fish during stream diversions and to the design of stream diversions to provide enhanced fish habitat during and post-construction. These values and protection requirements are discussed further in section 7.6 and the methods for monitoring and adaptive management are detailed in Attachment 4.

## **2.6 Wetlands**

Four wetlands are directly affected by this project through habitat loss and one further wetland may be indirectly affected through changes to hydrology. These wetlands and the management of potential effects are identified in a number of consent conditions.

Mitigation for this wetland habitat loss and modification will involve the restoration or formation of a minimum of 9.5 ha of wetland habitat within proposed offset flood storage areas within the Designation. A number of consent conditions relate to the design, implementation and monitoring of these wetland restoration projects during and post-construction.

A further potential effect on the five existing wetlands relates to formation of the road embankment on peats and the potential for this to raise or dam groundwater levels through impeding flows. This could have a major effect on the hydrology of these wetlands. A number of consent conditions relate to the monitoring of wetland hydrology and adaptive management where effects are observed during and post-construction.

Only one wetland could potentially be affected by significant discharges of sediment, the Te Harakeke/Kawakahia Wetland that lies downstream of an extensive area of earthworks in the Ngarara, Kakariki, and Paetawa streams catchments.

A number of consent conditions require monitoring of sediment discharges and adaptive management where effects are observed. These values and protection requirements are discussed further in section 7.7 and the methods for monitoring and adaptive management are detailed in Attachment 5.

## **2.7 The coastal marine area including river mouths**

The ecological values of the intertidal marine habitat in the Wharemauku Stream mouth, Waikanae River estuary and Waimeha Stream mouth have been assessed to be high. Of these three, the Waikanae Estuary is the most stable and protected estuary and has the highest values. It is a Scientific Reserve managed by the Department of Conservation.

During construction, there is a risk of sediment discharge to the Waikanae Estuary, which, if it were of a sufficient scale, could impact on both water quality and habitat conditions.

Baseline ecological sampling has been completed in the intertidal habitat of the Waikanae River and ongoing sampling is required to monitor this potential effect. A range of consent conditions require monitoring of sediment discharges and adaptive management where effects are observed during and post-construction. These values and protection requirements are discussed further in section 7.8 and the methods for monitoring and adaptive management are detailed in Attachment 6.

## **2.8 Potential positive effects**

### **2.8.1 Restoration and re-vegetation**

A total of 40.7 ha of indigenous planting is proposed covering a range of habitats including dry dune, dune slack, wetland, and riparian. In addition, a considerable area of re-vegetation is proposed to assist in landscape and visual mitigation, and as part of the formation of planted offset flood storage areas. These will provide additional ecological benefit, in particular increases in habitat and connectivity between currently isolated habitat fragments. Indigenous planting will also be used in the stormwater treatment wetlands and some of the wet treatment swales.

These mitigation requirements are discussed further in section 7.9 and the methods for their formation; monitoring and ongoing management will be detailed in future Site Specific Ecological Management Plans (SSEMPs).

### **2.8.2 Stormwater discharge**

Stormwater modelling for the Project indicates that the scale of stormwater run-off treatment proposed will ultimately reduce the current levels of contaminants entering these waterways and so will result in a positive outcome.

### **2.8.3 Research**

This Project will result in a range of ecological investigations that will provide public good in terms of increasing local conservation knowledge, and will potentially involve new science around stream diversions, wetland hydrology, wetland creation and rehabilitation, including mitigation success monitoring. This knowledge and science can contribute to management of adjoining areas on the Kāpiti Coast under control of other agencies.

### 3 Consent conditions

The content and process for development of this EMP is described in detail under resource consent conditions G33B to G37. Conditions G.38 to G43A go on to describe key activities, which the EMP must deal with as follows:

- Condition **G33B** describes the outcomes that the EMP must achieve and conditions G34 to G37 describe the content and process for development of this EMP;
- Conditions **G38** to **G39** relate to monitoring (baseline, construction and post construction) and reporting of the ecological values identified in the EMP;
- Condition **G40** describes the agreed adaptive management approach for responding to ecological effects identified in the EMP;
- Condition **G41** requires identification of values areas to inform the EMP and other related plans (LMP, SSEMP);
- Conditions **G42** to **G42B** specify the minimum areas of revegetation and restoration required to mitigated for adverse effects;
- Condition **G42C** describes how the EMP will inform the Site Specific Ecological Management Plan; and
- Conditions **G43** and **G43A** discuss ongoing protection and management of mitigation areas.

The following tables describe and summarises these conditions in the groups identified above.

There are also a number of resource consent and designation conditions specific to other plans or activities which also refer to the EMP or to specific ecological values (such as wetlands, avifauna, and streams). These are discussed in section 3.8 of this Plan.

#### 3.1 The EMP document

The purpose, structure, and content of the EMP is described in resource consent conditions **G33B** to **G37** as follows:

Condition	Summary of Condition Text
G33B	a) In managing the project shall achieve the following outcomes <ul style="list-style-type: none"> <li>i) Minimise effects on indigenous vegetation and features within the designation footprint</li> <li>ii) Minimise and monitor potential hydrological effects outside the footprint</li> <li>iii) Monitor success of all mitigation</li> </ul> b) To achieve these will comply with triggers and thresholds established in an EMP
G.34	Shall prepare an EMP <ul style="list-style-type: none"> <li>A. Detail the management programme to manage effects</li> </ul>

Condition	Summary of Condition Text
	<p>B. Document permanent mitigation measures</p> <p>C. Ensure mitigation has been successful through monitoring</p> <p>D. Ensure any long term effects are managed by adaptive management</p> <p>E. Shall be finalised in consultation with iwi</p> <p>Shall include but not be limited to</p> <ul style="list-style-type: none"> <li>a) monitoring pre during and post construction including role of iwi</li> <li>b) how outcomes will be achieved <ul style="list-style-type: none"> <li>i) how loss of valued areas will be minimised</li> <li>ii) How construction effects on water will be minimised</li> <li>iii) How hydrological effects on wetlands will be minimised</li> <li>iv) How effects of fish will be minimised</li> <li>v) How disturbance of nationally threatened or at risk birds will be avoided during breeding</li> </ul> </li> <li>c) A lizard management plan shall include <ul style="list-style-type: none"> <li>i) Lizard search methods prior to construction at El Rancho Wetland</li> <li>ii) Capture and release methods for lizards, Permits, restoration of lizard habitat, how lizard mortality will be minimised</li> </ul> </li> <li>d) Baseline data collection and development of management triggers.</li> <li>e) details of mitigation including objectives</li> <li>f) Details of monitoring to determine success against objectives</li> <li>g) Details of post construction work</li> <li>h) Response in event mitigation is not successful</li> <li>i) How adverse effects on fernbird will be avoided</li> <li>j) Details of iwi involvement in stream works and fish passage</li> <li>k) Process for determining requirement for additional mitigation if effects greater than anticipated</li> <li>l) The species and communities where adaptive management will be applied</li> <li>m) The salvage and transfer of elements of valued habitat to restoration sites</li> <li>n) A fish rescue plan including <ul style="list-style-type: none"> <li>i) rescue and relocation methods including <ol style="list-style-type: none"> <li>1. isolation of impact reach</li> <li>2. multiple fish capture methods</li> <li>3. transfer methods</li> <li>4. location of holding pools</li> <li>5. dewatering of waterbody</li> <li>6. use of pool refugia</li> <li>7. recording methods</li> </ol> </li> <li>ii) prepared by qualified ecologist</li> <li>iii) undertaken by qualified ecologist</li> <li>iv) will guide timing of works in any waterbody including</li> </ul> </li> </ul>

Condition	Summary of Condition Text
	wetlands v) reporting 1. Results of mudfish survey 2. Details of wetland condition monitoring o) Details of each diversion channel including thresholds/targets to measure success (SSEMP) Works will not commence until EMP certified
G.35	EMP shall be prepared by qualified and experienced ecologist Shall be prepared in accordance with i) NZTA's environmental plan ii) Conservation management strategy iii) GWRC pest management strategy
G.36	Shall be consistent with LMP
G.37	Shall submit draft prior to submitting final EMP and shall respond to comments

### 3.2 Ecological monitoring

Extensive ecological monitoring is required for each stage of the Project under resource consent conditions **G.38** to **G.39** including Baseline, Construction, and post-Construction. Baseline monitoring has been completed and summaries of the results are contained in the various technical sections of this EMP.

Resource consent condition G.38 requires construction and post-construction monitoring to:

1. *Monitor a range of construction activities to ensure effects that it was predicted could be avoided have been;*
2. *Determine if the adverse effects that could not be avoided occur during construction are of the extent and scale predicted; and*
3. *Confirm that the agreed mitigation for those unavoidable effects has been successfully completed.*

If additional adverse effects are shown to have occurred, an adaptive management process is required under Condition G.40 to remedy those effects or provide additional mitigation. The relevant resource consent conditions are summarised as follows:

Condition	Summary of Condition Text
G.38	<p>Shall undertake monitoring in accordance with EMP</p> <ul style="list-style-type: none"> <li>a) Collect baseline for 1 year prior</li> <li>b) Monitor for entire duration of construction</li> <li>c) Monitor for 2 (vegetation freshwater and marine) and 5 (wetland hydrology) years following completion of construction</li> <li>d) Undertake fernbird monitoring for 2 years post</li> <li>e) Monitor fish passage for adaptive management</li> </ul> <p>Carry out monitoring of new structures and works in streams (WS.3B).</p>
G.38A	<p>Monitor water quality of waterbodies upstream and downstream of earthwork discharges</p> <p>Shall include</p> <ul style="list-style-type: none"> <li>a) Continuous turbidity loggers in Waikanae, Wharemauku, Kakariki, and continuous turbidity loggers upstream and downstream of diversions for 1 week following completion</li> </ul> <p>Shall install and operate loggers to</p> <ul style="list-style-type: none"> <li>i) In case of Waikanae, Wharemauku and Kakariki, monitor turbidity for 6 months prior to earthworks</li> <li>ii) In case of Waikanae, Wharemauku and Kakariki, monitor discharges until earthworks stabilised</li> <li>iii) In case of stream diversions monitor until turbidity thresholds have not been exceeded for 1 week.</li> </ul> <p>Logs shall be monitored daily.</p> <p>The rainfall alert will be 7 mm/hr</p> <ul style="list-style-type: none"> <li>b) Triggered event monitoring shall <ul style="list-style-type: none"> <li>i) In addition to continuous turbidity logging shall measure turbidity wherever an event</li> <li>ii) Carried out within 2 hours of exceedence event</li> </ul> </li> <li>c) Thresholds and response actions</li> </ul> <p>Where change of 20% between upstream and downstream logger shall undertake the following</p> <ul style="list-style-type: none"> <li>i) Carry out audit within 24 hrs</li> <li>ii) Remedy the causes</li> <li>iii) Notify the manager</li> <li>iv) If threshold elevated for more than 48 hrs carry out additional invert sampling</li> <li>v) Report to Manager within 10 days of sampling to include <ol style="list-style-type: none"> <li>1. Results of sampling</li> <li>2. Causes of discharge and response</li> <li>3. Assessment whether following thresholds have been exceeded. <ul style="list-style-type: none"> <li>i Decline in QMCI of 1.5 or greater</li> <li>ii Decline in sensitive taxa of &gt; 20%</li> </ul> </li> </ol> </li> <li>vi) If thresholds have been exceeded agree and carry out mitigation</li> </ul>

Condition	Summary of Condition Text
	<p>measures approved by Manager</p> <p>d) Thresholds for diversions if 20% or greater increase in NTU than shall</p> <ul style="list-style-type: none"> <li>i) Carry out audit within 24 hrs</li> <li>ii) Remedy the causes</li> <li>iii) Notify the manager</li> <li>iv) If threshold elevated for more than 48 hrs carry out additional invert sampling</li> <li>v) Report to Manager within 10 days of sampling to include <ul style="list-style-type: none"> <li>1. Results of sampling</li> <li>2. Causes of discharge and response</li> <li>3. Assessment whether following thresholds have been exceeded. <ul style="list-style-type: none"> <li>i Decline in QMCI of 1.5 or greater</li> <li>ii Decline in sensitive taxa of &gt; 20%</li> </ul> </li> </ul> </li> <li>vi) If thresholds have been exceeded agree and carry out mitigation measures approved by Manager</li> </ul> <p>e) Sediment monitoring of Waikanae River following livening of Muaupoko diversion</p>
G.38B	<ul style="list-style-type: none"> <li>a) Wetland condition monitoring for wetlands shall be undertaken for <ul style="list-style-type: none"> <li>i) Raumati Manuka Wetland;</li> <li>ii) Otaihanga Northern Wetland;</li> <li>iii) Otaihanga Southern Wetland;</li> <li>iv) El Rancho Wetland (Weggery); and</li> <li>v) Ngarara Wetland;</li> </ul> </li> <li>b) In representative habitat during wet and dry seasons</li> <li>c) Shall continue for 5 years post construction</li> <li>d) Also refer conditions GD.7, G.34 and G.38.</li> </ul>
G.38D	<ul style="list-style-type: none"> <li>a) Prior to diversion work surveys of mudfish in the following streams <ul style="list-style-type: none"> <li>i) Smithfield Drain;</li> <li>ii) Hadfield Stream;</li> <li>iii) Paetawa Drain;</li> <li>iv) Muaupoko Stream; and</li> <li>v) Lower Drain 7.</li> </ul> </li> <li>b) Will include the following methods</li> <li>c) If condition preclude these methods agree alternatives</li> <li>d) Results provided to Manager within 10 days</li> <li>e) Methods to manager for certification prior to survey</li> <li>f) Results of mudfish survey in EMP</li> </ul>
G.39	<ul style="list-style-type: none"> <li>a) All ecological monitoring required by EMP to be carried out by qualified and experienced ecologists</li> <li>b) Results shall be <ul style="list-style-type: none"> <li>i) Available for inspection</li> </ul> </li> </ul>



Condition	Summary of Condition Text
	<ul style="list-style-type: none"> <li>ii) Provided to iwi</li> <li>iii) Submitted to Manger quarterly</li> <li>iv) Submitted to DG Doc and KCDC quarterly</li> <li>v) Summaries in annual report (G.12)</li> </ul>

Wetland hydrological monitoring is also required in the wetlands identified in Condition G.38B above by Conditions GD.5 and GD. 7 through the Groundwater Management Plan.

A key component of this monitoring is the development of management triggers where an effect may or may not have occurred but which require investigation to provide confirmation. These management triggers form part of the adaptive management process as follows:

### 3.3 Management triggers and adaptive management

Condition **G.40** details the adaptive management requirements where the extent or scale of adverse effects are found to be greater than anticipated, or where agreed mitigation methods do not achieve the objectives that have been set. The resource consent condition is summarised as follows:

Condition	Summary of Condition Text
G.40	<ul style="list-style-type: none"> <li>a) Shall implement adaptive management approach based on following principles <ul style="list-style-type: none"> <li>i) The ecosystems potentially at risk are not of such value that they cannot be mitigated;</li> <li>ii) There is potential for remediation to be done in time to prevent unacceptable impacts;</li> <li>iii) Clear management triggers can be developed to identify when action is needed;</li> <li>iv) The adaptive management outcomes are clearly defined;</li> <li>v) It is the best practicable means of dealing with the possibility of unanticipated adverse effects; and</li> <li>vi) There is a process to ensure full implementation of the adaptive management approach.</li> </ul> </li> <li>b) Adaptive Management monitoring shall: <ul style="list-style-type: none"> <li>i) Establish baseline information and management triggers for each habitat</li> <li>ii) Monitor during and post construction to confirm success and respond to failures</li> <li>iii) In the event of a trigger exceedence implement the following <ol style="list-style-type: none"> <li>1. Notify the manager</li> <li>2. Confirm cause</li> <li>3. If caused by project undertake following steps</li> </ol> </li> </ul> </li> </ul>

Condition	Summary of Condition Text
	<ul style="list-style-type: none"> <li>A. Notify the manager</li> <li>B. Identify practice</li> <li>C. Implement measures to prevent exceedence</li> <li>D. Remedy or mitigate effects of exceedence</li> <li>E. Obtain certification of amendment to plans</li> <li>F. Undertake further monitoring to confirm success</li> <li>G. If unsuccessful implement remedial actions and further monitoring</li> </ul> <ul style="list-style-type: none"> <li>4 Provide report to manager</li> </ul> <ul style="list-style-type: none"> <li>c) Provide details of adaptive management approach</li> <li>d) What to do if the management plan is inconsistent with conditions.</li> </ul>

The adaptive management process is described in detail in section 8.1 of this Plan.

### 3.4 Valued vegetation and habitats

Condition **G.41** identifies the areas of valued vegetation and habitat that have been identified through the consenting process as requiring management or mitigation through the construction of this Project. The resource consent conditions are summarised as follows:

Condition	Summary of Condition Text
G.41	<ul style="list-style-type: none"> <li>a) Engage qualified ecologist to prepare maps of valued vegetation and habitat</li> <li>b) Shall be used to <ul style="list-style-type: none"> <li>i) Inform EMP and other relevant plans, and inform design changes</li> <li>ii) Inform staff and contractors of protection of sites</li> </ul> </li> <li>c) Indigenous vegetation and habitat are: <ul style="list-style-type: none"> <li>i) Terrestrial <ul style="list-style-type: none"> <li>1 Raumati Kanuka</li> <li>2. Mahoe vegetation along Drain 7;</li> <li>3. Otaihanga Mahoe</li> <li>4. Otaihanga Kanuka</li> <li>5. Waikanae River riparian vegetation;</li> <li>6. Tuku Rakau Forest</li> <li>7. Ngarara Mahoe</li> <li>8. Kakariki Stream riparian vegetation.</li> </ul> </li> <li>ii) Valued wetland vegetation and habitats: <ul style="list-style-type: none"> <li>1. Raumati Manuka Wetland;</li> <li>2. Northern Otaihanga Wetland;</li> <li>3. Southern Otaihanga Wetlands;</li> <li>4. New wetland adjacent to Wastewater Treatment Plant</li> <li>5. El Rancho Wetland (Weggery);</li> </ul> </li> </ul> </li> </ul>

Condition	Summary of Condition Text
	<ul style="list-style-type: none"> <li>6. Tuku Rakau Wetland; and</li> <li>7. Ngarara Wetland.</li> </ul> <ul style="list-style-type: none"> <li>d) Effects shall be minimised by <ul style="list-style-type: none"> <li>i) Detailed design will avoid or minimise effects as far as practicable</li> <li>ii) Mechanisms will be developed to protect areas of valued habitat that is to be cleared</li> <li>iii) Mechanisms will be developed to minimise effects where part of valued habitat is to be cleared.</li> </ul> </li> <li>e) Will where practicable avoid areas of fernbird habitat during breeding months or remedy or mitigate effects where they cannot be avoided.</li> <li>f) Conditions shall take precedence.</li> </ul>
G.41A	<p>Will avoid as far as practicable vegetation clearance in fernbird habitat but if clearance is needed shall</p> <ul style="list-style-type: none"> <li>a) Check for presence</li> <li>b) If outside breeding trap and transfer</li> <li>c) If breeding birds inside breeding season don't clear</li> <li>d) If non breeding birds inside breeding season trap and transfer</li> </ul>

Maps showing the location of these areas are included in the following sections.

### 3.5 Mitigation

A quantum of ecological mitigation is required by resource consent conditions **G.41** to **G.43** as follows:

Condition	Summary of Condition Text
G.42	<ul style="list-style-type: none"> <li>a) Shall undertake a total of 40.7 ha of planting and restoration for landscape and ecological mitigation</li> <li>b) Will be in the areas shown in Plan Set "Proposed Ecological Mitigation Sites" <ul style="list-style-type: none"> <li>i) Will include a minimum of 7.6 ha of terrestrial</li> <li>ii) 5.4 ha of wetland</li> <li>iii) 5,240 m of stream and 17.7 ha of riparian planting and enrichment.</li> <li>iv) Within flood storage areas 2A and 3 a further 1.4 km of new stream and 10 ha of wetland and riparian planting</li> </ul> </li> </ul>
G.42A	Mitigation will be as far as practicable like for like.
G.42B	Where affected by works, will be carried out as soon as possible after works. Where not affected by works within 1 yr of commencement of construction. Definition of bulk earthworks
G.43	<ul style="list-style-type: none"> <li>a) Requirement for protection of mitigation areas in the long term</li> <li>b) Best endeavours to covenant or other legal mechanisms</li> </ul>

Condition	Summary of Condition Text
	<ul style="list-style-type: none"> <li>c) Shall not sell until protected</li> <li>d) Ongoing management shall include               <ul style="list-style-type: none"> <li>i) Tree works</li> <li>ii) Eco sourcing</li> <li>iii) Weed control</li> <li>iv) Fencing</li> <li>v) Pest management</li> <li>vi) Biosecurity Act</li> <li>vii) Inspections and reporting</li> </ul> </li> </ul>

The areas where this ecological mitigation is required are identified on maps in the following sections. Each of the six areas where ecological mitigation is to be carried out requires the development of a Site Specific Ecological Management Plan (SSEMP).

### 3.6 The SSEMP's

Site Specific Ecological Management Plans (SSEMPs) are required for six ecological mitigation areas. Resource consent condition **G.42C** sets out the purpose of the SSEMP, identifies what each SSEMP area must include, lists several design specifications, specifies which key stakeholders must be consulted with, and summarises reporting requirements.

The purpose of the SSEMPs is to ensure details of the ecological mitigation works are consistent with the EMP and the Landscape Management Plan (LMP) and will achieve the outcomes and standards required under condition **G.33B**. The SSEMPs must be consistent with and be implemented in accordance with the respective Management Plan (resource consent condition **G.19**). The resource consent conditions are summarised as follows:

Condition	Summary of Condition Text
G.19	a) SSMPs must be consistent with respective management plans
G.19A	<ul style="list-style-type: none"> <li>a) SSMPs lodged according to relevant timeframes for certification.</li> <li>b) Shall be prepared for the following               <ul style="list-style-type: none"> <li>ii) Ecological management.</li> </ul> </li> <li>c) Any minor changes to be submitted to manager for certification within 2 working days.</li> <li>d) Any more than minor changes to be submitted to manager for certification within 5 working days.</li> <li>e) Management Plans certified before submitting SSMP</li> </ul> SSMPs not part of CEMP as staged
G.42C	<ul style="list-style-type: none"> <li>a) Requirement for SSEMP for each ecological mitigation areas</li> <li>b) Purpose of SSEMP</li> <li>c) Shall include:               <ul style="list-style-type: none"> <li>i) Identification of vegetation to be retained</li> <li>ii) SEV scores</li> </ul> </li> </ul>

Condition	Summary of Condition Text
	<ul style="list-style-type: none"> <li>iii) Plans</li> <li>iv) Landscaping details</li> <li>v) Specifications for: <ul style="list-style-type: none"> <li>A. Weeds control</li> <li>B. Pest management</li> <li>C. Ground preparation</li> <li>D. Mulching</li> <li>E. Plant supply <ul style="list-style-type: none"> <li>1) To reflect natural associations</li> <li>2) Diversity of plants</li> <li>3) Genetic sourcing</li> <li>4) Size of plants</li> </ul> </li> </ul> </li> <li>vi) Monitoring and maintenance</li> <li>vii) Standards of plant establishment</li> <li>d) Prepare in consultation with <ul style="list-style-type: none"> <li>i) Te Āti Awa ki Whakarongotai;</li> <li>ii) Takamore Trust</li> <li>iii) Te Rūnanga O Toa Rangātira Inc</li> <li>iv) As relevant, Friends of Queen Elizabeth Park, Friends of Wharemauku Stream, Friends of Waikanae River, Ngā Manu Nature Reserve;</li> <li>v) KCDC; and</li> <li>vi) The Council.</li> </ul> </li> <li>e) Shall provide an annual report</li> <li>f) Shall not commence until certified</li> </ul>

The SSEMPs do not form part of the CEMP as they will be developed and lodged in a staged manner throughout the detailed design and construction phases of the Project.

### 3.7 Environmental awareness training

Resource consent condition G.11 requires the following:

Condition	Summary of Condition Text
G.11	<p>The Consent Holder shall ensure that personnel responsible for supervising earthwork site staff (i.e. foremen, supervisors and managers) shall undergo environmental awareness training, required by the CEMP. This training shall occur prior to the commencement of Work in any Stage and shall be given by a suitably qualified and experienced person certified by the Manager to deliver practical on-site training. Specifically, training may include (as relevant) but not be limited to:</p> <ul style="list-style-type: none"> <li>4. Details of any stream diversions or other in-stream work and works in wetlands, briefing on the values of the streams and wetlands, the</li> </ul>

Condition	Summary of Condition Text
	<p>objectives for stream and culvert design and construction erosion and sediment control measures, the requirements of native fish for fish passage, and the sensitivity of the receiving environment to sediment discharges;</p> <p>5. For supervisory and management personnel likely to be involved in any Work involving vegetation clearance, briefing on the values of any significant areas of vegetation that are to be retained, and the methods that shall be used to identify and protect them during construction; and</p> <p>6. Briefing on the requirements of Te Āti Awa ki Whakarongotai and Takamore Trust for cultural ceremonies to occur before the commencement of Work.</p> <p>The environmental awareness training shall include a process and programme for training of new staff members joining the Project team, and for any staff moving to a new Site Specific Management Plan (SSMP) area within the Project. This environmental awareness training shall continue for the duration of the earthworks.</p>

The document forms part of this training. This section is intended to provide an easy guide to all areas of ecological value, their locations, their values, and the Construction teams' responsibilities.

Refer to the ESCP for the induction and training requirements for management of erosion and sediment control, which are vital for minimising the Project's impact on freshwater and estuarine ecology.

More detailed information is available in the Construction Environmental Management Plan.

### 3.8 Management plan linkages

In addition to the resource consent conditions specific to the EMP and SSEMPs, there are a number of generic resource consent and designation conditions that relate to these documents. They are:

- General Condition **G.1** requires works to be general accordance with the Application plan sets including Ecological Mitigation Sites (attached to the EMP);
- General Condition **G.9** lists procedures for responding to incidents including un-consented effects on ecological values (which are described in the EMP);
- General Condition **G.11** requires staff training covering a range of ecological issues (which are described in the EMP) to be carried out under the CEMP;
- General Condition **G.15** describes the application of management plans (including the EMP) and Site Specific Management Plans (including the SSEMP);
- General Condition **G.19** describes the purpose of the management plans including the EMP;

- General Condition **G.19A** describes the purpose of the Site Specific Management Plans including the SSEMP.

There are also a number of resource consent and designation conditions specific to other plans or activities which also refer to the EMP or to areas of specific ecological value such as wetlands, avifauna, and streams. They are:

- An overlap between the EMP and the Erosion and Sediment Control Plan (ESCP) under conditions **G.26A to G.28** and **E.2 to E.11** as it relates to discharges to streams and the Coastal Marine Area;
- An overlap between the EMP and the Groundwater (Level) Management Plan (GMP) under conditions **G.28A – G.29** as it relates to wetlands and stream flows;
- An overlap between the EMP and the Landscape Management Plan (LMP) under conditions **DC.53C to DC.58** and **G.42C** as it relates to revegetation;
- An overlap between the Construction Erosion and Sediment control plans (CESCPs) under Conditions **E.1 to E.11** as they relate to events such as exceedances of water quality triggers in streams or impacts on wetlands or the marine environment;
- An overlap with conditions relating to stream diversion and reclamation (**WS.1A to WS.12**);
- An overlap with conditions relating to Groundwater take (**GT.1 to GT.6**) where they relate to potential effects on streams and wetlands and necessary mitigation;
- An overlap with conditions relating to Groundwater (**GD.1 to GD.8A**) where they relate to adverse ecological effects on wetlands and involvement of an ecologist;
- An overlap with condition **WR.1** which identifies the maximum extent of consented wetland reclamation; and
- An overlap with condition **VC.1** which identifies the maximum extent of consented vegetation removal from the beds of water bodies.

These require liaison and coordination over the development of the EMP and:

- a. Landscape Architecture and Urban Design teams (LMP)
- b. Teams responsible for erosion control and sediment management (ESCP) and the (CESCPs)
- c. Teams responsible for groundwater monitoring (GMP)

They also require communication and liaison with the earthworks teams responsible for

- a. Stream diversions and culvert installation
- b. Groundwater take
- c. Vegetation clearance and wetland reclamation



### 3.9 Other

As required by Condition G.35 this EMP has been prepared in accordance with

- the Wellington Conservancy Conservation Management Strategy.
- the Greater Wellington Regional Pest Management Strategy.
- the NZTA Environmental Plan.

## 4 Roles and responsibilities

### 4.1 Ecological specialists

Section 4.2 of the CEMP details roles and responsibilities associated with managing environmental factors from construction of the Project. The Environmental Manager has the responsibility for supporting the implementation of all required ecological mitigation, monitoring, reporting and communicating any issues to the Alliance Management Team.

Suitably qualified ecological specialists will be nominated to carry out baseline studies, contribute where appropriate to elements of detailed design, monitor the effects of construction on the ecology and, following construction, to over-see mitigation activities and carry out mitigation success studies.

The five ecological specialties that are required by conditions are:

- Terrestrial ecologist
- Freshwater ecologist
- Marine ecologist
- Ornithologist
- Herpetologist.

In some instances these specialists can train members of the construction environmental team to carry out elements of construction monitoring such as the collection of grab samples or monitoring of vegetation clearance.

Te Āti Awa ki Whakarongotai and Takamore Trust will have a, yet to be agreed, role in observing monitoring activities. This is detailed in the CEMP.

The proposed structure of the Alliance Construction Team is detailed in Section 4.2 of the CEMP and is summarised below.

### 4.2 Construction team

Section 4.2 of the CEMP details roles and responsibilities associated with managing environmental factors from construction of the Project. All personnel working on the Project, including Project team members and subcontractors, have a responsibility for following the requirements of this EMP. The key construction management roles are:

a. Alliance Project Manager

- Demonstrating commitment to the highest standards of environmental management;
- Ensures all team members comply with specifications, designation and resource consent conditions;
- Reporting on environmental performance, incidents, and issues to the Project Alliance Board (PAB);
- Reviews and approves environmental plans prior to issue;
- Ensures adequate resources are provided to staff to enable environmental issues to be appropriately managed; and.
- Approves training needs.

b. Design Manager

- Incorporates environmental requirements into design as required by consent conditions and environmental management plans; and
- Advises Environmental Manager of any design issues that may impact on environmental compliance.

c. Consents Manager

- Ensures all resource consents are gained prior to works starting.

d. Environmental Manager

- The Environmental Manager has the responsibility for supporting the implementation of all required ecological mitigation, monitoring, reporting and communicating any issues to the Project Management Team and the NZTA;
- Provides leadership to ensure staff are motivated to achieve environmental standards, and comply with all consent conditions and environmental management plan requirements including SSMPs;
- Develops, implements and reviews environmental management systems and environmental management plans and strategies for the Project;
- Coordinates environmental management interfaces with external agencies and stakeholders in conjunction with the Stakeholder Manager;
- Provides a liaison point between site staff, landscape contractors and aborists with respect to tree removal / relocation works;
- Manages and co-ordinates all environmental monitoring required by consent conditions and maintains and submits relevant reporting and records to the Greater Wellington Regional Council and Kāpiti Coast District Council as required;
- Coordinates all environmental auditing functions and ensures relevant records are maintained;
- Responds to and investigates all environmental complaints, issues or incidents;
- Reports on environmental performance, incidents and issues;

- Notifies Alliance Project Manager and Regulatory Authorities of any significant non compliances;
  - Coordinates environmental emergency responses; and
  - Responsible for resolving issues of environmental non compliances;
- e. Environmental Specialist
- Supports Environmental Manager and provides leadership to ensure all staff comply with environmental management systems;
  - Coordinates the preparation of Erosion and Sediment Control plans;
  - Undertakes building of environmental controls and lodging required certification to GWRC;
  - Undertakes regular site inspections and audits to ensure compliance with the CEMP and SSMPs, consent and designation conditions;
  - Coordinates all site monitoring including but not limited to groundwater, settlement, water quality, ecological, dust, noise, and vibration monitoring;
  - Manages maintenance and monitoring of Chemical Treatment Systems;
  - Ensures spill kits are available and stocked and provides training on equipment use;
  - Coordinates the development and lodgement for certification of site specific management plans;
  - Co-ordinates construction vibration monitoring and preparation of building condition surveys;
  - Undertakes environmental monitoring (following the completion of appropriate training) for groundwater, settlement, water quality, ecological, dust and noise monitoring.
  - Coordinates site archaeological protection requirements and provides necessary training and advice to site staff;
  - Conducts regular site inspections of erosion and sediment control devices and co-ordinates maintenance where necessary;
  - Coordinates as-built information for erosion and sediment control devices;
  - Monitors site controls during rain storms;
  - Input all environmental monitoring results to a CS-VUE database;
  - Ensures staff on-site are aware of environmental requirements at all times; and
  - Trains staff in site specific environmental procedures.
- f. Community Liaison Person
- Helps co-ordinate environmental testing and monitoring on neighbouring properties;
  - Advocates community and stakeholder environmental aspirations to construction team; and
  - Primary contact for stakeholder complaints and enquiries.

g. Construction Manager

- Provides leadership to the site team to achieve Project environmental objectives and targets to ensure a high level of performance is achieved;
- Ensures adequate resources are provided to ensure environmental issues are appropriately managed;
- Reports all environmental incidents, and complaints to the Environmental Manager;
- Responsible for ensuring erosion and sediment control systems are designed, installed and modified as appropriate for each stage of construction;
- Reviews, develops, implements and monitors construction methods ensuring compliance with consents; and
- Assists in the development, implementation and review of Project environmental objectives.

h. Site Superintendents

- Provides leadership to the site construction team to achieve project environmental objectives and targets to ensure high performance is consistently achieved;
- Ensures environmental controls including erosion and sediment control works are protected and maintained on a day to day basis;
- Ensures that the CEMP and the Site Specific Management Plans are implemented appropriately by the construction team;
- Leads the emergency response crew;
- Reports all environmental incidents, and complaints to the Environmental Manager; and
- Reviews the need to use a water cart or sprinklers to control dust.

i. Project Engineers

- Provide leadership to the site construction team to achieve Project environmental objectives and targets to ensure a high level of performance is achieved;
- Responsible for ensuring environmental controls and erosion and sediment control works are installed and modified as appropriate for each stage of construction;
- Assist in the development, implementation and review of project environmental objectives;
- Develops, implements and monitors construction methods and environmental protection measures to ensure compliance with consents, designations, the CEMP and SSMPs;
- Demonstrates understanding of major environmental and community issues and environmentally sensitive areas;
- Coordinates environmental interfaces with subcontractors and suppliers;
- Reports all environmental incidents and complaints to the Environmental Manager; and
- Ensures staff on-site are aware of environmental requirements and community relation protocols at all times.

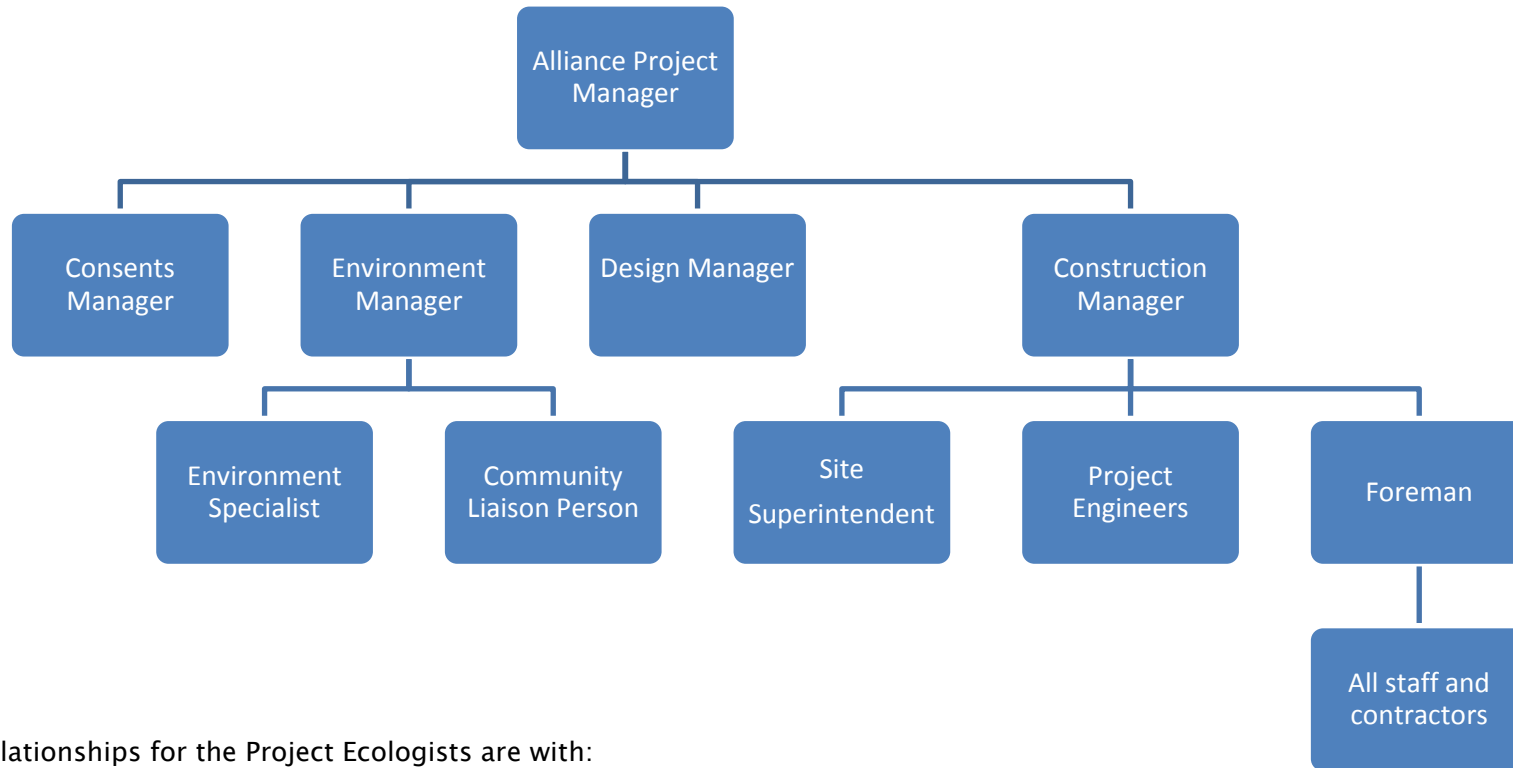
j. Foreman

- Manages the construction of critical erosion and sediment control devices, temporary stormwater ponds and removal of vegetation;
- Co-ordinates daily site inspections of environmental controls including erosion and sediment control devices and co-ordinates maintenance where necessary;
- Monitors the site during rainfall events and high wind events; and
- Ensures staff on site are aware of environmental requirements at all times.

k. All Staff & Contractors

- Understand resource consent conditions and requirements and how they relate to the specific activities being undertaken;
- Attend and actively participate toolbox talks and environmental training including Site Specific Management Plan briefings;
- Responsible for reporting incidents, defects and other problem areas to senior site staff as they arise on site;
- Ensure that required processes and procedures for environmental management are followed;
- Carry out routine maintenance and emergency work when directed;
- Care for all environmental works and controls; and
- Ensure the site is kept tidy and all waste is placed in appropriate bins.

**Figure 1 Construction Team Structure**



Key relationships for the Project Ecologists are with:

- The **Environmental Manager** for planning (EMP, SSEMP) and coordination;
- The **Environment Specialist** for biological and compliance monitoring and reporting;
- The **Construction Manager** for staging issues;
- The **Design Manager** and **Project Engineers** for design of structures and review of design changes;
- The **Foreman** for physical works e.g. vegetation clearance; and
- All staff and contractors for training.

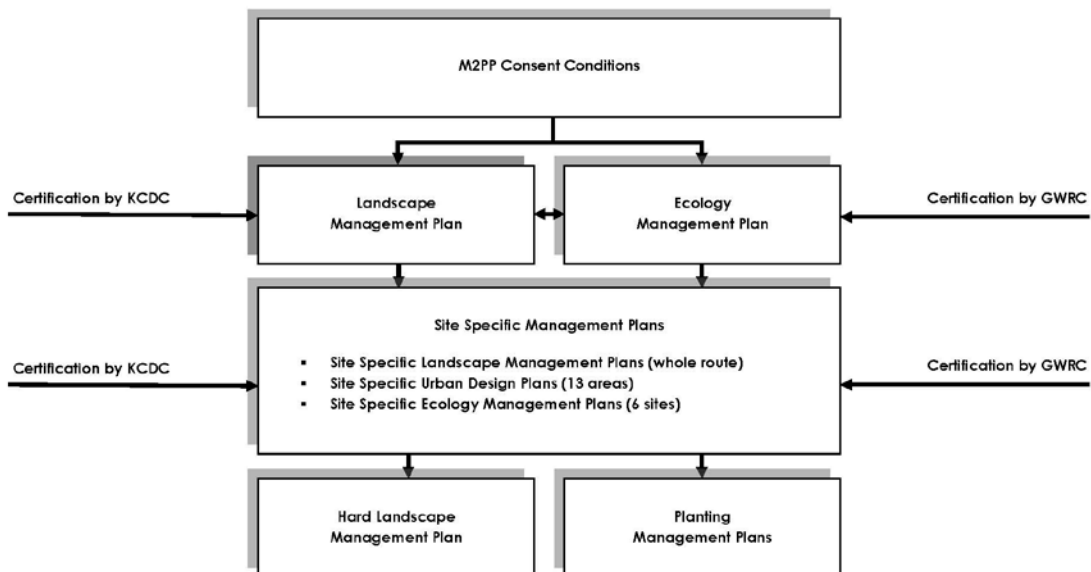
## 5 Integration of ecology and landscape

While the consent conditions treat the SSEMP / SSLMP as separate documents they are closely linked and will share many common elements. To ensure consistency between the objectives of the LMP and EMP and through the development of the SSEMPs and SSLMPs through detailed design, these plans will be combined (in addition to other site specific plan requirements in each area – e.g. Site Specific Urban Design Plans and other inputs such as stormwater, hydrology) into a single Site Specific Management Plan for each area. For example, the Kakariki / Smithfield SSEMP will be prepared in conjunction with up to half a dozen SSLMPs from Ngarara Road to north of Smithfield Road as well as two SSUDPs. This approach will improve integration between all disciplines and substantially reduce reporting and monitoring requirements.

The Project Ecologist, specialist ecologists (including as appropriate freshwater, wetland, herpetofauna and avi-fauna expertise), and the Project Landscape Architect will be responsible for the design and implementation of the ecological mitigation planting and associated works within each of the SSEMPs, including the details and extent of terrestrial indigenous planting and restoration to maximise the ecological benefits of mitigation planting and restoration. These will be addressed within each separate SSEMP and SSLMPs as appropriate.

As outlined in the section on SSEMPs and SSLMPs, each SSEMP will go through a process of ecological and landscape sign-off following completion of detailed design (including by ecological specialists) prior to certification by GWRC, as well as a similar sign-off process at the completion of mitigation planting to ensure all ecological and landscape mitigation requirements have been successfully achieved. The relationship between the EMP and LMP and associated SSMPs is outlined in Flowchart A below.

**Flowchart A: Linkages between EMP, LMP and SSMPs and certification process**





## 6 Detailed design

- The design team are to continue to be briefed by the Project Ecologist on the ecological values of all areas of ecological value, and habitats of significant species and the implications of any design changes. The EMP is to form part of that briefing.
- The Project Ecologist shall be involved in any aspects of detailed design immediately adjacent to or affecting the areas of ecological values identified in this EMP.
- The locations of all areas of ecological value identified in this EMP are to be shown on all relevant plans.
- Best endeavours will be undertaken to minimise loss of any valued vegetation and habitat within the Project Footprint during detailed design through the involvement of the Project Ecologist and Project Landscape Architect, including for example minimising effects of the CWB through ecological areas.
- If the extent of consented habitat loss or modification increases during detailed design, additional ecological mitigation that reflects the indigenous habitat types and ecological functioning and is based on the development of similar representative vegetation communities may be required as per condition G.42A. In this event the Project Ecologist will provide recommendations to the design team for the remedy or additional mitigation requirements.
- Any changes to detailed design must consider the potential requirements for additional resource consents, mitigation and consultation requirements.
- Where any areas of valued indigenous vegetation or habitat are modified, landscape design and associated planting will seek to provide buffering to these areas with the use of appropriate species in neighbouring landscape planting (through the LMP, SSEMP's and SSLMP's).

## 7 Ecological management

This section summarises the values, effects, protection measures, monitoring requirements, roles and responsibilities for each ecological value identified by consent conditions. It provides details and explanations as to the Alliance's obligations with regard to stream diversions, in-stream works, fish passage, sensitivity of receiving environments, protection of endangered species, wetland systems and significant indigenous vegetation and habitat where effects are to be minimised or avoided. It is divided into the following sections based on the specialist ecological advice that will be required:

- Terrestrial vegetation and habitats
- Herpetofauna (lizards)
- North Island fernbird
- Other birds
- Streams and aquatic habitat
- Freshwater fauna

- Estuarine / marine habitat
- Mitigation (SSEMPs).

Each of the following sections (with the exception of 7.9 Mitigation) is accompanied by a detailed Technical Attachment (Appended to this EMP) that:

- Contain the results of baseline ecological studies and sampling,
- Describes in detail the construction and post construction monitoring requirements and the scientific methods that will be used,
- Describes the reporting framework,
- Describes the rationale for the chosen management triggers,
- Provides an adaptive management framework specific to that ecological element, and
- Provides any other information relevant to the Project which is the sole responsibility of the Project Ecologists.

## 7.1 Valued vegetation and habitat

### 7.1.1 Introduction

Historically the Kāpiti Coast dune country, through which this Project runs, was almost completely deforested. Today the great majority of vegetation on this alignment is exotic, rough pasture, exotic forest or shelterbelt, or weedland dominated by gorse and blackberry. Small fragments of terrestrial vegetation occur in some locations, typically regenerating kanuka or mahoe forest. The value of these fragments as habitat is increased by their rarity. Their protection is a priority.

### 7.1.2 Consent Conditions

One consent condition (G.41) relates specifically to the protection and management of valued indigenous vegetation. This condition is listed in full in Attachment 1 *Indigenous Vegetation and Habitat Monitoring and Management Plan*.

### 7.1.3 Plan Objectives

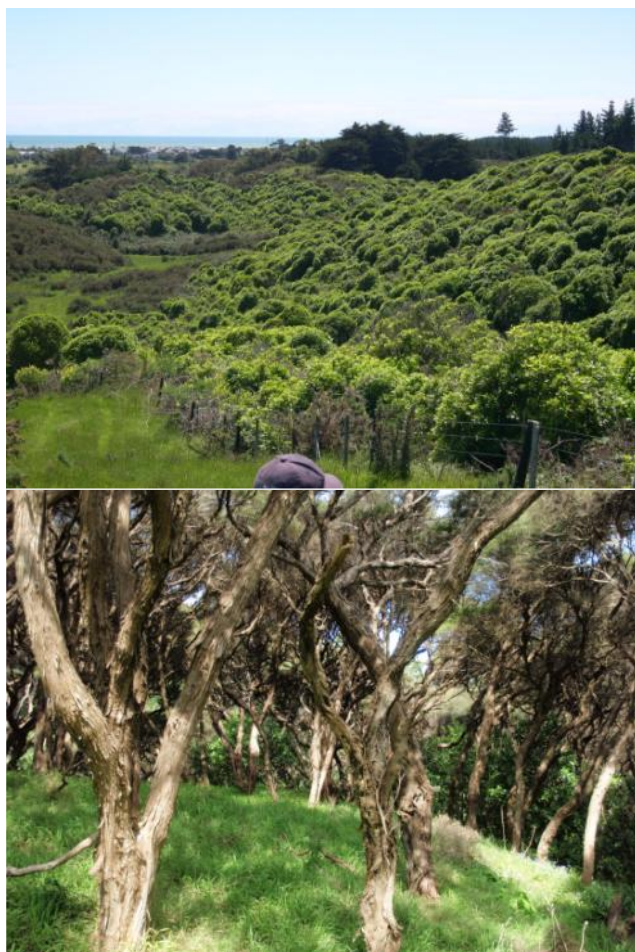
There are three primary resource consent and designation requirements for management of valued indigenous vegetation.

- Detailed design will avoid or minimise effects as far as practicable;
- Mechanisms will be developed to protect areas of valued indigenous vegetation that lie within the designation but which do not need to be cleared; and
- Mechanisms will be developed to minimise the impact on areas of valued indigenous vegetation where complete loss is not required.

### 7.1.4 Summary of Baseline Survey Results

Consent condition (G.41) requires that a detailed map be prepared identifying all areas containing indigenous vegetation and indigenous habitats. This map is contained in the *Indigenous Vegetation and Habitat Monitoring and Management Plan* (Attachment 1).

The map highlights the eight sites of valued indigenous vegetation and habitats identified in condition G.41 c) i) that will be affected or which could potentially be affected by works. Each area is shown in the figures that follow (Map 1 to Map 8). They are:



Site Name	Chainage	Existing site management & Survey
Raumati Kanuka	Between 3600 & 3900	<ul style="list-style-type: none"> <li>■ Scattered fragments of kanuka forest and mahoe on elevated dunes south of Raumati Road.</li> <li>■ These areas of forest and scattered trees and treeland are all unfenced and are grazed by horses and occasional stock.</li> <li>■ Regeneration is largely absent as a result of grazing pressures.</li> <li>■ Large areas of blackberry and gorse encroaching on site, with a number of understory and canopy weed species, including a number of exotic trees and shrubs present.</li> </ul>
Drain 7 Mahoe	Between 4800 & 5000	<ul style="list-style-type: none"> <li>■ This area is unfenced and grazed by horses and occasional stock. Regeneration is largely absent as a result of grazing pressures.</li> <li>■ Large areas of blackberry and other weeds encroaching.</li> </ul>
Otaihanga Mahoe	Between 8800 & 8850	<ul style="list-style-type: none"> <li>■ The area is unfenced, but is surrounded to the north, west and south by the Southern Otaihanga Wetland. Pine plantation surrounds the area to the east, which will be removed as part of the Expressway construction.</li> <li>■ Some weeds present within this area, including blackberry, gorse.</li> </ul>
Otaihanga Kanuka	Between 9050 & 9150	<ul style="list-style-type: none"> <li>■ Kanuka Forest west of Southern Otaihanga Wetland</li> <li>■ The area is unfenced, with no stock pressures, being within KCDC land and adjacent to managed pine forest. Loss of pine plantation as part of Expressway construction will result in some edge effects.</li> <li>■ No natural regeneration occurring, primarily as a result of dominance by Veldt grass and other exotic pasture grasses. Reduced pressures associated with removal of mountain-biking tracks and equipment in this area.</li> </ul>
Waikanae River riparian vegetation.	Between 10550 & 10650	<ul style="list-style-type: none"> <li>■ This area is unfenced, but stock are excluded from this area. Some maintenance of riverside willows observed. Otherwise, all other indigenous riparian plantings have been planted and maintained for approximately 5 – 7 years.</li> </ul>
Tuku Rakau Forest	Between 11300 & 11400	<ul style="list-style-type: none"> <li>■ Regenerating broadleaved low forest east of Takamore Urupa.</li> <li>■ This area is fenced from stock and is undergoing a natural transformation from gorse to broadleaved forest, with gorse more dominant on the edges. Limited natural regeneration occurring within a mahoe-monoculture.</li> </ul>

Site Name	Chainage	Existing site management & Survey
Ngarara Mahoe	Between 12300 & 12550	<ul style="list-style-type: none"> <li>■ (regenerating broadleaved low forest on Ngarara Farm between Te Moana Road and Ngarara Road)</li> <li>■ Unfenced from stock. However, most stock have been excluded by gorse and blackberry surrounding these areas. Limited natural regeneration occurring within a mahoe-monoculture.</li> </ul>
Kakariki Stream riparian vegetation.	Between 13800 & 14050	<ul style="list-style-type: none"> <li>■ Fenced from stock.</li> <li>■ Limited natural regeneration other than Carex geminata.</li> </ul>

A further 1.85 ha of indigenous vegetation that will be removed or modified comprises seven small areas of indigenous vegetation consisting of scattered individual trees or small clusters of trees considered to be of low value.

Site Name	Chainage	Existing site management & Survey
1	Between 4100 & 4450	■ Just north of the Raumati Manuka Wetland (approximately 15 mahoe trees);
2	Between 4650 & 4800	■ The raised dunes west of Rata Road (between 30 and 60 scattered or individual mahoe trees within blackberry and gorse);
4	Between 9150 & 9250	■ Roadside mahoe trees in the vicinity of the over-bridge embankments north of Otaihanga Road (approximately 10 – 20 mahoe trees);
5	Between 9400 & 9700	■ Scatted kanuka trees north of Otaihanga Road ROW (approximately 15 trees);
3	Between 11150 & 11200	■ Scattered cabbage trees south of Takamore Urupa (approximately 5 trees);
6	Between 12950 & 13200	■ Scattered mahoe trees on the raised dunes adjacent to Ngarara Wetland (approximately 10 trees); and
7	Between 15050 & 15150	■ Scattered kanuka and manuka trees in farmland north of Smithfield Road (approximately 10– 20 trees).

### 7.1.5 Protection requirements

The consented Project Footprint will affect the eight sites of valued vegetation and habitat to the extent shown in the following Table. The protection requirements are given.

Site Name	Protection Requirements
Raumati Kanuka	<ul style="list-style-type: none"> <li>Only a small proportion will not be affected. Remainder to be protected.</li> </ul>
Drain 7 Mahoe	<ul style="list-style-type: none"> <li>Loss of 0.35 ha of 0.85 ha. Remainder to be avoided and/or effects remedied.</li> </ul>
Otaihanga Mahoe	<ul style="list-style-type: none"> <li>To be avoided.</li> </ul>
Otaihanga Kanuka	<ul style="list-style-type: none"> <li>Loss of 0.17 ha of 0.5 ha. Remainder to be avoided and/or effects remedied.</li> </ul>
Waikanae River riparian vegetation.	<ul style="list-style-type: none"> <li>Loss of 0.13 ha of 0.5 ha. Remainder to be avoided and/or effects remedied.</li> </ul>
Tuku Rakau Forest	<ul style="list-style-type: none"> <li>Loss of 0.25 ha of 0.9 ha. Remainder to be avoided and/or effects remedied.</li> </ul>
Ngarara Mahoe	<ul style="list-style-type: none"> <li>Loss of 0.86 ha of 4.2 ha. Remainder to be avoided and/or effects remedied.</li> </ul>
Kakariki Stream riparian vegetation.	<ul style="list-style-type: none"> <li>Loss of 0.18 ha of a larger area of streamside vegetation. Remainder to be avoided and/or effects remedied.</li> </ul>
Vegetation Sites 1 – 7	<ul style="list-style-type: none"> <li>Loss of 1.8 ha of isolated trees and open treelands along the Project, typically kanuka and mahoe. Remainder to be avoided and/or effects remedied.</li> </ul>

### 7.1.6 Mechanisms for protection

Mechanisms for protection are provided for each stage of Project works, including detailed design, enabling works, construction and post construction.

#### a. Detailed Design

- The design team are to continue to be briefed by the Project Ecologist on the ecological values of these areas of indigenous vegetation and the implications of any design or construction changes. The EMP is to form part of that briefing.
- The Project Ecologist shall be involved in any appropriate aspects of detailed design immediately adjacent to or affecting the ecological values of these areas of indigenous vegetation.
- The locations of the eight areas of valued terrestrial vegetation identified above are to be shown on all relevant plans and, where these fragments are retained, landscape design and associated planting will seek to provide buffering to these areas and expand their extent with the use of appropriate species in neighbouring landscape planting (through the LMP, SSEMP's and SSLMP's).

- Best endeavours will be undertaken to minimise loss of any valued indigenous vegetation within the Project Footprint during detailed design through the involvement of the Project Ecologist and Project Landscape Architect, including a specific focus on minimising effects of the CWB through the Otaihanga Kanuka Forest (for example, through the use of boardwalks or steepening up embankments).
- Any changes to detailed design must consider the potential impact on these areas of indigenous vegetation, including potential resource consent, mitigation and consultation requirements in respect of any loss or modification to these areas.
- If the extent of consented habitat loss or modification increases through detailed design, additional ecological mitigation that reflects the indigenous habitat types and ecological functioning and is based on the development of similar representative vegetation communities may be required as per condition G.42A. Any additional mitigation requirements will be determined by the Project Ecologist in consultation with GWRC and any additional resource consents sought.

b. Enabling works

- During the site establishment phase of construction, each area of valued indigenous vegetation and habitat will be clearly identified by flags (tape) and temporary fencing, the extent of clearance agreed with the Project Ecologist (in consultation with the Project Landscape Architect), and that extent identified by both fencing and dazzling of trees to be removed – and vegetation clearance limited to those agreed areas.
- Monitoring of indigenous vegetation health (e.g. die-back, presence of invasive weeds, smothering etc.) will occur throughout the construction phase.
- The management of pests and weeds immediately within and adjacent to these areas of valued vegetation will be detailed in the SSLMPs and/or the SSEMPs. This management and responsibilities will fall under contracts let by the Alliance.
- Weed surveys will be carried out twice a year, in spring and autumn to track the introduction of weeds and their spread and to recommend appropriate management of these weeds, particularly in relation to areas of valued indigenous vegetation. These surveys will fall under contracts let by the Project Landscape Architect.

c. Construction

i. Environmental Awareness Training (Condition G.11)

- Personnel responsible for supervising construction earthwork site staff (i.e. foremen, supervisors and managers) shall undergo environmental awareness training of all areas of ecological value within the Designation. This training shall be undertaken in conjunction with the Project Ecologist and shall occur prior to the commencement of Work in any Stage and shall be given by a suitably qualified and experienced person.
- With regard to areas of valued indigenous vegetation and habitats, this training is to be provided by the Project Ecologist to all supervisory and management personnel likely to be involved in any work involving vegetation clearance, including briefing on the following:



- The values of any significant areas of indigenous vegetation that are to be retained;
- The methods that shall be used to identify and protect each area during construction;
- The implications of any indigenous vegetation removal or modification outside of the Project Footprint, including resource consent and mitigation requirements; and
- The contingency response procedures should there be any additional vegetation removal or modification outside of the Project Footprint.

#### ii. Vegetation Clearance

- The Project Ecologist is to be on site during clearance or modification of any part of the areas of valued indigenous vegetation in the eight identified sites.
- The Project Ecologist is to be notified when earthworks are to occur within 10m of any of these eight areas of valued indigenous vegetation.

#### iii. Salvage

- During indigenous vegetation clearance, consideration must be given to the salvage of components of any indigenous vegetation that is to be cleared. Salvage requirements will be detailed within the site specific landscape management plans (SSLMP) and/or the applicable SSEMP.
- Salvage is to include mulch, logs, soils and duff, and any plants that are likely to survive translocation to a new site. These species are to be identified in the SSLMP and/or the applicable SSEMP.

#### d. Post Construction

- Each area of valued indigenous vegetation will continue to be monitored for 2 years following construction to ensure that there are no further effects, including die-back, weed invasion etc.
- The mechanisms for protection of mitigation planting, as required by consent condition G.43, will be detailed in the SSEMPs and associated SSLMPs which will be prepared for each ecological mitigation area.

### 7.1.7 Monitoring

Attachment 1 details the monitoring required. In summary monitoring will vary depending on the construction stages and type of communities being monitored as follows:

#### i. Valued Vegetation (Extant)

- Baseline studies (completed and results detailed in Attachment 1)
- Indigenous vegetation clearance monitoring
- Bi-annual surveys of the health of valued vegetation (Construction and 2 years Post Construction)



ii. Mitigation Planting

- Mitigation success monitoring (3 years).

This monitoring will be carried out by the Project Ecologist based on methods detailed in Attachment 1 and reports will be prepared accordingly.

**7.1.8 Adaptive management**

Attachment 1 details the triggers that if exceeded, will trigger an adaptive management response, and provides options for adaptive management. In summary these triggers and tools are:

i. Management triggers

The key management triggers for indigenous vegetation and habitat are:

Attribute	Measure	Management Trigger
<b>Extant valued vegetation (G.41)</b>		
Total vegetation community area	The project clears more extant indigenous vegetation than consents allow (G.42)	> 3.8 ha of valued terrestrial vegetation lost or modified
Specific weed threats	Weeds currently not present in each area are introduced to the site or clearance encourages increase in invasive weed presence	Increase in either weed extent or diversity in response to vegetation clearance
Domestic stock access	Presence of stock and effect of grazing on extant vegetation.	Increase in browse damage.
<b>Mitigation planting (G.43)</b>		
Total area of planted or restored terrestrial vegetation.	Area of re-vegetation does not meet consent requirements (G.42)	< 7.6 ha of terrestrial mitigation planting achieved
Plant survival	Survival of a minimum of 80% of plant species.	>20% loss of plants at 4 years
Indigenous canopy closure	Canopy closure of a minimum of 80% within the planted areas.	< 80% canopy closure at 4 years
Invasive weeds	Weeds currently not present in each area are introduced to the site or clearance encourages increase in invasive weed presence	Increase in either weed extent or diversity in response to vegetation clearance

Attribute	Measure	Management Trigger
Natural processes	Natural colonisation by other non-planted indigenous species.	Absence of colonisation of native species.

#### ii. Process if Adverse Effect

In the event unanticipated adverse effects occur, an adaptive management process is required. A generic process is provided in section 8.1 Adaptive management. How this process will be applied to valued vegetation is detailed in Attachment 1.

#### iii. Options for Adaptive Management

The potential options to remedy effects will be determined on a case-by-case basis depending on a range of factors. Options may include but are not limited to:

- Hand removal of debris;
- Replanting of areas where die back has occurred;
- Extending planting to better buffer affected vegetation.

The method used will be determined as part of the adaptive management process.

#### iv. Additional Mitigation

If effects caused during construction cannot be remedied, or if mitigation success monitoring shows that mitigation targets have not been achieved post-construction, additional mitigation may be required. A generic process for determining additional mitigation is provided in section 8.2 Response to observed effects. How this process will be applied to valued indigenous vegetation is detailed in Attachment 1.

### 7.1.9 Linkages

The key plans relating to valued indigenous vegetation, in addition to this EMP are the Site Specific Ecological Management Plans (SSEMP) for each of the six ecological mitigation sites, and the Landscape Management Plan (LMP) and Site Specific Landscape Management Plans (SSLMPs) which are to be prepared for the full Project alignment. There are three generic conditions that relate to valued vegetation:

- General Conditions **G.1 b) xiv)** requires works to be general accordance with Application plan sets including Ecological Mitigation Sites (dated 29 November 2012). These plans are included (see Section 7.9);
- General Condition **G.9** lists procedures for responding to incidents including un-consented effects on ecological values. These are included (See Section 7.9.11 and specifically 8.3);
- General Condition **G.11** requires staff training covering a range of ecological issues (which are described in this Plan Section 3.7) to be carried out under the CEMP.

### 7.1.10 Roles and responsibilities

The responsibilities for protection and monitoring of indigenous vegetation and habitat are:

i. Design Manager

- Work with Project Ecologist and Project Landscape Architect during detailed design to consider the ecological values of the areas of valued indigenous vegetation.
- Seek to constrain vegetation loss to those areas consented;
- Seek to reduce vegetation loss if practicable;
- Notify the project ecologist if design changes potentially increase adverse effects on valued vegetation.

ii. Construction Manager

- Communication with the Project Ecologist through staging of earthworks and (indigenous) vegetation clearance, including prior notice of works in and around areas of valued vegetation.

iii. Environmental Manager

- Responsible for Environmental Awareness Training of personnel responsible for supervising earthwork site staff, including liaison with Project Ecologist for specialist ecological input into training in regard to areas of valued indigenous vegetation and habitat.
- Responsible for communication with the Project Ecologist through staging of earthworks and (indigenous) vegetation clearance, including prior notice of works in and around areas of valued vegetation.
- Responsible for notifying the Project Ecologist if unanticipated adverse effects have occurred or may occur and, in conjunction with the Project Ecologist, reporting to GWRC and KCDC.
- Responsible for contingency response and briefing of Project Ecologist in the event of any adverse effects beyond demarcated areas
- Responsible for obtaining, in consultation with Project Landscape Architect and Project Ecologist, any resource consents and/or necessary approvals from KCDC and GWRC for any ecological mitigation for effects on the areas of valued indigenous vegetation and habitat beyond that consented (as outlined in Tables 3 and 4 above).

iv. Site Foreman

- Responsible for liaison with Project Ecologist to demarcate the areas of valued indigenous vegetation and habitat prior to earthworks or vegetation clearance.
- Responsible for avoiding sites demarcated as being valued vegetation during construction.

- Responsible for reporting to the Environmental Manager and Project Ecologist if effects may or have extended into areas of valued vegetation or habitat that were to be avoided.

v. Project Landscape Architect

- Responsible for liaising with the Project Ecologist during development of the LMP and SSLMPs.
- Responsible for coordination with Project Ecologist during development of the EMP and SSEMPs.
- Responsible for incorporation of valued vegetation in design of re-vegetation programmes.
- Responsible for developing, in conjunction with the Project Ecologist, weed and browsing pest management programmes within the SSLMPs and SSEMPs.
- Responsible for oversight of revegetation, indigenous planting and maintenance programmes for all SSEMP and SSLMP areas.

vi. Project Ecologist

- Responsible for liaising with design teams during detailed design to ensure that impacts on areas of indigenous vegetation are minimised as far as practicable.
- Responsible, in conjunction with the Project Landscape Architect and Project Stormwater Engineer, for developing the SSEMPs, including liaison and inputs from specialist technical ecologists (avi-fauna, freshwater, terrestrial, herpetofauna and wetland).
- Responsible for input into specialist ecological aspects of Environmental Awareness Training of personnel responsible for supervising construction and earthwork site staff.
- Responsible, in conjunction with Environmental Manager and Project Landscape Architects, for identification and demarcation of sites of valued indigenous vegetation prior to earthworks.
- Responsible for observing any indigenous vegetation clearance or modification within the areas of valued indigenous vegetation during construction.
- Responsible for developing, in conjunction with the Project Landscape Architect, weed and browsing pest management programmes within the SSLMPs and SSEMPs.
- Responsible for carrying out ongoing monitoring of ecological values and reporting.
- Responsible for responding, in conjunction with the Environmental Manager, to any unintended adverse effects or breaches of monitoring triggers for the areas of valued indigenous vegetation and habitat.
- Responsible for developing, in conjunction with Environmental Manager and Project Landscape Architect, any adaptive management programmes in the event Project effects are greater than consent conditions allow.
- Responsible for sign off of all ecological mitigation components of each SSEMP area following completion of plant maintenance periods (including relevant sign off from specialist ecologists as appropriate).

- Responsible for developing, in conjunction with Environmental Manager and Project Landscape Architect, any mitigation for effects on the areas of indigenous vegetation and habitat beyond that consented (as outlined in Tables 3 and 4 above).

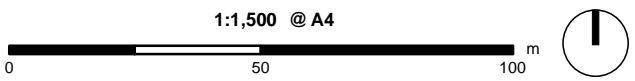




- Notified designation
- Likely long term designation
- Construction footprint
- Pioneer shrublands, scrub & low forest
- Indigenous forest
- Vegetation affected

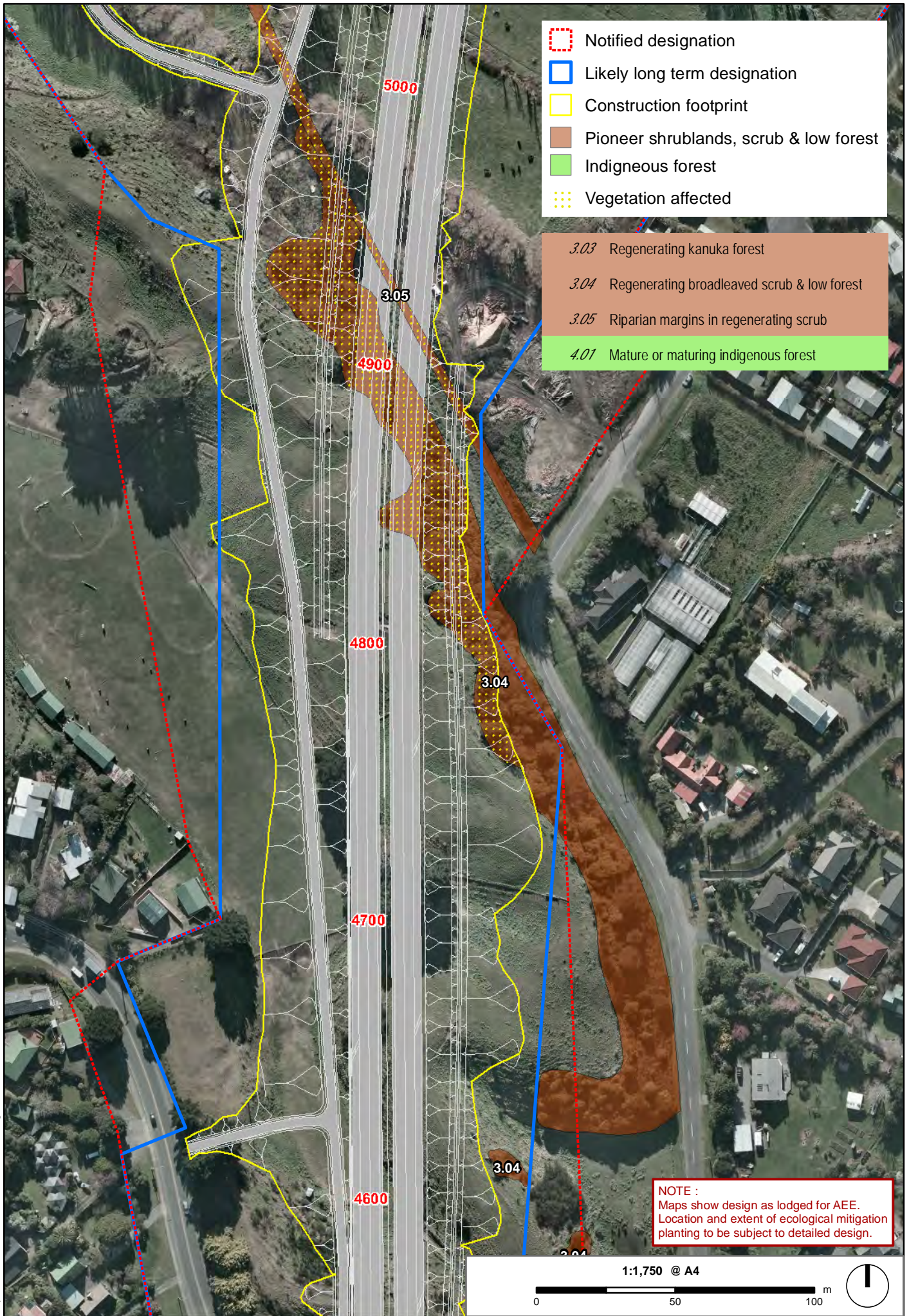
- 3.03  Regenerating kanuka forest
- 3.04  Regenerating broadleaved scrub & low forest
- 3.05  Riparian margins in regenerating scrub
- 4.01  Mature or maturing indigenous forest

**NOTE :**  
 Maps show design as lodged for AEE.  
 Location and extent of ecological mitigation planting to be subject to detailed design.

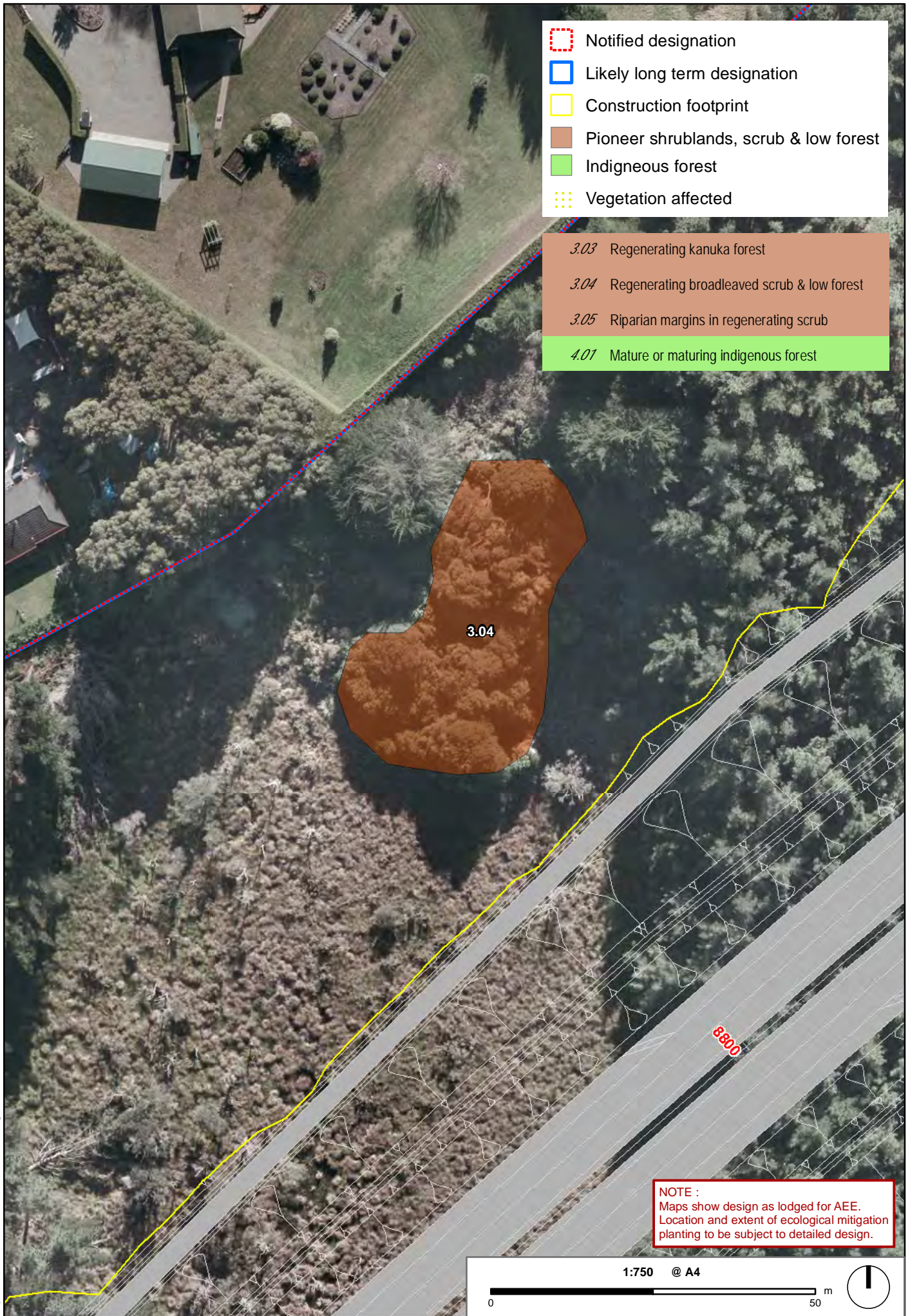




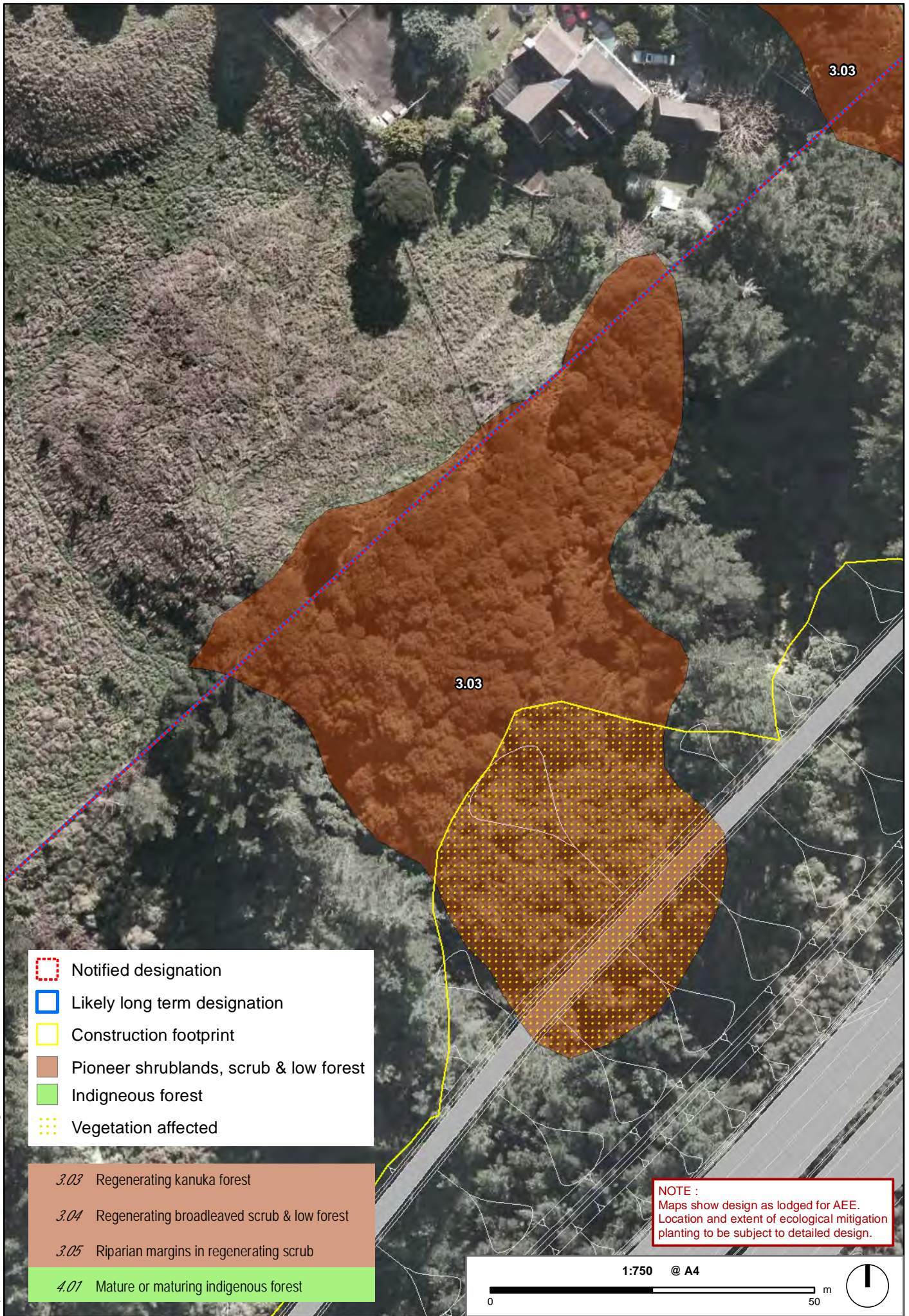
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- Notified designation
- Likely long term designation
- Construction footprint
- Pioneer shrublands, scrub & low forest
- Indigenous forest
- Vegetation affected

- 3.03 Regenerating kanuka forest
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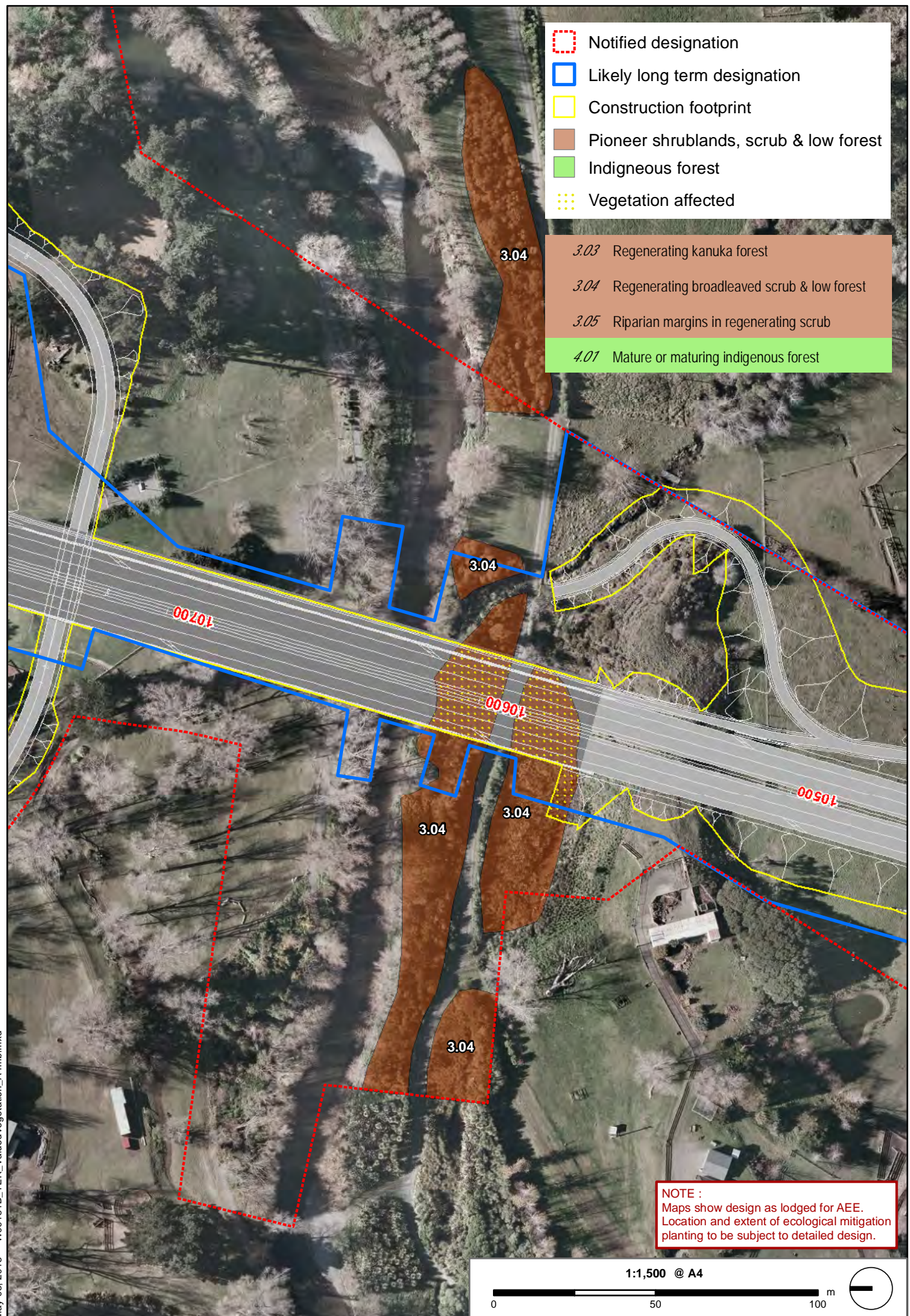
**NOTE :**  
 Maps show design as lodged for AEE.  
 Location and extent of ecological mitigation  
 planting to be subject to detailed design.





- Notified designation
- Likely long term designation
- Construction footprint
- Pioneer shrublands, scrub & low forest
- Indigenous forest
- Vegetation affected

- 3.03 Regenerating kanuka forest
- 3.04 Regenerating broadleaved scrub & low forest
- 3.05 Riparian margins in regenerating scrub
- 4.01 Mature or maturing indigenous forest



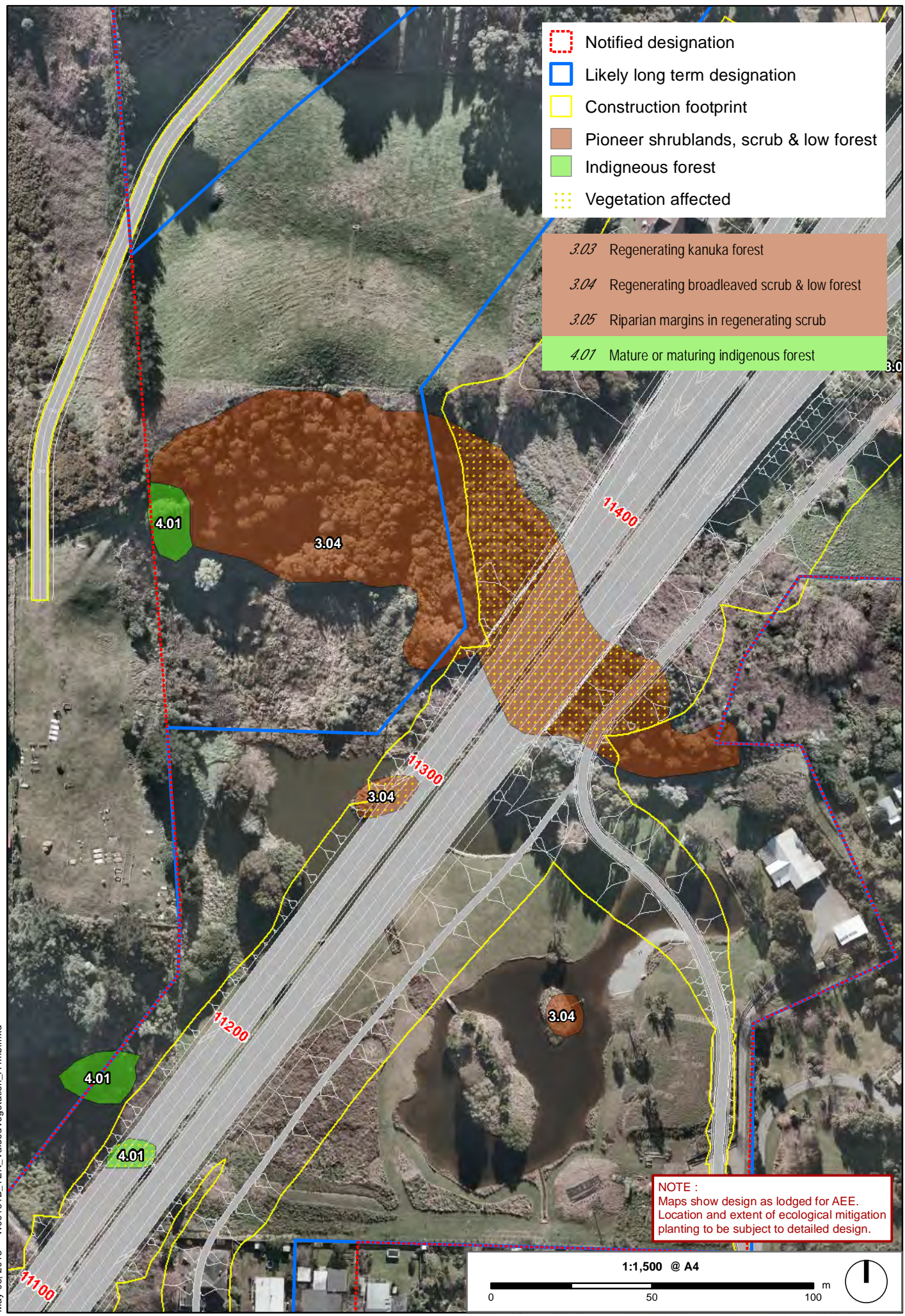
**NOTE :**  
 Maps show design as lodged for AEE.  
 Location and extent of ecological mitigation  
 planting to be subject to detailed design.

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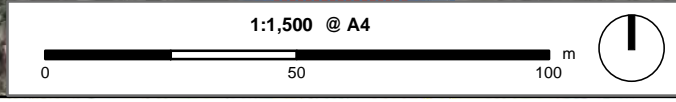
- Notified designation
- Likely long term designation
- Construction footprint
- Pioneer shrublands, scrub & low forest
- Indigenous forest
- Vegetation affected

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- 3.04 Regenerating broadleaved scrub & low forest
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**NOTE :**  
 Maps show design as lodged for AEE.  
 Location and extent of ecological mitigation  
 planting to be subject to detailed design.

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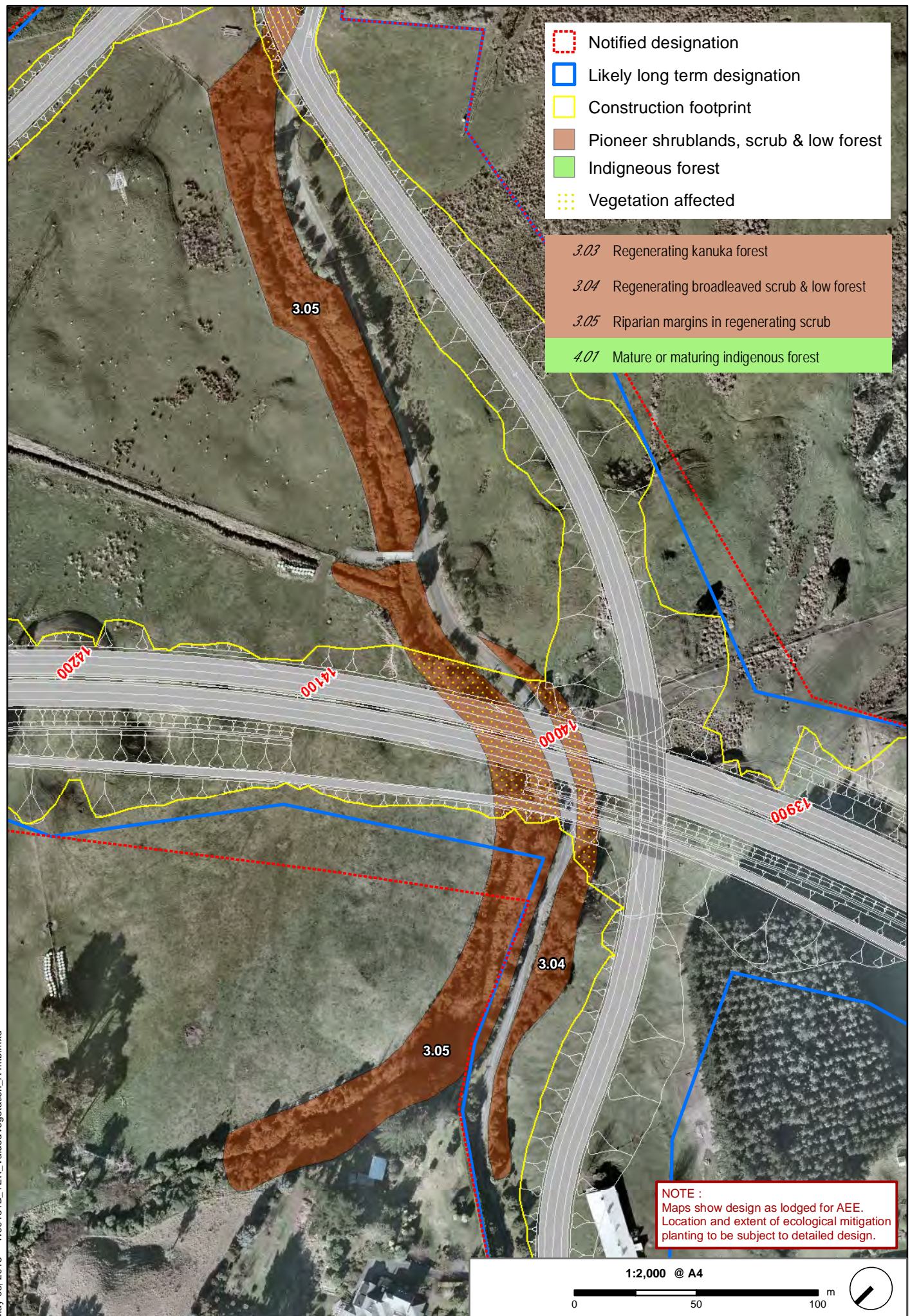






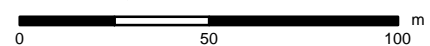
- Notified designation
- Likely long term designation
- Construction footprint
- Pioneer shrublands, scrub & low forest
- Indigenous forest
- Vegetation affected

- 3.03 Regenerating kanuka forest
- 3.04 Regenerating broadleaved scrub & low forest
- 3.05 Riparian margins in regenerating scrub
- 4.01 Mature or maturing indigenous forest



**NOTE :**  
 Maps show design as lodged for AEE.  
 Location and extent of ecological mitigation  
 planting to be subject to detailed design.

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## 7.2 Herpetofauna

### 7.2.1 Introduction

There is very little indigenous vegetation within the Project Footprint and only one species of lizard, the common skink, has been recorded during Project ecological investigations. This species is adapted to rural landscapes and is widespread and abundant in rank grass along the alignment.



A further five native lizard species, which are more reliant on indigenous vegetation as habitat, could be present within the Project Footprint. However, these species are likely to be in such low numbers that normal sampling cannot reliably detect their presence. These include the Wellington green gecko and the ornate skink (both species of which are threatened).

It has been concluded of all of the potential sites other species of lizard may be found, in particular arboreal geckos and the ornate skink, the shrublands and scrub surrounding the El Rancho Wetland (Weggery) is the most likely. This site lies between chainage 10,900 and 11,100 and is shown on Map 9.

### 7.2.2 Consent conditions

One consent condition relates specifically to the protection and management of lizards (G.34). The focus of this condition is the development of a Lizard Management Plan as part of the EMP for the area of vegetation to be cleared at El Rancho Wetland (Weggery). This condition is listed in full in Attachment 2.

### 7.2.3 Plan objectives

There are three primary resource consent and designation requirements for management of effects on indigenous lizards:

- Using best endeavours to capture from vegetation on the margins of El Rancho Wetland (Weggery) before vegetation clearance commences – and translocate any lizards captured to other wetlands in the El Rancho Wetland complex in accordance with the DOC permit.
- Providing mitigation for loss of lizard habitat and lizard mortality through inclusion of habitat features in landscape planting within the SSEMPs.
- Obtaining the necessary permits from the Department of Conservation.

### 7.2.4 Summary of baseline survey results

The results of investigations for the AEE are summarised in Attachment 2. No additional baseline surveys were required by consent conditions.

In summary only one species of lizard, the common skink, was identified during this survey. No other species were seen despite the presence of habitat in some areas that was appropriate.

Common skink was widespread and abundant in the rank grass that covers large areas of the site.

#### **7.2.5 Protection requirements**

Protection of lizards is to be achieved through:

- The capture of any lizards (all species) that are located within the vegetation of the El Rancho Wetland (Weggyery) prior to its clearance, and translocation of these animals to appropriate habitat.
- The minimisation of vegetation clearance of the El Rancho Wetland (Weggyery) to minimise habitat loss and lizard mortalities.

#### **7.2.6 Mechanisms for protection**

The *Lizard Management Plan* (Attachment 2) provides methodologies for species rescue and release, and construction and post-construction monitoring, as well as presenting the results of baseline monitoring. Relevant permits are also included. In summary it requires:

##### **i. Detailed Design**

Preparation of this EMP and a Lizard Management Plan (Condition G.34 c)), including obtaining necessary Department of Conservation permits.

Design of lizard habitat features as part of planting and revegetation work where relevant in the SSEMP sites.

##### **ii. Enabling Works**

Prior to vegetation clearance in the El Rancho Wetland (Weggyery), a comprehensive lizard capture and relocation programme will be carried out in the vegetation to be cleared.

Vegetation clearance to generally follow the detailed methods provided in section 7.1 Valued Vegetation.

##### **iii. Vegetation Clearance (Unexpected find)**

Any lizards uncovered during vegetation clearance and earthworks (outside of the El Rancho Wetland (Weggyery) area are to be provided to the Project Ecologist for identification and relocation (in conjunction with the Department of Conservation).

#### iv. Post Construction

Maintenance of lizard habitat features as part of planting and revegetation work where relevant in the SSEMP sites.

#### **7.2.7 Monitoring**

No monitoring is required for species capture and release.

The success of ecological mitigation planting and associated monitoring will also be monitored as part of success monitoring for each SSEMP. This monitoring will include criteria for checking lizard habitat features in those SSEMPs where they have been provided.

#### **Adaptive Management**

##### i. Management triggers

Not applicable

##### ii. Process if Adverse Effect

Not applicable

##### iii. Options for Adaptive Management

Not applicable

##### iv. Additional Mitigation

Not applicable

#### **7.2.8 Linkages**

A number of specific habitat features are required as mitigation for lizard habitat loss and lizard mortality. Where revegetation is required, the species of plant, locations, any specific planting requirements, and habitat features (debris, cut log discs, cover objects etc.) are to be identified in the Landscape Management Plan (**LMP**) and included in the SSEMP and Site Specific Landscape Management Plans (**SSLMP**).

#### **7.2.9 Roles and Responsibilities**

In summary the responsibilities are:

##### i. Environmental Manager

- Providing the Project Ecologist with sufficient prior notice of works in and around El Rancho Wetland (Weggery) for rescue and transfer to occur.



ii. Project Ecologist

- Obtaining necessary Department of Conservation permits and approvals for lizard capture and transfer. Complete.
- Environmental Awareness Training of personnel responsible for supervising earthwork site staff in conjunction with the Environmental Manager.
- Carrying out the capture and transfer of lizards within the El Rancho Wetland (Wegbery) area at the appropriate stages of works.
- Present during clearance of vegetation in and around the El Rancho Wetland (Wegbery).
- Inputs into SSEMPs and SSLMPs (as relevant) with regard to provision of appropriate habitat features for lizards.
- Developing in consultation with Environmental Manager any adaptive management programmes in the event effects are greater than consent conditions allow.

iii. Project Landscape Architects

- Liaising with the Project Ecologists during development of LMP, SSEMP and SSLMPs (as relevant) to ensure provision of lizard habitat features at relevant locations.



- Notified designation
- Likely long term designation
- Construction footprint
- Wetlands & wet depressions
- Potential lizard release area
- Affected arboreal habitat



**NOTE :**  
 Maps show design as lodged for AEE.  
 Location and extent of ecological mitigation  
 planting to be subject to detailed design.

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## 7.3 Avifauna – North Island Fernbird

### 7.3.1 Introduction

Within the Project alignment the North Island fernbird (fernbird) is the only species of avifauna identified in consent conditions as requiring specific management and monitoring. Fernbird is a nationally critical species whose population is declining due to loss of habitat and predation. Technical Report 3: Avifauna, describes the native bird species along the Project Alignment.

### 7.3.2 Consent conditions

There are seven consent conditions that relate to the protection and management of fernbird (DC 53.C iv), DC.57 v), G.34, G.38, G.40, G.41 A, and G.42.

A number of these are the responsibility of other disciplines (DC.53 and DC.57) but will require ecological input. The consent conditions that relate specifically to fernbird are listed in full in Attachment 3.

### 7.3.3 Plan objectives

There are five primary resource consent and designation requirements for management of fernbird during detailed design and post-construction.

- A baseline habitat survey will be undertaken prior to construction.
- The distribution of fernbird will be monitored through construction.
- Potential fernbird habitat will not be cleared until surveyed by the Project Ecologist.
- Potential fernbird habitats will not be cleared or modified if fernbird are breeding (between August and February inclusive).
- Mitigation will be provided for loss of fernbird habitat.

The *Avifauna Monitoring and Management Plan* (Attachment 3) provides methodologies for construction and post-construction monitoring and adaptive management, species rescue and release if required, as well as presenting the results of baseline monitoring.

### 7.3.4 Summary of baseline survey results

Fernbird were first observed during studies for the AEE. This triggered more detailed investigations which were subsequently written into consent conditions. These additional



baseline studies were carried out in all potential fernbird habitat along the Project alignment using 14 fixed recorders.

Fernbird were recorded on three occasions at two of the 14 monitoring sites. Both sites lie within 400 m of each other in marginal wetlands adjacent to the Kakariki Stream. These recordings correlate with visual observation made during earlier 5-minute bird counts.

All observations of fernbird lie between chainage 13600 and 14050 and the sites are shown on Map 10.

### **7.3.5 Protection requirements**

A small area of fernbird habitat lies beneath the Project footprint. Protection of fernbird is required in the following ways:

- Monitoring prior to vegetation clearance to ensure fernbird are not present.
- The minimisation of vegetation clearance to minimise habitat loss.

### **7.3.6 Mechanisms for protection**

#### **i. Detailed Design**

- Pre-construction baseline studies are required by consent conditions and these have been carried out.
- The relevant LMP, SSLMP and SSEMPs in the wider Ti Kouka Wetland (west of Ngarara Road) to Smithfield Road area need to identify fernbird habitat to be avoided or that will be lost, and include provision for habitat creation and enhancement.

#### **ii. Enabling Works**

- Immediately prior to vegetation clearance and earthworks in the wider Ti Kouka Wetland (west of Ngarara Road) to Smithfield Road area, all areas of identified fernbird habitat must be checked for presence of fernbird. Specific conditions relate to breeding season restrictions and the effect of this on Project construction staging.

#### **iii. Construction**

- For the entire duration of construction, a number of resource consent and designation conditions require monitoring of identified fernbird habitat and of any birds that may have been transferred during enabling works.
- In the event a fernbird is observed within the Project Footprint outside the areas of identified fernbird habitat, the Project Ecologist will immediately be notified and an adaptive management process instigated.
- Development of the Kakariki/Smithfield Ecological Mitigation Area must include habitat features for fernbird as specified in the relevant SSEMP.

iv. Post Construction

- A minimum of two years of monitoring of fernbird is required following completion of earthworks.

### 7.3.7 Monitoring

EMP Attachment 3: *Avifauna Monitoring and Management Plan* contains details on required monitoring and adaptive management. A decision tree is provided to be followed whenever vegetation clearance must occur in or near identified fernbird habitat.

Monitoring requirements vary between breeding season and non breeding seasons. They involve both bio-acoustic monitoring and playback surveys.

In the event fernbird are found in vegetation to be cleared, they must either be subject to a trap and transfer programme, or, if they are seen during breeding season works in that area must stop until breeding has been confirmed.

The success of mitigation planting and associated monitoring will also be monitored as part of success monitoring for each SSEMP. This monitoring will include criteria for checking fernbird habitat features.

### 7.3.8 Adaptive management

i. Management Triggers

It has been determined that the detectable fernbird population is too small to formulate a meaningful trigger based on population size or distribution, or breeding success. On this basis, vegetation will be taken as surrogate and success monitoring will be based on the quality of fernbird habitat that is formed in the Kakariki/Smithfield Ecological Mitigation Area.

ii. Process if Adverse Effect

In the event that creation of fernbird habitat is unsuccessful, an adaptive management process is required. A generic process is provided in section 8.1 Adaptive management.

iii. Options for Adaptive Management

The potential options to remedy effects will be determined on a case-by-case basis depending on a range of factors. The method used will be determined as part of the adaptive management process.

iv. Additional Mitigation

If effects caused during construction cannot be remedied, or if mitigation success monitoring shows that mitigation targets have not been achieved, additional mitigation may be required. A generic process for determining additional mitigation is provided in

section 8.2 Response to observed effects. How this process will be applied to valued vegetation is detailed in Attachment 1.

### **7.3.9 Linkages**

A number of specific fernbird habitat features are required as mitigation for loss of fernbird habitat. These features are to be outlined in detail in the Site Specific Ecological Plan (**SSEMP**) for the Kakariki/Smithfield ecological mitigation area, with a particular focus on the Ngarara Wetland (where the fernbird was observed) and along the Kakariki Stream.

### **7.3.10 Roles and responsibilities**

In summary the responsibilities for fernbird are:

i. Design Manager

- Responsible for consulting with the Project Ecologist over any changes to location or extent of Project Footprint in the wider area of identified fernbird habitat between Ti Kouka Wetland (west of Ngarara Road) and Smithfield Road.

ii. Environmental Manager

- Communication with Project Ecologist through staging of earthworks and (indigenous) vegetation clearance, including prior notice of works in and around identified fernbird habitat.

iii. Foreman

- Responsible for liaison with Project Ecologist prior to habitat clearance in areas of identified potential fernbird habitat as described above.
- Responsible for avoiding sites demarcated as providing fernbird habitat until the Project Ecologist has confirmed vegetation clearance can proceed.
- Reporting to the Environmental Manager if fernbird are observed within the Project Footprint and outside the identified habitat described above.

iv. Project Landscape Architects

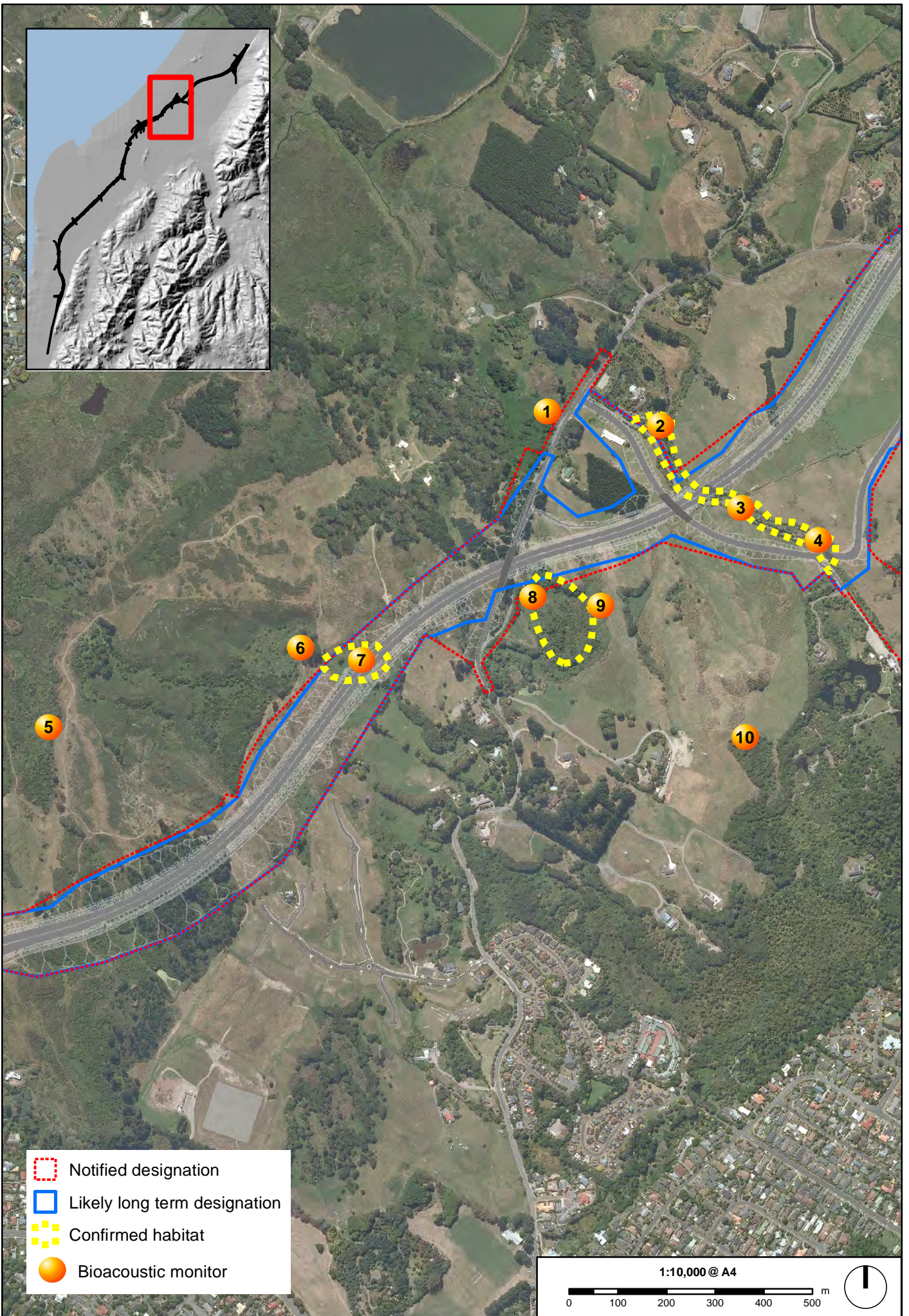
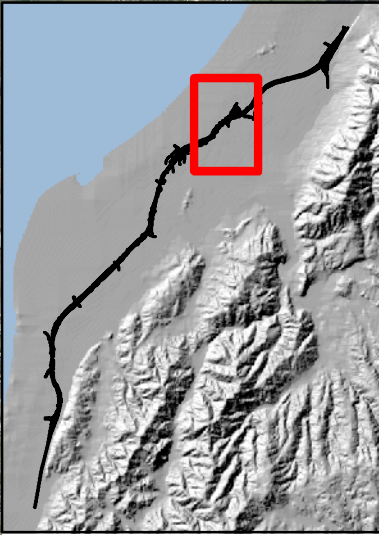
- Liaising with the Project Ecologist and specialist ecologists during development of the LMP, the SSEMP for Smithfield/Kakariki and the SSLMPs between Ngarara Road and Smithfield Road.
- Coordination with the Project Ecologist during development of the SSEMP.
- Incorporation of fernbird habitat features in design of revegetation programmes at SSEMP locations in conjunction with the Project Ecologist.
- Contract management for revegetation and maintenance of planting areas.





v. Project Ecologist

- Liaising with design team during detailed design between Ti Kouka Wetland (west of Ngarara Road) and Smithfield Road.

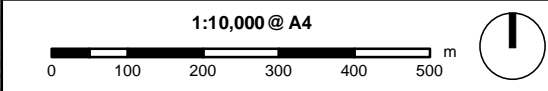
- Environmental Awareness Training of personnel responsible for supervising earthwork site staff in conjunction with the Environmental Manager.
- In conjunction with the Environmental Manager and Project Landscape Architect, identification and demarcation of sites of fernbird habitat prior to earthworks.
- Carrying out ongoing construction and post-consultation monitoring of fernbird and reporting, including distributing the results of surveys to the Department of Conservation.
- If necessary, carrying out fernbird trap and transfer programme and monitoring the results.
- If trap and transfer operation required, obtain DOC permits and liaise with the Department of Conservation regarding operation and results.
- Developing in consultation with the Environmental Manager any adaptive management programmes in the event effects are greater than consent conditions allow.





-  Notified designation
-  Likely long term designation
-  Confirmed habitat
-  Bioacoustic monitor

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## 7.4 Avifauna – Other Birds

### 7.4.1 Introduction

In addition to conditions specific to the North Island fernbird, resource consent condition G.34 b) v) requires the avoidance of disturbance to nationally Threatened or At-Risk birds during breeding season.

While a number of Threatened or At-Risk birds (black shag, pied shag, bittern, crake, dabchick) were recorded traversing the site or in areas adjacent to the designation, no breeding habitat for these species occurs within the designation. The two exceptions to this are NZ pipit and grey duck.

### 7.4.2 Consent conditions

There is only one condition that relates to avifauna other than fernbird (G.34). This condition requires the avoidance of breeding habitat of Nationally Endangered or At Risk species. The consent condition is listed in full in Attachment 3.

### 7.4.3 Summary of baseline survey results

In addition to North Island fernbird, two At-Risk bird species have been identified in close proximity to the project alignment or within the designation. They are NZ pipit and Grey duck.

- NZ pipit is widespread within open country of the Kāpiti Coast including adjacent to and potentially within the Project alignment. In this habitat, this species nests in clumps of rank grass.
- Grey duck may have been observed by local residents within the flooded areas (Kiwi Pond) south of Wharemauku Stream. This species has hybridised extensively with the introduced mallard, and pure grey ducks are now both rare, and difficult to identify given the wide range of hybrid morphs.

### 7.4.4 Protection requirements

There are no requirements to avoid or protect vegetation or habitat used by these two species, other than the generic requirement to avoid ‘disturbance’ during breeding as follows:

- Given the cryptic nature of pipit and this species potentially widespread distribution within open grassland long the Project alignment, it is unlikely that nesting birds will be



able to be identified prior to earthworks and/or vegetation clearance – and so meeting the consent conditions to avoid disturbance during the breeding season is not feasible for NZ pipit. However, in agreement with GWRC, the *Avifauna Monitoring and Management Plan* (Attachment 3) requires that areas of potential pipit habitat within the Project Footprint between Ngarara Road and just north of Smithfield Road are to be intensively grazed during the pipit breeding season prior to earthworks to minimise the potential for these areas to provide breeding habitat.

- The *Avifauna Monitoring and Management Plan* (Attachment 3) requires that the Kiwi Pond area south of the Wharemauku Stream is to be inspected by a qualified ornithologist during the grey duck breeding season to confirm presence or absence prior to construction in this area.

#### **7.4.5 Mechanisms for protection**

The *Avifauna Monitoring and Management Plan* (Attachment 3) provides methodologies for construction monitoring of grey duck and pipit.

##### **i. Detailed Design**

- Nil

##### **ii. Enabling Works**

- Inspections by the Project Ecologist of the Kiwi Pond area south of the Wharemauku Stream in the event that vegetation clearance or earthworks are to occur during the grey duck breeding season (August to January inclusive).
- In the event a grey duck nest is observed within the designation outside the area of potential breeding habitat, the Project Ecologist will immediately be notified and an adaptive management process instigated.
- Intensive grazing by stock in the area of potential pipit habitat between Ngarara Road and north of Smithfield Road throughout the breeding season prior to earthworks in this location.

##### **iii. Construction**

- In the event a grey duck is observed within the Project Footprint outside the area of identified breeding habitat (Kiwi Pond), the Project Ecologist will immediately be notified and an adaptive management process instigated.

##### **iv. Post Construction**

- Nil

#### **7.4.6 Monitoring**

Monitoring focuses on pre-construction surveys of the habitat surrounding Kiwi Pond to confirm whether grey duck are present. In the event that breeding grey-duck are identified, earthworks will be postponed until breeding activity has ceased.

#### **7.4.7 Adaptive management**

- i. Management Triggers
  - Not applicable
- ii. Process if Adverse Effects
  - Not applicable
- iii. Options for Adaptive Management
  - Not applicable
- iv. Additional Mitigation
  - Not applicable

#### **7.4.8 Linkages**

Nil

#### **7.4.9 Roles and responsibilities**

In summary the responsibilities are:

- i. Environmental Manager
  - Communication with the Project Ecologist through staging of earthworks and vegetation clearance, including prior notice of works in and around grey duck breeding habitat at the Kiwi Pond location and prior to works in and around potential pipit habitat between Ngarara Road and north of Smithfield Road.
  - Communication with property team to ensure the area of potential pipit habitat between Ngarara Road and north of Smithfield Road is intensively grazed by stock throughout the breeding season prior to earthworks in this area.
- ii. Foreman
  - Responsible for avoiding nest sites of threatened and at-risk bird species identified by the Project Ecologist.
  - Reporting to the Environmental Manager if grey duck are observed within the designation and outside the identified habitat described above.
- iii. Project Ecologist
  - Environmental Awareness Training of personnel responsible for supervising earthwork site staff.
  - Surveying for grey duck nests in the event of vegetation clearance during the breeding season in the vicinity of Kiwi Pond.
  - Developing in consultation with the Environmental Manager (and the Department of Conservation as necessary) any adaptive management programmes in the event effects are greater than consent conditions allow.

## 7.5 Streams and aquatic habitat

### 7.5.1 Introduction

The Project alignment crosses 14 perennial waterways with a mix of bridges and culverts. Bridges have been proposed over most of the larger waterways to minimise ecological effects and assist with flood capacity. This will result in the loss or modification of a significant proportion of stream. In addition large lengths of stream are to be diverted, the original channels filled and new channels formed.

The total length of affected waterway is 3,120 m of which 1,123 m will be lost to culverts and filling in from the Expressway embankment, 1,525 m to diversions, and 472 m will be affected by channel stabilisation (e.g. riprap) associated with bridge formation.

Even though the waterways traversed by the Project are typically highly modified (with most being of low or very low relative value), the degree of habitat loss proposed is at a scale that requires comprehensive mitigation. *Note: the protection of native fish species is discussed in Section 7.6 of this Plan.*

### 7.5.2 Consent conditions

There are a large number of consent conditions that relate the protection and management of streams. A number of these are the responsibility of other disciplines (G.27, W, GT and GD) but are likely to require ecological input. The consent conditions that relate specifically to freshwater are listed in full in Attachment 4.

### 7.5.3 Plan objectives

There are a number of consent requirements for management of streams and waterbodies as follows:

- Detailed design will have ecological input and will seek to minimise effects on waterbodies as far as practicable;
- Sediment and erosion control will be developed and carried out in coordination with water and habitat quality monitoring by the Project Ecologist;
- Mechanisms will be developed to minimise the impact on areas of valued stream habitat where complete loss is not required.

The *Stream and Aquatic Habitat Monitoring and Management Plan* (Attachment 4) provides methodologies for construction and post-construction monitoring of stream works and sediment discharge, and adaptive management processes, as well as presenting the results of baseline monitoring.

### 7.5.4 Summary of baseline survey results

Fourteen waterbodies and freshwater habitats will be affected by works. Each is shown in the figures that follow (Map 11 to Map 14). They are:

Site Name	Chainage
<b>Whareroa Drain:</b> Re-alignment of drain at headwater and replacement or extension of existing culverts	At 2580
<b>Drain 7 upper:</b> Crossing by culvert (in location of existing culvert)	At 3650
<b>Drain 7 Lower:</b> Crossing by culvert (in location of existing culvert). A focus area for ecological mitigation.	At 4950
<b>Wharemauku Stream:</b> Crossing by single bridge and associated stream bank armouring.	At 5450
<b>Mazengarb Stream:</b> Crossing by culvert	At 8050
<b>Mazengarb Drain (Waste Water Treatment Plant Drain):</b> Crossing by culvert. A focus area for ecological mitigation.	At 8500
<b>Muaupoko Stream:</b> Diversion of lower 50 m at the confluence with Waikanae River	At 10600
<b>Waikanae River:</b> Crossing by single bridge including flood protection works, temporary diversion, and associated river bank armouring.	At 10625
<b>Waimeha Stream:</b> Crossing by three bridges from grade separated interchange, and associated river bank armouring.	At 11900
<b>Ngarara Creek:</b> Single crossing by culvert	At 13200
<b>Kakariki Stream:</b> Crossed by two bridges, associated river bank armouring and a small associated diversion.	At 14000
<b>Smithfield Drain:</b> Significant lengths of this network of drains to be diverted. A focus area for ecological mitigation.	From 14000 to 14900
<b>Paetawa Drain:</b> Crossings and diversion of a network of drains are affected. Main stem is bridged; subsidiary drains are culverted or re-aligned. A focus area for ecological mitigation.	From 16380 to 17400
<b>Hadfield Drain / Kowhai Stream:</b> Crossing and channel realignment of drain. A focus area for ecological mitigation.	From 17450 to 17600

### 7.5.5 Protection requirements

The consented Project Footprint will affect the areas of stream and aquatic habitat to the extent shown in the following Table. The protection requirements are given.

Watercourse Name / Sample Site	Ecological Value	Culverts (m)	Diversion (m)	Armouring (m)	Combined stream works (m)
Whareroa Drain	Very Low	41	–	–	<b>41</b>
Drain 7 (Lower)	Low	70	–	–	<b>70</b>
Drain 7 (Upper)	Very Low	120	–	–	<b>120</b>
Wharemauku Stream	<b>Moderate</b>	–	50	32	<b>82</b>
Mazengarb Stream	Low	144	–	–	<b>144</b>
Mazengarb Drains (WWTP)	Low	147	–	–	<b>147</b>
Muaupoko Stream	<b>Moderate</b>	21	30	–	<b>51</b>
Waikanae River	<b>Very High</b>	–	–	83(+ 160)	<b>243</b>
Waimeha Stream	Low	16	360	62	<b>438</b>
Ngarara Creek	Low	90	–	–	<b>90</b>
Kakariki Stream	Moderate	–	125	105	<b>230</b>
Smithfield Drains	Low	36	510	–	<b>546</b>
Paetawa Drains	Low	280	390	30	<b>700</b>
Hadfield Drain	Moderate	158	60	–	<b>218</b>
<b>TOTAL:</b>		<b>1,123</b>	<b>1,525</b>	<b>472</b>	<b>3,120</b>

### 7.5.6 Mechanisms for protection

Mechanisms for protection are provided for each stage of Project works, including detailed design, enabling works, construction and post construction.

#### i. Detailed Design

- The design team are to continue to be briefed by the Project Ecologist on the ecological values of these areas of the waterbodies crossed by the Project and the implications of any design or construction changes. The EMP is to form part of that briefing.
- The Project Ecologist shall be involved in any aspects of detailed design immediately adjacent to or affecting the ecological values of these waterbodies.
- The locations of all waterbodies identified above are to be shown on all plans.

- Best endeavours will be undertaken to minimise effects on these waterbodies within the Project Footprint during detailed design through the involvement of the Project Ecologist and Project Landscape Architect.
- Any changes to detailed design must consider the potential impact on these waterbodies, including potential resource consent, mitigation and consultation requirements in respect of any additional loss or modification to these areas.
- If the extent of consented freshwater habitat loss or modification increases through detailed design, additional ecological mitigation may be required as per condition G.42A. Any additional mitigation requirements will be determined by the Project Ecologist in consultation with GWRC and any additional resource consents sought.
- Each stream restoration area requires preparation of an SSEMP as outlined in Section 7.9. These ecological restoration sites must be developed in consultation with the Project Landscape Architect and detailed in the SSEMPs and SSLMPs (as relevant).

ii. Enabling works

- During the site establishment phase of construction, each waterbody will be clearly identified by flags (tape) and temporary fencing, the extent of earthworks agreed with the Project Ecologist, and that extent identified by fencing.

iii. Construction

a. Environmental Awareness Training (Condition G.11)

- Personnel responsible for supervising construction earthwork site staff (i.e. foremen, supervisors and managers) shall undergo environmental awareness training of all areas of ecological value within the Designation. This training shall be undertaken in conjunction with the Project Ecologist and shall occur prior to the commencement of Work in any Stage and shall be given by a suitably qualified and experienced person.
- With regard to areas of valued freshwater habitat, this training is to be provided by the Project Ecologist to all supervisory and management personnel likely to be involved in any work within these waterways, including briefing on the following:
  - The values of these waterbodies and the extent of waterbody to be retained;
  - The methods that shall be used to identify and protect each area during construction;
  - The implications of any waterway modification outside of the Project Footprint, including resource consent and mitigation requirements; and
  - The contingency response procedures should there be any additional waterway removal or modification outside of the Project Footprint.

b. Vegetation Clearance

- The Project Ecologist is to be on site during clearance or modification of any part of the areas of riparian indigenous vegetation (as outlined in the terrestrial vegetation requirements).

- The Project Ecologist is to be notified when earthworks are to occur within 10m of any of the identified areas of valued riparian vegetation.

c. Sampling

- Regular sampling of waterways is required to monitor sediment levels through construction.

d. Post Construction

- Post-construction sampling of the Waikanae River is required to confirm recovery of fish and invertebrate populations in the new channel formed as part of bridge installation.
- The mechanisms for protection of mitigation planting, as required by consent condition G.43, will be detailed in the SSEMPs and associated SSLMPs which will be prepared for each ecological mitigation area.
- (See also section 7.9 Mitigation).

#### 7.5.7 Monitoring

- Attachment 4 details the construction and post-construction monitoring required.

#### 7.5.8 Adaptive management

i. Management triggers

- Attachment 4 details the triggers that if exceeded, will trigger an adaptive management response, and provides options for adaptive management. In summary the key management triggers for streams and aquatic habitat are:
  - A threshold breach of the sediment discharge (indicating a device failure or other management system failure) based on a 20% increase in the downstream logger result from the upstream control logger within the Waikanae River, Kakariki Stream and Wharemauku Stream (Note: the Wharemauku Stream is subject to refinement of triggers to take into account actual locations of telemetered NTU loggers).
  - A threshold breach in the ESCP or circumstances in Condition E.9 (i.e. a failure of an erosion or sediment control measure, or a storm event in exceedance of the design volume of the sediment devices) based on “grab samples” (or hand held NTU readings) collected 20m downstream and up stream of any event triggered release of sediments.
  - A suspended sediment threshold of a 20% difference (increase) where the NTU level of > 5 after 24 hours is the threshold for potential benthic community effects in diversion reconnections.
  - If these triggers above are exceeded, the next phase of the adaptive management response is to undertake benthic macroinvertebrate sampling for comparison with baseline results. A trigger for adverse effects will be determined if there is a 20% change in the QMCI or a 20% change in abundance in specific sensitive taxa as outlined in Attachment 4.



#### ii. Process if Adverse Effects

- In the event unanticipated adverse effects occur, an adaptive management process is required. A generic process is provided in section 8.1 Adaptive management. How this process will be applied to freshwater habitat is detailed in Attachment 4.

#### iii. Options for Adaptive Management

- The potential options to remedy effects will be determined on a case-by-case basis depending on a range of factors. Options may include but are not limited to:
  - Machine clearance or raking of the deposited sediments
  - Hand removal of debris (for example, stream bank collapse);
  - Extending planting to improve freshwater habitat connectivity.
- The method used will be determined as part of the adaptive management process.

#### iv. Additional Mitigation

If effects caused during construction cannot be remedied, or if mitigation success monitoring shows that SEV mitigation targets have not been achieved post-construction, additional mitigation may be required. A generic process for determining additional mitigation is provided in section 8.2 Response to observed effects. How this process will be applied to streams and aquatic habitat is detailed in Attachment 4.

### 7.5.9 Linkages

A number of plans, in addition to the EMP, relate to effects on streams and aquatic habitat. Mitigation for stream habitat loss will be outlined within each of the six SSEMPs. Where revegetation is required as part of that mitigation, the species of plant, location and any specific planting requirements are to be provided in the LMP and the SSEMP as relevant.

In addition, there are a number of consent conditions specific to other activities that overlap with protection of the ecological values of streams and waterways. They are:

- An overlap between the EMP and the Erosion and Sediment Control Plan (ESCP) under conditions **G.26A to G.28** and **E.2 to E.11** as it relates to discharges to streams and the Coastal Marine Area;
- An overlap between the EMP and the Groundwater (Level) Management Plan (GMP) under conditions **G.28A – G.29** as it relates to wetlands and stream flows;
- An overlap between the Construction Erosion and Sediment Control Plans (CESCPs) under Conditions **E.1 to E.11** as they relate to events such as exceedances of water quality triggers in streams or impacts on wetlands or the marine environment;
- An overlap with conditions relating to stream diversion and reclamation (**WS.1A to WS.12**);
- An overlap with conditions relating to Groundwater Take (**GT.1 to GT.6**) where they relate to potential effects on streams and wetlands and necessary mitigation;

- An overlap with condition **VC.1** which identifies the maximum extent of consented vegetation removal from the beds of water bodies.

These consent conditions require liaison and coordination through the detailed design and construction phases with the Erosion and Sediment Management team, the team responsible for stream works, and the hydrologists responsible for ground water take and wetland hydrology monitoring.

#### **7.5.10 Roles and responsibilities**

In summary the responsibilities are:

##### **i. Design Manager (Roading and Structures)**

- Responsible for consulting with the Project Ecologist over any changes to location or extent of culverts, diversions and bridges within the arising from detailed design.
- Responsible for consulting with the Project Ecologist over culvert design to ensure fish passage.
- Responsible for consulting with the Project Ecologist over the design of stream diversions and in-stream habitat including rip rap.

##### **ii. Environmental Manager**

- Communication with Project Ecologist through staging of culvert, diversion and bridge installation works, including prior notice of works in and around perennial and intermittent waterbodies.
- Responsible for the daily review of data from the fixed telemetered turbidity (NTU) loggers in the Waikanae River, Wharemauku Stream and Kakariki Stream.
- Responsible for the daily review of data from the telemetered turbidity (NTU) loggers installed as part of stream diversion works.

##### **iii. Site Foreman**

- Responsible for liaison with Project Ecologist during enabling works and construction phase for erosion and sediment control methods including coordination of water quality monitoring.
- Responsible for liaison with Project Ecologist during any exceedence of erosion and stormwater standards and associated reporting and adaptive management.
- Responsible for liaison with Project Ecologist over staging of all works in perennial or intermittent waterbodies within the Designation.

##### **iv. Project Landscape Architects**

- Liaising with the Project Ecologist during development of the LMP, SSEMPs and the SSLMPs.
- Coordination with the Project Ecologist during development of the SSEMP.
- Incorporation of riparian mitigation habitat features in design of revegetation programmes at SSEMP locations in conjunction with the Project Ecologist.

v. Project Ecologist

- Responsible for the installation and maintenance of fixed telemetered turbidity (NTU) loggers in the Waikanae River, Wharemauku Stream and Kakariki Stream prior to earthworks in these catchments.
- Responsible for the installation and maintenance of fixed telemetered turbidity (NTU) loggers in the locations of stream diversions prior to earthworks.
- Liaising with design team during detailed design of culverts, riprap and bridges located within perennial and intermittent waterbodies.
- Environmental Awareness Training of personnel responsible for supervising earthwork site staff in conjunction with the Environmental Manager.
- In conjunction with the Environmental Manager and Project Landscape Architect, identification and demarcation of sites of stream diversions prior to earthworks.
- Carrying out ongoing construction and post-consultation monitoring of freshwater systems.
- Developing in consultation with the Environmental Manager any adaptive management programmes in the event effects are greater than consent conditions allow.