

## Roads of national significance



# Ara Tuhono - Puhoi to Wellsford





## Pūhoi to Warkworth

Landscape and Visual Assessment Report August 2013



#### **Puhoi to Warkworth**

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## Glossary of abbreviations

Abbreviation	Definition	
ACDP	Auckland Council District Plan (Rodney Section) 2011	
ARPS	Auckland Regional Policy Statement	
DoC	Department of Conservation	
MHWS	Mean High Water Springs	
MSE	Mechanically Stabilised Earth	
NGA	Northern Gateway Alliance	
NZCPS	New Zealand Coastal Policy Statement 2010	
NZILA	New Zealand Institute of Landscape Architects	
NZTA	NZ Transport Agency	
OGPA	Open Grade Porous Asphalt	
ONL	Outstanding Natural Landscape	
Project	Ara Tühono Puhoi to Wellsford Road of National Significance (RoNS), Puhoi to Warkworth Section	
RDC	Rodney District Council (preceded Auckland Council)	
RMA	Resource Management Act 1991	
RoNS	Roads of National Significance	
SH1	State Highway 1	
SNA	Significant Natural Area	
VAC	Visual Absorption Capability	
ZTV	Zone of Theoretical Visibility	



## **Glossary of defined terms**

Term	Definition
Alteration	In relation to structures, means to change the layout or appearance of the structure without changing its function, maximum physical dimensions or location.
Auckland Council	The unitary authority that replaced eight councils in the Auckland Region as of 1 November 2010.
Culvert	A pipe with an inlet from a watercourse and outlet to a watercourse, designed to convey water under a specific structure (such as a road).
Diversion of stormwater	The turning aside of stormwater from its natural course of flow; causing it to flow by a different route.
Earthworks	The disturbance of land surfaces by blading, contouring, ripping, moving, removing, placing or replacing soil or earth, or by excavation, or by cutting or filling operations.
Erosion Control	Methods to prevent or minimise the erosion of soil, in order to minimise the adverse effects that land disturbing activities may have on a receiving environment.
Grade separated interchange	The layout of roads, where one road crosses over/under the other at a different height.
Indicative Alignment	A route and designation footprint selected after short-list and long-list development to enable consultation with the community. This development involved specialist work assessing environmental, social and engineering inputs.
Land Disturbing Activity	Any disturbance to the ground surface that may result in soil erosion through the action of wind or water.
Mechanically Stabilised Earth Walls	Internally reinforced soil structures with face angles ranging from 70 degrees to 90 degrees from the horizontal. Slope angles less than 70 degrees are termed reinforced soil slopes.
Motorway	Motorway means a motorway declared as such by the Governor-General in Council under section 138 of the PWA or under section 71 of the Government Roading Powers Act 1989.
Noise Mitigation	An activity or structure which reduces/mitigates the impact or effect of noise.
Overland Flow Path	The flow path of stormwater over the ground.
Pier	Vertical support structure for a bridge.
Portal	The entranceway to a tunnel starting where the road is completely uncovered to where it is completely covered.
Project area	From the Johnstone's Hill tunnel portals in the south to Kaipara Flats Road in the north.
Viaduct	A multi-span bridge.



## **Contents**

1.	Introduction	I
1.1	Purpose and Scope of this Report	1
1.2	Project description	2
1.3	Project features	2
1.4	Interchanges and tie-in points	2
2.	Landscape and Visual Assessment Methodology	3
2.1	Desktop Assessment and Route Investigations	3
2.2	Background Research	4
2.3	Analysis of the Existing Landscape	4
2.4	Characterisation of the Landscape	4
2.5	Project Visibility – ZTV Mapping	5
2.6	Landscape and Visual Effects Assessment	5
2.7	Effects Rating	7
3.	Statutory Context	8
3.1	Resource Management Act (1991)	8
3.2	New Zealand Coastal Policy Statement (2010)	8
3.3	Auckland Council Regional Policy Statement	9
3.4	Auckland Council Regional Plan: Coastal	9
3.5	Auckland Council District Plan: Rodney Section (2011)	9
4.	Existing Environment	10
4.1	Landform and Hydrology (Refer to Appendix A and B)	10
4.2	Vegetation (Refer to Appendix C)	10
4.3	Land Use and Land Cover (Refer to Appendix C)	11
5.	Assessment of Landscape and Visual Effects	13
5.1	Landscape Character Area 1 – Puhoi	14
5.2	Landscape Character Area 2 – Hungry Creek	18
5.3	Landscape Character Area 3 – Schedewys Hill	21
5.4	Landscape Character Area 4 - Moirs Hill North	25
5.5	Landscape Character Area 5 – Perry Road	28
5.6	Landscape Character Area 6 – Wyllie / Woodcocks	32
5.7	Landscape Character Area 7 - SH1 Link	35
6.	Construction Effects	39
6.1	Potential construction effects	39
6.2	Mitigation of construction effects	39
7.	Recommended mitigation measures	41
7.1	Construction and Earthworks	42

## **Landscape and Visual Assessment Report**



9.	References	47
8.	Conclusion	46
7.3	Mitigation Planting	. 44
7.2	Structures and Detailed Design Elements	. 44

Appendix A. Landform

**Appendix B. Existing Land Use and Vegetation** 

**Appendix C. Sensitive Landscape Areas** 

Appendix D. Indicative Alignment and Landscape Character Areas



## 1. Introduction

## 1.1 Purpose and Scope of this Report

This report forms part of a suite of technical reports prepared for the NZ Transport Agency's (NZTA's) Ara Tūhono Pūhoi to Wellsford Road of National Significance (RoNS) Pūhoi to Warkworth Section (the Project). Its purpose is to inform the Assessment of Environmental Effects (AEE) and to support the resource consent applications and Notices of Requirement for the Project.

The Puhoi to Wellsford route has been identified as a road of national significance (RoNS) with a strategic role in connecting the regions of Auckland and Northland. This report assesses the landscape and visual effects of the proposed alignment between Puhoi and Warkworth (the "Project").

In doing so the report considers the character and quality of the existing environment and analyses the physical effects of the Project, with specific regard to natural character, landscape and amenity values, as well as the nature and extent of visual effects on the main audiences within the receiving environment.

The Report also recommends suitable mitigation measures to assist in minimising any adverse identified, and to assist in the sensitive integration of the highway into the landscape setting.

The purpose of this Report was to assess the actual and potential landscape and visual effects of the indicative alignment and wider Project area and address how to remedy or mitigate any adverse effects.

The assessment extends over a variety of different landscapes along the 18.5 kilometre alignment and recommends mitigation measures where appropriate for these individual areas.

The indicative alignment shown on the Project drawings has been developed through a series of multi-disciplinary specialist studies and refinement. A NZTA scheme assessment phase was completed in 2011, and further design changes have been adopted throughout the AEE assessment process for the Project in response to a range of construction and environmental considerations.

It is anticipated that the final alignment will be refined and confirmed at the detailed design stage through conditions and outline plans of works (OPW). For that reason, this assessment has addressed the actual and potential effects arising from the indicative alignment, and covers the proposed designation boundary area.

Except as noted in this report:

• The recommendations we propose to mitigate adverse effects are likely to be applicable to other similar areas within the proposed designation boundary, subject to confirmation of their suitability at the detailed design stage.



## 1.2 Project description

This Project description provides the context for this assessment. Sections 5 and 6 of the Assessment of Environment Effects (Volume 2) further describe the construction and operational aspects of the Project and should be relied upon as a full description of the Project.

The Project realigns the existing SH1 between the Northern Gateway Toll Road (NGTR) at the Johnstone's Hill tunnels and just north of Warkworth. The alignment will bypass Warkworth on the western side and tie into the existing SH1 north of Warkworth. It will be a total of 18.5 km in length. The upgrade will be a new four-lane dual carriageway road, designed and constructed to motorway standards and the NZTA RoNS standards.

## 1.3 Project features

Subject to further refinements at the detailed design stage, key features of the Project are:

- A four lane dual carriageway (two lanes in each direction with a median and barrier dividing oncoming lanes);
- A connection with the existing NGTR at the Project's southern extent;
- A half diamond interchange providing a northbound off-ramp at Pūhoi Road and a southbound on-ramp from existing SH1 just south of Pūhoi;
- A western bypass of Warkworth;
- A roundabout at the Project's northern extent, just south of Kaipara Flats Road to tie-in to the existing SH1 north of Warkworth and provide connections north to Wellsford and Whangarei;
- Construction of seven large viaducts, five bridges (largely underpasses or overpasses and one flood bridge), and 40 culverts in two drainage catchments: the Pūhoi River catchment and the Mahurangi River catchment;
- A predicted volume of earthworks being approximately 8M m<sup>3</sup> cut and 6.2M m<sup>3</sup> fill within a proposed designation area of approximately 189 ha earthworks;

The existing single northbound lane from Waiwera Viaduct and through the tunnel at Johnstone's Hill will be remarked to be two lanes. This design fully realises the design potential of the Johnstone's Hill tunnels.

The current southbound tie in from the existing SH1 to the Hibiscus Coast Highway will be remarked to provide two way traffic (northbound and southbound), maintaining an alternative route to the NGTR. The existing northbound tie in will be closed to public traffic as it will no longer be necessary.

#### 1.4 Interchanges and tie-in points

The Project includes one main interchange and two tie-in points to the existing SH1, namely:

- The Pūhoi Interchange;
- Southern tie-in where the alignment will connect with the existing NGTR; and
- Northern tie-in where the alignment will terminate at a roundabout providing a connection with the existing SH1, just south of Kaipara Flats Road north of Warkworth.



## 2. Landscape and Visual Assessment Methodology

We have undertaken an assessment of the existing landscape context and character in the vicinity of the Project. The existing landscape has been described in terms of its landform, land cover and land use in order to gain a full understanding of the potential landscape and visual effects of the Project.

The landscape within the Project area has been divided into areas with a readily distinguishable landscape character. These Landscape Character Areas are areas within the landscape that display a relatively homogenous and consistent landscape character. Their edges are determined by changes in landscape character, which often correspond to changes in land use or natural boundaries such as catchments, prominent landforms (e.g. ridgelines) or water bodies. A description of the natural character, landscape and visual amenity values attributed to each Landscape Character Area is outlined. The Landscape Character Areas are mapped and contained within Appendix D.

The Project's visibility has been determined by Zone of Theoretical Mapping (ZTV). The ZTV map is contained within the drawing set as Drawing LV-101. Visual simulations have been prepared to illustrate the Project from a number of identified viewpoints (refer to Drawing LV-001 for an overview of the viewpoint locations). These are contained within the drawing set as Drawings LV-001 and LV-201 – LV-239.

The landscape and visual effects of the Project have been described in terms of biophysical, visual amenity and landscape/natural character effects. Landscape mitigation measures have been recommended to reduce any potential adverse landscape and visual effects of the Project on the receiving environment.

The potential landscape and visual effects of the Project as they relate to the RMA are:

- i) Effects on the natural character of wetlands and rivers and their margins [s6(a)];
- ii) Effects on outstanding natural features and landscapes [s6(b)];
- iii) Effects on amenity values (visual amenity) [s7(c)];
- iv) Effects on the quality of the environment (biophysical aspects of the landscape) [s7(f)]; and
- v) Landscape effects during construction [s7(c), s7(f)].

We used the following methodology in the assessment of landscape and visual effects for the Project.

### 2.1 Desktop Assessment and Route Investigations

We undertook a review of the preliminary engineering plans and a desktop assessment of the indicative alignment. Initial route investigations were undertaken by Rob Pryor and Jason Hogan and we carried out detailed site investigations during the scheme assessment phase and subsequent planning stages of the Project.

We also undertook investigations of the Northern Gateway Toll Road (NGTR) section of SH1 to gain an understanding of, and to ascertain the potential landscape and visual effects of this Project, which passes through similar terrain and incorporates a number of viaducts and bridges over streams and estuaries.



## 2.2 Background Research

To gain a full understanding of the scope and potential implications of the Project, we reviewed the background documents including:

- NZTA policy documents and guidelines, including:
  - o Urban Design Policy;
  - o Landscape Guidelines;
  - o Landscape and Visual Assessment Guidelines (Draft); and
  - Standard Specification for Highway Landscape Treatments (Draft);
- RMA provisions relevant to landscape and visual matters. The landscape provisions were identified in this assessment solely to frame the assessment in a way that focuses on landscape matters, not to assess the statutory planning provisions (which are covered in the Project's AEE); and
- Assessment reports prepared for the Project, being Terrestrial Ecology, Urban Design, Operational Water, Cultural, Heritage, Noise and Geotechnical.

## 2.3 Analysis of the Existing Landscape

We analysed the existing landscape in terms of its landscape attributes and values, and considered factors as covered in the NZILA Best Practice Note – Landscape Assessment and Sustainable Management 2010.

We analysed the landscape in terms of the following attributes:

Biophysical features, patterns and processes

Biophysical features, patterns and processes are natural in origin, and include the geology and landform that shape a landscape, hydrology, ecology and vegetation.

Aesthetic and perceptual qualities

Aesthetic and perceptual qualities are less tangible (than the biophysical features, patterns and processes) phenomena as perceived and experienced by people, such as the view of a scenic landscape or the distinctive smell of the foreshore. Some transient factors also fall into the category of sensory qualities. Perceptual analysis of landscapes or landscape features involves the assessment of the sensory qualities of a landscape that give rise to aesthetic values or perceptions of quality.

#### Associative aspects

Associative meanings include Tangata Whenua values and 'shared and recognised' values. These are cultural or social associations with particular landscape features, such as a historic settlement site; and patterns of social activity that occur in particular parts of a landscape. This information helps understand a person's sense of attachment and belonging to a landscape, and how and why it is valued.

### 2.4 Characterisation of the Landscape

We assessed the indicative alignment and Project area and identified landscape character areas (refer to **Appendix D**). Landscape character areas are areas within the landscape that display a relatively homogenous and consistent landscape character. Each of the landscape character areas has a particular character, by reference to a distinct, recognisable and consistent pattern of key



attributes, landscape features and elements in the landscape that makes each landscape character area different from another.

The change in character between each area often corresponds to changes in land use or natural boundaries, such as catchments, prominent landforms (e.g. ridgelines) or water bodies. We identified the key physical and perceptual features that are important in creating the character of each area to determine the extent of effects the Project will have on each landscape character area.

## 2.5 Project Visibility – ZTV Mapping

We used a technique using readily available digital terrain data to establish 'Zones of Theoretical Visibility' (ZTV). ZTV is a computer-generated tool to identify the likely (or theoretical) extent of visibility of a development. The elevation of the alignment is tested against a 3D terrain model. The terrain model is a bare-earth model; that is, it does not feature buildings, vegetation or other boundaries that may have a significant effect on the visibility of the alignment, which is the principal reason why this technique is known as a Zone of Theoretical Visibility. Additionally the ZTV does not, of itself, take account of the effects of distance in reducing the significance of an alignment. Despite these limitations, we consider ZTV can have particular benefits which, if used carefully, aid the landscape and visual impact assessment process.

The ZTV maps provided a useful guide to site survey to assist our assessment, by showing areas from which visibility may occur. It also focussed the visual assessment process on those areas that may be affected. We then undertook ground truthing by travelling the alignment on foot and ascertaining the extent of visibility in actual terms.

ZTV maps tend to present an extreme view of intervisibility - in terms of pure line-of-sight, many developments can be seen across a wide area. However, a development's actual visual significance is dependent on a number of factors, such as scale, setting and the nature of the viewing experience. This is particularly applicable to the Project given that the alignment traverses highly variable terrain and a large area of exotic forestry that will significantly restrict views of the alignment.

Thus, ZTV mapping is simply a useful tool, like visual simulations, to illustrate and explain the extent of visibility of the Project, and needs to be interpreted with caution and considered as an indicative tool only.

The ZTV maps are included in the drawing set as Drawing LV-101.

## 2.6 Landscape and Visual Effects Assessment

The main potential landscape and visual effects that we have considered are:

- i) Effects on the natural character of wetlands and rivers and their margins;
- ii) Effects on outstanding natural features and landscapes;
- iii) Effects on amenity values;
- iv) Effects on the natural landscape components of the landscape (landforms, streams, vegetation);
- v) Landscape and visual effects during construction.



We assessed the landscape and visual effects of the Project by considering the following effects:

#### 2.6.1 Biophysical Effects

Biophysical effects refer to the extent and significance of modifications to landforms, watercourses and vegetation. Biophysical or landscape effects are primarily dependent on the landscape sensitivity of a site and its surrounds. Landscape sensitivity is influenced by landscape quality and vulnerability, or the extent to which landscape character and values are at risk of change.

We determined the nature and extent of landscape effects by an analysis of the specific implications of the Project in relation to the landscape values and the sensitivity of the landscape to change. We also assessed the Project's likely contribution to wider cumulative effects.

### 2.6.2 Visual Amenity Effects

The assessment of visual amenity effects analyses the visual response that any of the identified changes to the landscape may evoke. A proposal's effects on visual amenity and landscape character are dependent on:

- i) The visibility of the project;
- ii) The nature and extent of the viewing audience type, size and level of exposure;
- iii) The visual qualities of the landscape e.g. visual amenity, aesthetic and landscape value;
- iv) The Visual Absorption Capability (VAC), or the ability to visually assimilate change without significant modification to the character and quality of the landscape (influenced by land use, vegetation and topography); and
- v) The ability to mitigate any adverse effects through mitigation techniques.

In order to gain a fuller understanding of the potential visual effects of the Project, we had visual simulations prepared from a number of representative public and private viewpoints. We selected the viewpoints by identifying a representative number of private and public locations to depict various views of the Project as well as some of the most proximate and potentially most affected locations. We selected the viewpoints following our desktop review, ZTV mapping analysis, walkovers of the alignment route and visits to public roads and private properties in the vicinity of the alignment. We could not access some potentially affected locations from the existing SH1 due to stringent Health and Safety requirements of NZTA in relation to working around motorways.

Buildmedia and Precision Aerial Surveys then prepared eleven visual simulations. The visual simulations are included in the drawing set as Drawings LV-001 and LV-201 – LV-239.

#### 2.6.3 Landscape / Natural Character Effects

Landscape character derives from a combination of landscape attributes that give an area its identity – landform, land cover and land use. Landscape character effects relate to changes in land use and changes to existing patterns and elements in the landscape, including vegetation, water bodies, landform and human settlement.

In accordance with section 6(a) of the RMA, an assessment of natural character applies to the natural character of the coastal environment, wetlands, rivers, streams and their margins. Our assessment of the natural character of the rivers, streams and wetlands potentially affected by the Project has been based on field investigations and the Terrestrial and Freshwater Ecology Assessments.



#### 2.6.4 Landscape Mitigation

During both the scheme assessment and planning stages of the Project, our input into the design process has influenced the route selection and design, so that potential adverse effects upon the landscape in a number of areas have been avoided or already mitigated. Such avoidance has included shifting the alignment to avoid the sensitive areas associated with the Puhoi River and estuary, Pohuehue Reserve, Perry Road lifestyle area and Mahurangi River branches.

Following our assessment of effects for the individual landscape character areas, we have also recommended mitigation measures to address the specific effects in each area. These measures are outlined in Section 8 of this report.

### 2.7 Effects Rating

We have used the following five-point scale to rate the Project's potential landscape and visual effects, based on the scale provided in the New Zealand Institute of Landscape Architects Best Practice Note – Landscape Assessment and Sustainable Management (2010):

The total ratings we give in the descriptions denote the overall landscape and visual effects rating, which has the following range of potential ratings and effects.

#### **Negligible Effect**

The project has discernible effects but too small to have adverse landscape or visual effects.

#### Low Effect

The project constitutes only a minor component of the wider view. Awareness of the project would not have a marked effect on the overall quality of the scene or create any significant adverse effects.

#### **Moderate Effect**

The project may form a visible and recognisable new element within the overall scene and may be readily noticed by the viewer. The project may cause an adverse impact but these effects could be mitigated or remedied.

#### **High Effect**

The project forms a significant and immediately apparent part of the scene that affects and changes its overall character. The project may cause a high adverse impact on the environment but could be mitigated or remedied.

#### Significant Effect

The project becomes the dominant feature of the scene to which other elements become subordinate and it significantly affects and changes its character. The project causes extensive adverse effects that cannot be avoided, remedied or mitigated.

In terms of s104D of the RMA, we consider effects moderate and above to be 'more than minor'.



## 3. Statutory Context

A designation and resource consents are being sought by the NZ Transport Agency (NZTA) for the Project.

Key statutory and policy considerations that inform the assessment of landscape and visual effects are contained in the following:

Resource Management Act (1991) NZ Coastal Policy Statement (2010) Auckland Regional Policy Statement Auckland Regional Plan: Coastal

Auckland District Plan: Rodney Section (2011)

Key messages from these documents taken into consideration in the landscape and visual effects assessment are the protection of outstanding natural landscapes, significant natural areas, the coastal environment and the avoidance of adverse effects on elements, features and patterns that contribute to the quality of the landscape the alignment passes through.

The relevant landscape objectives and policies are identified in the section 28.4 and section 28.8.2 of the AEE.

## 3.1 Resource Management Act (1991)

Provisions of Part 2 of the RMA of specific relevance to the landscape and visual assessment include:

Section 6, which sets out matters of national importance that must be recognised and provided for, including:

- s(6)a The preservation of the natural character of the coastal environment, wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development.
- s(6)b The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.

Section 7, which sets out matters to which particular regard shall be given, including:

- s(7)c The maintenance and enhancement of amenity values.
- s(7)f The maintenance and enhancement of the quality of the environment.

## 3.2 New Zealand Coastal Policy Statement (2010)

The New Zealand Coastal Policy Statement provides overview policies at a national level for the management of New Zealand's coastline. The provisions of the NZCPS are discussed in the AEE.



## 3.3 Auckland Council Regional Policy Statement

The Auckland Regional Policy Statement (Proposed Change 8) (ARPS) identifies three Outstanding Natural Landscapes (ONLs) associated with the Project. The alignment either traverses, or is in the vicinity of West Mahurangi Harbour (43), Mahurangi-Waiwera (44) and Upper Puhoi Valley (46). Policies relating to subdivision, use and development in these areas focus on preserving the natural character of the coastal environment, protecting outstanding natural features and landscapes and avoiding adverse effects on elements, features and patterns that contribute to the quality of the landscape character area. These policies are discussed further in Section 28.4 of the AEE.

All of these inland areas (43, 44 and 46) are classified as 'Hill Country' and all share the same 'Landscape Type Descriptors' in the ARPS that include relatively high relief/significant areas of maturing vegetation and a low level of built modification. The ARPS notes a key objective relating to the ONLs is to protect them from inappropriate subdivision, use and development. The Project only directly impacts on two of these ONLs – 43 and 44.

## 3.4 Auckland Council Regional Plan: Coastal

The sections of the Regional Plan: Coastal that are most relevant to the assessment of landscape and visual effects of the Project are 3.0 – Natural Character and 4.0 – Landscape.

#### 3.5 Auckland Council District Plan: Rodney Section (2011)

The Project traverses a number of zones as identified in the District Plan maps (refer Section 4.2.3 of the AEE). The main zones are General Rural and East Coast Rural. Some of the objectives and policies for these zones relate specifically to landscape and visual effects and we have taken these into consideration in this assessment.

#### **RDC Significant Natural Areas**

Along the Project alignment there are also a number of locations that are identified as Significant Natural Areas (SNAs) in the District Plan. Although these SNAs generally coincide with the ONLs, they were determined by the ARC based on their values as areas of natural habitats for native fauna and flora, rather than broader landscape values.



## 4. Existing Environment

Most of the land traversed by the Project is in productive land use, particularly exotic forestry and pastoral farming. The landforms of the area vary from steeply sloping to gently undulating hill country. The distribution and mix of indigenous and exotic vegetation through much of the landscape combined with areas of pasture create a fragmented mosaic pattern of land cover throughout the wider area.

The extensive network of rivers and streams throughout the Project area reflect the relative complexity of the landform along much of the alignment and reinforce the natural landscape patterns of the area.

Human settlement patterns along the alignment are largely concentrated around Puhoi in the south and Warkworth in the north. Rural residential settlement is dispersed along the alignment, largely concentrated around Perry Road and Viv Davie-Martin Drive.

The existing SH1 corridor forms a dominant element through the rural environment and in several locations will be in close proximity to the proposed alignment – the southern tie-in at Johnstone's Hill northern portal, Hungry Creek, Mahurangi West Road, and the northern tie-in south of Kaipara Flats Road.

This section provides a general overview of the existing environment. The individual landscape character areas are discussed in detail in Section 5 of this report.

## 4.1 Landform and Hydrology (Refer to Appendix A and B)

Apart from the main river valleys and the areas associated with the coastline, the area surrounding the proposed designation is largely characterised by low open undulating hill country in the north, and steeper rolling hill country with distinctive complex incised landforms of interconnected ridges and valley systems associated with the terrain in the centre and south.

The extensive network of rivers and streams throughout the Project area reflect the relative complexity of the landform along much of the indicative alignment. The catchments the alignment traverses are that of the Puhoi and Mahurangi Rivers.

#### 4.2 Vegetation (Refer to Appendix C)

Originally, the wider Project area was almost entirely covered with broadleaf and podocarp forest consistent with the remainder of Northland. Kauri dominated the leached infertile upland slopes of the hill country along with rimu, mountain totara, tawa, tairaire, towai, quintinia, tawari and toro. The main mid-slope species included rimu, miro, totara, northern rata, tawa, taraire, kohekohe and nikau. Kahikatea, matai, puriri and pukatea were associated with the lower slopes and deeper alluvial soils of the valley floors.

Following European settlement, almost all the kauri and main areas of podocarp forest in the Project area were felled for timber and converted to pasture. Further clearing then occurred in the pursuit of kauri gum. Despite this widespread clearance of the forests, remnant stands, although comparatively small and fragmented, are quite common throughout the area.

Regenerating bush is widespread in the area, particularly mixed with exotic scrub around the edges of forestry, riparian areas, damp gullies and in abandoned pasture within the hill country. Scattered



indigenous specimen trees are frequent throughout areas of pasture, in association with exotic tree species. Pine forestry is the dominant vegetation associated with much of the hill country along the route.

The distribution and mix of vegetation through the landscape, in combination with areas of pasture, creates a fragmented mosaic pattern of land cover throughout much of the wider area.

Between Johnstone's Hill Tunnels and Hungry Creek Road, the Puhoi River and the associated mudflats and estuaries are tidal, and there are extensive areas of mangroves.

## 4.3 Land Use and Land Cover (Refer to Appendix C)

Most of the land traversed by the Project is in productive land use, particularly exotic forestry and pastoral farming. The main land use patterns can be broadly categorised as follows:

#### 4.3.1 Pastoral Farming

Pastoral farming is the dominant form of agriculture in the wider Project area with extensive tracts of pasture for mixed grazing in the northern areas near Warkworth.

#### 4.3.2 Exotic Forestry

The large, established forestry plantations are a significant component of the established landscape character along much of the route. The main areas of forestry include the extensive areas around Moirs Hill near Pohuehue, and The Crag further to the south in the vicinity of Puhoi. These forests are largely comprised of mixed-age stands of pine interspersed with clear felled areas, particularly to the north. There are some smaller areas of hardwoods, predominantly eucalyptus, scattered along the alignment.

#### 4.3.3 Indigenous Forest and Bush

Scattered remnants of indigenous forest are located along the indicative alignment, particularly in the steeper hill country sections, and often associated with stands of exotic forestry. Regenerating indigenous cover is prevalent, with emergent canopy species such as kauri, tanekaha, rimu and rewarewa commonly emerging through manuka and kanuka shrubland.

#### 4.3.4 Horticulture

Horticultural land use is limited along the alignment. Aside from infrequent small scale activities, the main cluster of horticultural land is centred around the outskirts of Warkworth where there are several orchards, vineyards and a large-scale glasshouse operation along Woodcocks Road to the west of the township. Another locally prominent land use is the Genesis Aquaculture fish farm located at the western end of Perry Road.

#### 4.3.5 Settlement

The settlement areas within the Project area are the service towns and clusters of rural-residential enclaves. Warkworth is the main rural service town and acts as a sub-regional retail and service centre. Warkworth has an established and growing retail and manufacturing employment base and nearby there has been intensification of rural-residential lifestyle block development. Other concentrations of settlement are associated with the rural village of Puhoi, located at the southern

#### **Landscape and Visual Assessment Report**



end of the Project. Smaller areas of rural settlement are concentrated around Perry Road, Wyllie Road and Viv Davie-Martin Drive.

The perimeter of the main settlement areas is characterised by rural fringe activities that include a mixture of pastoral land use, combined with scattered new development, including subdivisions, industrial activities and recreational facilities.

## 4.3.6 Lifestyle

There is rural-residential lifestyle settlement in the south and north of the Project, with notable concentrations in a number of localities including Perry Road, Wyllie Road and Viv-Davie Martin Drive. These settlements generally coincide with the townships along the alignment, notably Puhoi and Warkworth. The rural-residential lifestyle blocks are an established part of the existing environment.



## 5. Assessment of Landscape and Visual Effects

The NZTA's route selection process has meant that the Project alignment largely avoids the most sensitive landscapes (Outstanding Natural Landscapes and Sensitive Natural Areas in this part of the region. However, due to the challenging terrain that presents design limitations and the rural lifestyle settlement in some parts of the area which have existing views into the Project area, some landscape and visual effects on the character of the landscape and local populations are unavoidable for a project of this nature.

Due to the nature and scale of the Project, and the level of disturbance it will bring to the landscape, the landscape and visual effects of the alignment, although variable along the route, will generally be relatively high during and immediately following construction. The effects will reduce with mitigation for a number of the landscape character areas and the long-term effects will lessen as the landscape matures. Recommended mitigation measures are outlined in Section 7.

Areas where we have assessed the landscape and visual effects to be low are in the landscape character areas that are away from public views, and have already been significantly modified by land use management regimes (e.g. hill country forestry).

In areas where we have assessed the landscape and visual effects to be moderate to high, mitigation provides the ability to significantly reduce these effects in many of the landscape character areas, although it will be less effective in the landscape character areas that have high landscape value and sensitivity. These areas include those where there are permanent residential audiences – around Perry Road, Moirs Hill Road, Viv Davie-Martin Drive and Puhoi Close. For these residential groups, the alignment will have an adverse effect on the existing rural character and amenity values.

In the landscape character areas where we have identified high landscape and visual effects, suitable mitigation is fundamental to achieving integration of the highway into the landscape setting. Using the techniques detailed within Section 7 of this report, we consider successful mitigation can be achieved. Although the alignment will alter the local landscape character, appropriate mitigation can enable 'fit' within the landscape to ensure that the P-Wk Project may co-exist comfortably with the natural elements, rural production and patterns of settlement.

In some areas, the landscape character is already significantly modified by the existing SH1. Where the new alignment coincides with SH1, it will add cumulatively to the established effects, although such areas generally have a greater ability to accommodate the P-Wk Project than areas that are currently less modified.

The following section of the report provides a summary of the existing environment and values of the landscape character areas. We outline the proposed works, describe and rate the potential landscape and visual effects and summarise the effects on the identified landscape character areas.



## 5.1 Landscape Character Area 1 – Puhoi

#### 5.1.1 Route Description and Proposed Works

This landscape character area extends from the northern portals of the Johnstone's Hill tunnels to the vegetated escarpment north of Puhoi Road (see Appendix D).

In this character area, the indicative alignment runs close to the existing SH1 and will be highly visible from SH1, Hibiscus Coast Highway, the local residential area and from parts of the Puhoi River. The indicative alignment includes prominent viaduct structures over Okahu Creek, Puhoi Road and the Puhoi River.

#### 5.1.2 Existing Environment and Values

#### (a) Natural Character

Apart from the low lying areas associated with the Puhoi River, the remainder of the land in this character area is complex low hill country, typical of the wider area. Through this character area, the land has been mostly cleared of original cover and converted to pasture for grazing. Scattered settlement with increasing density toward Puhoi Village adds to the domesticated character of the landscape, particularly in the vicinity of Puhoi Close.

The natural character of this area has been reduced to a large degree by modification and human intervention, including the existing SH1, Johnstone's Hill tunnels and residential settlement pattern. Despite these interventions, the natural character values remain relatively prominent due to the pervasive influence of the Puhoi River, which meanders through the valley. Its mangrove-lined banks are strong indicators of the estuarine and tidal influences that extend this far up the river.

Other notable natural elements include the pockets of regenerating indigenous vegetation along the riparian margins and within local gullies, and the reasonably distinctive landform.

#### (b) Landscape Values

The landscape values of the area are derived more from the wider landscape than on a local level. The more elevated land to the west and the lower portion of the Puhoi River to the east are classified as Outstanding Natural Landscapes in the ARPS. An area of indigenous bush above the Johnstone's Hill tunnels, is classified as a Significant Natural Area in the District Plan. The Project avoids both the ONLs and SNA, although the existing SH1 is in close proximity to part of the ONL in the vicinity of the Johnstone's Hill tunnels. The landscape character area is already compromised to a degree however by the existing SH1.

Although for the most part separated from the indicative alignment, the higher valued landscapes, in particular the river, still have a considerable influence on the character and quality of the wider landscape character area. Their influence combines with the patterns created by landform, areas of pasture and scattered vegetation to create a relatively distinctive landscape character, with a comparatively high level of landscape amenity.

Within this landscape character area, the variable landform creates a series of distinct landscape sub-units, with areas enclosed by the landform of the hill country providing contrast to the open expanse of the flat areas associated with the river valley.

There are a number of notable cultural heritage values associated with the area as detailed in the Heritage and Cultural Assessment Reports. These features include Ngā Pā o Te Hemara Tauhia,

#### **Landscape and Visual Assessment Report**



which is located at the end of a low ridge just to the north of the Johnstone's Hill tunnels, sandwiched between the existing State highway and the Project alignment; a recently rediscovered pa site just north of Okahu Creek; and the nearby historic settlement of Puhoi Village.

Photographs 1 and 2 are indicative of this landscape character area.



Photograph 1 - View looking west from SH1

The Mahurangi-Waiwera ONL (44) is located in this landscape character area. The specific landscape values attributed to ONL 44 are set out in Appendix F-2 of the ARPS. These include the deep river valleys of the Puhoi and Waiwera Rivers together with the other enclosed coastal estuaries that feed into the Hauraki Gulf. The key elements, patterns and processes of ONL 44 include the coastal and hill country landforms with remnant indigenous vegetation and pattern of pasture reinforcing the topography.





Photograph 2 - View looking east from SH1

#### (c) Key Attributes of the Puhoi Character Area

- Puhoi River with its estuarine and intertidal influences
- Residential settlement pattern
- Enclosing hill country landform, forming discrete landscape sub-units
- River valley flats
- Intermix of pasture and scattered vegetation with pockets of indigenous vegetation
- Cultural heritage values
- Influence of the existing SH1 and Johnstone's Hill tunnels

#### 5.1.3 Landscape and Visual Effects

#### (a) Biophysical Effects

The Project will necessitate extensive earthworks to negotiate the localised ridge and gully systems with some cut slopes and fill embankments of up to 20m high through the central portion of this landscape character area and a major 24m high cut where the highway enters into the hill country to the north of Puhoi. Two large viaducts will span Okahu Creek and Puhoi Road/Puhoi River. Even though this hill country is not highly sensitive, the earthworks and structures will result in considerable alteration to the existing natural landform.

Vegetation removal will be limited to localised clearance of riparian vegetation on the river and wetland margins and removal of some indigenous and exotic tree species scattered through areas of pasture as outlined in the Terrestrial Ecology Assessment Report.



#### (b) Visual Amenity Effects

Although the landform and existing vegetation will provide some visual containment of the highway, large sections of the carriageway and extensive areas of earthworks will be visible from SH1, Hibiscus Coast Highway and the areas to the east. The most visible areas will be the start of the Project at the Johnstone's Hill Tunnels, from Hibiscus Coast Highway and where it crosses the Puhoi River flats and enters the hill country to the north.

Within this landscape character area there is a small, local permanent residential audience clustered around Puhoi Close and also at Billings Road. For residents of Puhoi Close, the new highway will have a high level of effect upon the visual amenity of the area. Their current rural outlook, which also includes a view to the existing SH1, will be replaced by views towards parts of the 300m long viaduct crossing the Puhoi River and Puhoi Road. In this location, the viaduct is approximately 300m from the nearest dwelling in Puhoi Close.

SH1 already has an influence on the character of this area for residents of Puhoi Close. Regardless, the cumulative effects of the two alignments will reinforce the transport network as a main component of the landscape character locally, and the proximity of the new viaduct will result in a high visual effect, further eroding the remaining levels of rural amenity for the residential population. Existing vegetation will assist in screening views and mitigation planting within the designation area will be undertaken to minimise potential adverse effects.

#### (c) Landscape / Natural Character Effects

The main landscape sensitivity is associated with the river tributaries and wetland areas that will be spanned by viaducts across Okahu Creek and the Puhoi River. While these structures will present an imposition upon the natural character of these areas, the physical effects of the viaducts on the landscape will be reduced by the structures spanning these waterways. The reduction is due to some of the natural character of the waterways being retained.

#### (d) Visual Simulations

Visual Simulation 01 – Hibiscus Coast Highway illustrates the view from beside the road looking in a northwesterly direction. Visual Simulation 02 – Puhoi Close illustrates the view from Puhoi Close looking in a northeasterly direction.

#### (e) Effects on ONL 44

The effects of the alignment on the ONL are considered to be low as the alignment skirts outside the periphery of the delineated area near the Puhoi River. Also in this area, the existing SH1 and Johnstone's Hill tunnels have already modified the natural character and landscape values to a high degree. The proposed alignment is inland of the existing SH1 and will not adversely affect the elements, patterns and processes; natural science factors; aesthetic values; expressiveness or transient values of the ONL.

#### 5.1.4 Mitigation

Mitigation measures are outlined in Section 7 of this Report.

#### 5.1.5 Summary of Effects

We have assessed the landscape and visual effects of the Project on this landscape character area as high. These effects will be particularly pronounced during the construction stage due to the extent of earthworks and exposed cut slopes.

#### **Landscape and Visual Assessment Report**



Following suitable mitigation measures, these effects will be reduced to a moderate level over 3-5 years as the cut slopes, fill embankments and mechanically stabilised earth (MSE) slopes take on more natural appearances through weathering and revegetation.

The visual effects for the residents in Puhoi Close will be high until the mitigation planting between the viaduct and the residential area has become established and views towards the viaduct are progressively screened.

Effects	Effects Rating	Comment
Biophysical	High	Extensive earthworks required
Visual Amenity	High	Major element of the view from existing SH1, Puhoi Road and the residential settlement at Puhoi Close and Billings Road area
Landscape / Natural Character	High	Alteration to several key elements and features
Overall – Pre-mitigation	High	
Mitigation		
Overall - Post-mitigation	Moderate	

## 5.2 Landscape Character Area 2 – Hungry Creek

#### 5.2.1 Route Description and Proposed Works

Landscape character area 2 extends from the vegetated escarpment north of Puhoi Road to immediately west of Mahurangi Road West (see Appendix D).

In this landscape character area the indicative alignment leaves the Puhoi River valley and enters into the low hill country through a rapid succession of cut slopes and fill embankments. It traverses a series of minor low spurs and gullies, which extend eastward to the Hikauae Creek. The alignment remains in close proximity to the existing SH1, although largely visually contained by the landform until it emerges parallel to SH1 in the vicinity of Hungry Creek. Here the indicative alignment requires a visually prominent retaining structure.

The indicative alignment then emerges into the open pastoral land to the north in the vicinity of Mahurangi Road West via a bridge.

#### 5.2.2 Existing Environment and Values

#### (a) Natural Character

With the exception of a small number of dwellings, this landscape character area is largely covered in a mosaic of young, exotic pine combined with more mature forest intermixed with areas of regenerating indigenous vegetation and exotic scrub. Aside from the natural landform that is largely intact, forestry has substantially modified the natural character of the area due to the exotic species that have been planted, and the creation of forestry tracks for access.



Other land use in the vicinity of the Project includes a small area of rural residential development on the eastern side of SH1 south of Hungry Creek, the Hungry Creek Arts Centre and a few dwellings in elevated locations above SH1 to the east of the alignment.

#### (b) Landscape Values

The existing land use has significantly degraded the landscape values of this landscape character area by modifying and reducing the natural character that underpins the character and quality of the landscape. What remains is patchy vegetation and a series of forestry tracks, which contribute to a relatively homogeneous character and a low level of landscape amenity.

These deficiencies are pronounced further by the contrast with the land on the eastern side of SH1, much of which is identified in the ARPS (Change 8) and District Plan as an Outstanding Natural Landscape or Significant Natural Area. These areas are largely characterised by a combination of large areas of regenerating indigenous bush combined with smaller pockets of indigenous vegetation over hill country pasture.

## (c) Key Attributes of the Hungry Creek Character Area

- Exotic pine forested landscape traversed with forestry tracks
- Scattered and sparse residential settlement pattern
- Physical proximity to the existing SH1
- Contrasting and more natural characteristics to the east of SH1

Photographs 3 and 4 are indicative of this landscape character area.



Photograph 3 - View looking north from Cook Road





Photograph 4 - View from Watson Road looking southwest

#### 5.2.3 Landscape and Visual Effects

#### (a) Biophysical Effects

The Project passes across the grain of the land through this landscape character area. Due to the relatively complex landform of the low hill country, the indicative alignment will require extensive earthworks including cut slopes, fill embankments and large retaining structures in the vicinity of Hungry Creek. The construction works will require the removal of large areas of the existing exotic pine forest and associated vegetation. Despite this, due to its degraded landscape character and quality, this landscape character area can readily assimilate these effects.

#### (b) Visual Amenity Effects

The permanent residential audience is limited to several properties along the eastern side of SH1 and three properties within the proposed designation that will not be occupied. The existing landform and vegetation will provide considerable physical containment of the highway for those residents with views, and for users of SH1 for most of this area.

Even though the landscape sensitivity is low, and the indicative alignment is well contained by the landform and the exotic forestry, the visual effects for users of the existing SH1 will be high in some areas due the extent of earthworks and the proximity of the new highway. The users of the existing SH1 will have views of slopes and steep embankments up to approximately 10m in height and 100m long, and this view will be particularly prominent for southbound SH1 users. Views from the existing SH1 however will be brief and transitory and the indicative design anticipates mechanically stabilised earth slopes, which are hydroseeded following construction, resulting in a green vegetated slope that will reduce adverse effects.



#### (c) Landscape / Natural Character Effects

The main natural character effects of the Project in this landscape character area are associated with the indicative alignment crossing a number of watercourses, requiring culverting. In some areas the culverting is extensive. However, as the indicative alignment extends through predominantly exotic forestry, the overall effects on natural character will be low.

#### 5.2.4 Mitigation

Mitigation measures are outlined in Section 7 of this Report.

#### 5.2.5 Summary of Effects

We have assessed the landscape and visual effects of the Project on this landscape character area during and immediately following construction to be in the moderate to high range due to the extensive earthworks and their impact on visual amenity. However, following suitable mitigation, these effects could be reduced to a low level over a short time period (approximately 3-5 years) as the cut slopes, fill embankments and mechanically stabilised earth (MSE) slopes take on more natural appearances through weathering and revegetation.

Effects	Effects Rating	Comment
Biophysical	Moderate - high	Extensive earthworks and retaining walls required
Visual Amenity	Moderate - high	Major element of the view from parts of existing SH1, and localised residential settlement to the east.
Landscape / Natural Character	Low	Alteration to watercourses
Overall – Pre-mitigation	Moderate - high	
Mitigation		
Overall – Post-mitigation	Low	

## 5.3 Landscape Character Area 3 – Schedewys Hill

#### 5.3.1 Route Description and Proposed Works

Landscape character area 3 extends from where the indicative alignment emerges from the forested hill country to the west of Mahurangi West Road through to Moirs Hill (see Appendix D).

The indicative alignment emerges from the forest on an abutment away from the existing SH1 via the Hikauae Bridge and then extends across the low, open, undulating pastoral landscape through a series of low cut slopes and fill embankments. In several locations in this area the indicative alignment crosses tributaries of the Hikauae Creek. There is a split-level viaduct of approximately 250m in length. The indicative alignment then climbs into the hill country via a split-level carriageway through a series of box cuts and fill embankments for a length of approximately 4km.

Moirs Hill Road is to be realigned and bridged across the indicative alignment. In this vicinity the largest cut is approximately 30m below Moirs Hill Road.



#### 5.3.2 Existing Environment and Values

#### (a) Natural Character

The natural character in this landscape character area has been subordinated to a large degree by farming and forestry activities that have significantly altered natural patterns and processes. The more gentle and low-lying land to the south of this landscape character area is characterised mainly by pastoral farmland with sporadic and sparsely scattered indigenous vegetation together with clumps of exotic shelterbelts and drifts of exotic scrub.

Riparian vegetation associated with the number of watercourses running through the area is relatively insignificant. Further north, forestry at various stage of maturity is the main component on the more elevated and steeper country. This forestry combines with patchy sporadic areas of indigenous and exotic scrub and some areas of open grassland. Apart from a very small cluster of settlement in the southern part of the landscape character area around SH1 and Mahurangi West Road, there are no other dwellings in the immediate vicinity of the Project.

#### (b) Landscape Values

The disjointed distribution of vegetative cover and varied land use in this area lacks distinctiveness or aesthetic coherence. These features combine to reduce the overall character and quality of the landscape character area. Despite this, the area retains a degree of amenity on a local level by virtue of the open expansive views to the wider landscape, lack of built development and the combination of the open rolling pasture juxtaposed against the forested surrounding hillsides.

#### (c) Key Attributes of the Schedewys Hill Character Area

- Open rolling pasture on undulating slopes
- Scattered vegetation pattern
- Exotic pine forested landscape traversed with forestry tracks
- Scattered and sparse residential settlement pattern
- Physical proximity to the existing SH1 in the south
- Contrasting and more natural characteristics to the east of SH1

Photographs 5 and 6 are indicative of this landscape character area.





Photograph 5 - View from SH1 lay-by looking south



Photograph 6 – View from SH1 looking west



### 5.3.3 Landscape and Visual Effects

#### (a) Biophysical Effects

The main physical changes to the landscape within this landscape character area will result from the Project earthworks in the south and the combination of earthworks and vegetation removal in the more elevated sections to the north. Neither of these landscape sub-units are particularly sensitive in landscape terms. Although very exposed to the surrounding countryside, the low undulating farmland in the southern section of this landscape character area has the capacity to readily assimilate the earthworks in the vicinity, which will have a low effect on the natural character of the landform in this area.

The elevated section of the indicative alignment that ascends the hillside to the north will require large cuts and several large embankments. The 33m box cutting immediately to the south of Moirs Hill Road will also be substantial.

This area is not particularly sensitive to the effects of the earthworks and vegetation clearance proposed, as the visual diversity created by the existing variable vegetation patterns offers a reasonably high capacity to accommodate the consequential physical and visual change.

#### (b) Visual Amenity Effects

The audience most affected by the Project in this area will be the residents of the two land holdings in the vicinity of Mahurangi West Road between the Project and the existing SH1. Even though the existing SH1 is an established component of the local character, for these residents, the effects of being surrounded by the two alignments will result in a reduction in rural amenity values. The visual amenity effects for these residents will be high.

The two landholdings on the eastern side of the existing SH1 will be less affected, due to their viewing distance. The existing SH1 is currently in their foreground views. The visual amenity effects for these residents will be moderate.

The anticipated large box cutting immediately to the south of Moirs Hill Road will not be visible from most of the surrounding area and will be restricted largely to views from the alignment. The Hikauae Bridge and Schedewys viaduct will be visible from parts of SH1 in the vicinity of Mahurangi West Road and from elevated locations immediately to the east of the highway.

The main visual effects of the Project will be during, and soon after its construction. These effects will diminish quite rapidly though, once pasture and vegetation in the disturbed areas reestablishes and the unvegetated cut slopes weather. Once this occurs, even though the new road will form a distinctive band running over the landscape, it will not be overly intrusive or incongruous given the scale, modified character and unexceptional qualities of this landscape character area.

#### (c) Landscape / Natural Character Effects

The natural character in this area is not high, and is characterised by the farming and exotic forestry activities that have significantly altered the natural patterns and processes within this landscape character area. As the alignment extends through predominantly exotic forestry and grazed pasture, the effects on natural character will be low.

#### (d) Visual Simulations

Visual Simulation 03 – Mahurangi West Road illustrates the view from the intersection of Mahurangi West Road and Pukapuka Road looking in a northwesterly direction. Visual Simulation



04 – Schedewys Hill illustrates the view from the existing SH1 lay-by on Schedewys Hill looking in a westerly direction. Digital Render 05 – Moirs Hill Motorway illustrates the view from the indicative alignment looking in a northerly direction towards the Moirs Hill Road bridge.

#### 5.3.4 Mitigation

Mitigation measures are outlined in Section 7 of this Report.

### 5.3.5 Summary of Effects

We have assessed the landscape and visual effects of the Project overall on landscape character area 3 to be moderate, during and immediately following construction, given the landscape context and restricted visual catchment.

The effects will reduce to low over 3-5 years as the cut slopes and fill embankments 'mature' through weathering and revegetation. The visual amenity effects for the residents of the two land holdings in the vicinity of Mahurangi West Road between the Project and the existing SH1 will be high. Mitigation planting within the proposed designation boundaries will reduce these effects over time.

Effects	Effects Rating	Comment
Biophysical	Moderate - high	Extensive earthworks required in several locations
Visual Amenity	Moderate	Restricted viewing audience
Landscape / Natural Character	Low	Area not high in natural character
Overall – Pre-mitigation	Moderate	
Mitigation		
Overall – Post-mitigation	Low	

## 5.4 Landscape Character Area 4 – Moirs Hill North

#### 5.4.1 Route Description and Proposed Works

Landscape character area 4 extends north from Moirs Hill Road through the forested area towards Perry Road (see Appendix D).

Within this landscape unit the indicative alignment extends from the ridgeline occupied by Moirs Hill Road and then passes to the west of Pohuehue Reserve through a series of ridgelines and valley systems. The indicative alignment then emerges out of the forestry area to the southern abutment of a viaduct at the head of the lower Mahurangi River (right branch) near Perry Road. The highly variable terrain is traversed mainly via numerous box cuts of up to 35m in one location.

The indicative alignment and proposed designation completely avoid the Pohuehue Reserve, which will be unaffected by the Project. However, it is mentioned in this report because of its local significance.



#### 5.4.2 Existing Environment and Values

#### (a) Natural Character

Except for the nearby Pohuehue Reserve, this landscape character area is comprised almost entirely of exotic forestry, which has significantly degraded the natural character values of the area. The southern parts are characterised mainly by recently cleared and replanted areas combined with indigenous and exotic scrub. There are more advanced stands of pine in the northern part of the character area.

The monoculture is dissected by a series of forestry roads and clearances for logging operations. Pohuehue Reserve, which is administered by the Department of Conservation, is located some 250m east of the indicative alignment in the central part of the landscape character area. A large spoil site is indicated within the proposed designation that extends up to 50m from the reserve, but it is separated by a ridgeline and a forestry track.

The Pohuehue Reserve remnant and regenerating stand of indigenous forest includes an area of secondary podocarp/ hardwood forest and is a significant natural feature of the area that is also classified as an Outstanding Natural Landscape (ARPS – Change 8) - West Mahurangi Harbour, ONL 43 and Significant Natural Area (ACDP). The indicative alignment and proposed designation completely avoid the Pohuehue Reserve.

#### (b) Landscape Values

The majority of this landscape character area exhibits low landscape values due to the forestry operations and the influence these have on the character and quality of the landscape. Despite this, the area still retains a moderate degree of amenity through the extensive views from elevated locations to the surrounding landscape, particularly in the vicinity of Moirs Hill Road.

The specific landscape values attributed to the West Mahurangi Harbour ONL(43) are set out in Appendix F-2 of the ARPS. These values include the complex harbour topography that is defined and enframed by large pockets of native forest. Other attributes include the ridges, river and stream valleys, bays and harbour headlands. The key elements, patterns and processes include the interplay between remnant vegetation and rural pasture, reinforcing the landform.

## (c) Key Attributes of the Moirs Hill North Character Area

- Exotic pine forested landscape traversed with forestry tracks
- Scattered and sparse residential settlement pattern
- Elevated views
- Physical proximity to Pohuehue Reserve

Photograph 7 is indicative of this landscape character area.





Photograph 7 - View looking west from Moirs Hill Road

### 5.4.3 Landscape and Visual Effects

#### (a) Biophysical Effects

The biophysical effects through this landscape character area will be high due to the extensive earthworks and modification to the existing landform. Small retaining walls or MSE slopes will be required along parts of the Moirs Hill Road realignment. However, due to the low landscape quality and modified level of natural character, the landscape associated with the indicative alignment in this landscape character area has a high capacity to accommodate the change associated with the Project.

#### (b) Visual Amenity Effects

The visual effects of the indicative alignment through much of this landscape character area will be well contained locally, due to the landform and forestry and there will be limited opportunities to view the new highway from the existing SH1. The main visual effects will be restricted to several residential properties along the ridge of Moirs Hill Road who will gain views towards parts of the alignment. These views will be highly variable as the alignment is cut into the complex landform.

## (c) Landscape / Natural Character Effects

The extensive exotic forestry has significantly degraded the natural character values of this area. The alignment extends entirely through the pine forest and the effects on natural character will be low. The main natural character effects are associated with the indicative alignment crossing a number of watercourses requiring the culverting of these. The spoil disposal areas will also necessitate the culverting or diverting of the watercourses.



#### (d) Effects on ONL 43

The Project will not adversely affect the landscape and natural character values of the Pohuehue Reserve ONL or SNA as it is physically and visually separated from these areas by the intervening ridgeline. The indicative alignment will not adversely affect the elements, patterns and processes; natural science factors; aesthetic values; expressiveness or transient values of the ONL.

#### (e) Visual Simulations

Visual Simulation 06 – Moirs Hill Road, illustrates the view from Moirs Hill Road looking in an easterly direction.

#### 5.4.4 Mitigation

Mitigation measures are outlined in Section 7 of this Report.

#### 5.4.5 Summary of Effects

We have assessed the landscape and visual effects of the indicative alignment on this landscape character area to be low to moderate due to the relatively low landscape quality and modified level of natural character. With the implementation of mitigation measures these effects will be reduced to low.

Effects	Effects Rating	Comment
Biophysical	High	Extensive earthworks required in several locations
Visual Amenity	Low – moderate	Restricted visual catchment
Landscape / Natural Character	Low – moderate	Alteration to watercourses
Overall – Pre-mitigation	Low – moderate	
Mitigation		
Overall – Post-mitigation	Low	

## 5.5 Landscape Character Area 5 – Perry Road

#### 5.5.1 Route Description and Proposed Works

In this landscape character area, the indicative alignment emerges from the forested hill country to the southern abutment of a viaduct into the river valley occupied by the right branch of the Mahurangi River (see Appendix D).

The Perry Road viaduct extends for a distance of 440m up to 40m above existing ground level. The Kauri Eco Viaduct extends for a distance of 210m up to 21m above existing ground level. Although the indicative alignment crosses over several tributaries of the Mahurangi River, it generally avoids the flatter part of the valley and main trunk of the River by skirting around the base of the slopes to the south and western parts of the valley.



This route requires a series of cuttings and fill embankments of up to 27m high through the lower spurs extending from the main ridgeline and gullies where they connect to the main valley system.

#### 5.5.2 Existing Environment and Values

#### (a) Natural Character

This is a largely domesticated rural landscape that is strongly influenced by lifestyle activities. However the natural character values remain high due to:

- The influence of the Mahurangi River, with its meandering passage strongly defined by an extensive ribbon of riparian vegetation along its margins, which makes it a distinctive landscape feature.
- Other vegetation throughout the landscape character area, including a significant remnant indigenous stand in the southern part of the unit, on the interface with the exotic forestry plantation, and another area of indigenous bush with mature kauri on the slopes to the west of Genesis Aquaculture.
- The landform of the valley and the surrounding hill country.

#### (b) Landscape Values

The southern part of this landscape character area is identified as an Outstanding Natural Landscape (ONL 43 – West Mahurangi Harbour – refer to **Appendix B**). The specific landscape values attributed to ONL 43 are set out in Appendix F-2 of the ARPS and are discussed above at Section 5.4.2. The landscape values of the remainder of the area are also high, due to the distinctive combination of natural elements combined with human settlement patterns.

In the southern part of the area, around Perry Road, is a well-established rural residential enclave nestled into the foothills. The cluster of houses are well integrated into the setting by a distinctive fine grained pattern and compartmentalisation of the landscape created by local changes in landform, shelterbelts, and the scattered indigenous vegetation associated with the tributaries of the River.

This compartmentalisation creates a feeling of enclosure and intimacy in this area that adds to the overall amenity values. Further to the north the density of residential settlement remains comparatively high, albeit more scattered throughout the open valley and the surrounding slopes.

#### (c) Key Attributes of the Perry Road Character Area

- The Mahurangi River and riparian vegetation
- Remnant mature and regenerating indigenous vegetation
- River valley landform surrounded by rolling hill country
- Rural-residential settlement pattern interspersed with pastoral activities
- Compartmentalised landscape defined by shelterbelts and specimen tree plantings

Photographs 8 and 9 are indicative of this landscape character area.

#### 5.5.3 Landscape and Visual Effects

#### (a) Biophysical Effects

This landscape character area is highly sensitive in landscape and visual terms. The construction of the highway will bisect the valley, existing stands of indigenous vegetation and areas of pasture.

#### **Landscape and Visual Assessment Report**



Although the indicative alignment avoids the main cluster of settlement associated with Perry Road, it will have high biophysical effects in the southern part of this landscape character area.

The indicative alignment avoids the large area of mature indigenous bush, including kauri, immediately northwest of Genesis Aquaculture, through the construction of the viaduct.

#### (b) Visual Amenity Effects

This area will require extensive earthworks that will cause considerable disruption to the local landform and result in high visual effects for the local residential population. The Project will have a high effect on the rural amenity values of the area, and will change the landscape character of the valley. Such effects will be exacerbated by the enclosure and intimate scale of the landscape locally.

#### (c) Landscape / Natural Character Effects

The Project will have a high effect on the existing natural character values through the extensive earthworks, alteration to landform, stream culverting and the removal of a large area of mature indigenous bush. The close proximity to the residential settlement will degrade the landscape character and amenity values of the area.

#### (d) Effects on ONL 43

The portion of ONL43 affected by the indicative alignment is an appendage of the ONL that extends inland in the vicinity of Perry Road. The effects on this immediate area will be moderate due to the construction of the Kauri Eco Viaduct near the large area of indigenous vegetation to the west of Genesis Aquaculture.

The indicative alignment will have low effects on the integrity of the overall ONL however, due to the small portion affected. The ONL is extensive and largely focussed around the West Mahurangi Harbour and the river and stream valleys, bays and harbour headlands surrounding it which will be unaffected by the Project.

#### (e) Visual Simulations

Visual Simulation 07 – Perry Road, illustrates the view from the private residential property at 124 Perry Road looking in a westerly direction.





Photograph 8 – View from upper Wyllie Road looking northeast



Photograph 9 – View from Valerie Close looking west



#### 5.5.4 Mitigation

Mitigation measures are outlined in Section 7 of this Report.

#### 5.5.5 Summary of Effects

We have assessed the landscape and visual effects for this landscape character area to be high. Although landscape mitigation offers the potential for some amelioration over time, the effects will remain moderate to high.

Effects	Effects Rating	Comment
Biophysical	High	Extensive earthworks required, indigenous vegetation removal
Visual Amenity	High	Major element of the view from some parts of the local residential settlement
Landscape / Natural Character	High	Alteration to key elements and features
Overall – Pre-mitigation	High	
Mitigation		
Overall – Post-mitigation	Moderate – high	

#### 5.6 Landscape Character Area 6 – Wyllie / Woodcocks

#### 5.6.1 Route Description and Proposed Works

Within landscape character area 6 the indicative alignment crosses the flat expanse in the vicinity of the confluence of the left and right branches of the Mahurangi River (see Appendix D).

In this area the indicative alignment will be located on a low fill embankment from where it departs the low hill country to the south through to Woodcocks Road. The alignment extends over Wyllie Road via an overpass and a bridge extends over the Woodcocks Road/Carran Road intersection and the western arm of the Mahurangi River.

#### 5.6.2 Existing Environment and Values

#### (a) Natural Character

To the south of Wyllie Road is the land associated with the lower part of the river flats occupied by the right branch of the Mahurangi River. To the northwest of Wyllie Road the indicative alignment leaves this area and enters the broader landscape associated with the wide valley that extends westward toward Kaipara Flats. This landscape character area is characterised by a flat open pastoral landscape that is bisected by a tributary of the Mahurangi River. This watercourse, however, is not a distinctive natural feature due to the flat terrain and sparse riparian vegetation.

Although predominantly open grassland, there is a block of exotic forestry at the toe of the hill country to the west of Wyllie Road and a cluster of indigenous riparian vegetation to the northeast

#### **Landscape and Visual Assessment Report**



of the intersection of Woodcocks and Carran Roads. The remainder of the vegetation consists of fragmented shelterbelts and a scattering of vegetation along the Mahurangi River tributary.

Land use is predominantly pastoral grazing with a component of horticultural production. Throughout the area is a low density, but evenly distributed, pattern of dwellings, particularly near the roads. Overall, the natural character values are relatively low.

#### (b) Landscape Values

This is a productive rural landscape that is not particularly distinctive in any way. Even so, it still retains a reasonable level of landscape amenity by virtue of the rural qualities of the setting and open views to the surrounding countryside.

#### (c) Key Attributes of the Wyllie / Woodcocks Character Area

- Flat and open pastoral landscape bisected by the Mahurangi River tributaries
- Rising foothills to the west
- Scattered vegetation pattern with shelterbelts, riparian vegetation, exotic forestry and specimen trees
- Rural-residential settlement pattern interspersed with pastoral activities

Photographs 10 and 11 are indicative of this landscape character area.

#### 5.6.3 Landscape and Visual Effects

#### (a) Biophysical Effects

In this area the indicative alignment will be located on a low fill embankment. Although open and exposed, the sensitivity of this modified rural landscape character area is relatively low. The indicative alignment will however fragment the existing productive land units, alter the character and reduce the existing rural amenity of the area. Nonetheless, the alignment can be accommodated in this landscape character area with low to moderate biophysical effects on the overall character and quality of the landscape.

#### (b) Visual Amenity Effects

For the local residential population and users of nearby roads, the alignment will become a distinctive visual feature traversing the flat, open landscape on a raised embankment. Its visual integration, however, will be assisted by the low-lying landform, and further by suitable mitigation planting within the proposed designation boundaries.

#### (c) Landscape / Natural Character Effects

The alignment will have a low effect on the natural character values of the area. The main effects on natural character will relate to the culverting of a tributary to the Mahurangi River and several small watercourses. The landscape fill areas to the south of Woodcocks Road will assist to assimilate the alignment into the surrounding rural land. The indicative alignment avoids the tributary of the Mahurangi River in this area through bridging across Woodcocks/Carran Rd.

#### (d) Visual Simulations

Visual Simulation 08 – Wyllie Road illustrates the view from Wyllie Road looking in a southeasterly direction Visual Simulation 09 – Woodcocks Road illustrates the view from outside 433 Woodcocks Road looking in an easterly direction.





Photograph 10 – View looking east from Wyllie Road



Photograph 11 – View looking east from Wyllie Road



#### 5.6.4 Mitigation

Mitigation measures are outlined in Section 7 of this Report.

#### 5.6.5 Summary of Effects

We have assessed the landscape and visual effects of the Project on this landscape character area to be low to moderate during the construction of the highway on the raised embankment. The implementation of mitigation measures will reduce these effects to low during the operational phase and the Project will integrate into the existing open rural character of the setting that has the ability to accommodate the development.

Effects	Effects Rating	Comment
Biophysical	Low – moderate	Minor earthworks required
Visual Amenity	Low - moderate	Minor element of the view from local residential settlement
Landscape / Natural Character	Low	Low effect on key elements and features
Overall – Pre-mitigation	Low – moderate	
Mitigation		
Overall – Post-mitigation	Low	

#### 5.7 Landscape Character Area 7 – SH1 Link

#### 5.7.1 Route Description and Proposed Works

North of the Woodcocks Road/Carran Road intersection, the indicative alignment heads in a north-easterly direction from Woodcocks Road, where it departs from the flat open farmland along a cut through a south facing slope adjacent to the Mahurangi River floodplain. The indicative alignment then traverses the lower northern slopes of a narrow valley before connecting to the existing SH1 between Hudson Road and Kaipara Flats Road (see Appendix D).

#### 5.7.2 Existing Environment and Values

#### (a) Natural Character

The landform is characterised by low rolling hill country typical of the local area, with the gentle slopes either side of the valley providing definition to the landscape character area. Although pasture covers most of the hillsides and valley floor there are also relatively large clusters of regenerating indigenous vegetation over the slopes together with exotic trees, sporadic low hedgerows and a scattering of scrub throughout the area.

A tributary of the Mahurangi River also runs through the valley. The tributary lacks any significant riparian vegetation and its natural alignment has been highly modified so that it appears more of a drainage channel through much of the area. Although some natural elements remain prominent within the landscape character area, the natural patterns and processes have been significantly



modified by past and present agricultural land use to a point where the rural character is now the dominant expression of the landscape.

Residential settlement is largely absent from the low-lying areas of the valley but is a feature on the upper slopes, particularly the southern side where there is a lifestyle subdivision accessed off Viv Davie-Martin Drive. The low ridgeline to the south of the alignment separates the area from nearby Warkworth.

#### (b) Landscape Values

This character area is comprised of a pastoral landscape which is not particularly distinctive or memorable, although it does possess a reasonable degree of amenity due to its rural ambience, and the combination of its open rolling pasture together with contrasting areas of vegetation. These attributes are all further enhanced by the influence and views of elevated ranges in the distance.

#### (c) Key Attributes of the SH1 Link Character Area

- Low rolling and open hill country extending down to the valley floor
- Contrasting vegetation pattern with pasture, shelterbelts, riparian vegetation and specimen trees
- Residential settlement pattern on the southern slopes
- Influence of SH1

Photographs 12 and 13 are indicative of this landscape character area.

#### 5.7.3 Effects

#### (a) Biophysical Effects

The construction of the Project through this landscape character area will not require any significant modification to the landform, removal of vegetation or impact on any other notable landscape features. In addition, due to the area's predominant rural character and its proximity to Warkworth and the existing SH1, the Project will assimilate into the landscape, which exhibits a capacity to accommodate the type of change the Project will bring.

#### (b) Visual Amenity Effects

The location of the Project in combination with the surrounding landform will limit the visibility of the alignment from much of the surrounding area. Those most sensitive to the visual effects that will be generated by the Project are the nearby residents in the vicinity of the indicative alignment and particularly those with properties accessed off Viv Davie-Martin Drive. Most of this audience is located in elevated locations however, with views out across the wider landscape. The Project will have a moderate to high impact on the existing visual and rural amenity values for this permanent (but very small and localised) audience as it will become a distinctive visual feature traversing the valley floor and gently undulating slopes.

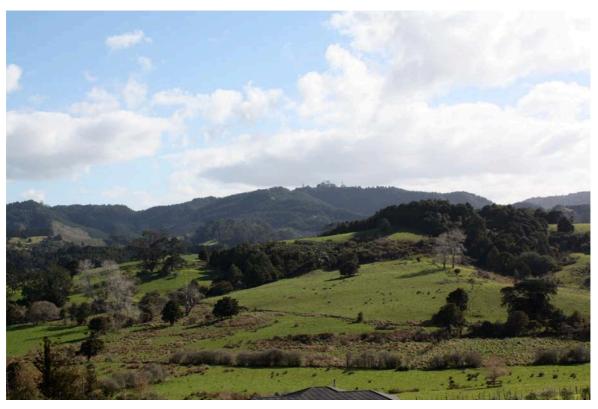
#### (c) Landscape / Natural Character

The natural character values of this area have been diminished to a large degree by the farming and settlement activities and the proximity of the area to the existing SH1. The alignment will have a low to moderate effect on the landscape quality and natural character of the area.



#### (d) Visual Simulations

Visual Simulation 10 – Viv Davie-Martin Drive illustrates the view from 78 Viv Davie-Martin Drive looking in a northerly direction. Visual Simulation 11 illustrates the view from 91 SH1 looking in a southeasterly direction.



Photograph 12 - View looking north from Viv Davie-Martin Drive





Photograph 13 - View looking southwest east from SH1

#### 5.7.4 Recommended Mitigation

Mitigation measures are outlined in Section 7 of this Report.

#### 5.7.5 **Summary of Effects**

We have assessed the landscape and visual effects of the Project on this landscape character area to be moderate to high during and immediately following construction for approximately 5 residential properties on the northern side of Viv Davie-Martin Drive.

The main effects in this character area relate to the visual amenity. Following mitigation, the overall landscape and visual effects will reduce to moderate.

Effects	Effects Rating	Comment
Biophysical	Low	Minor earthworks required
Visual Amenity	Moderate – high	Major element of the view from localised parts of the Viv Davie-Martin Drive residential area
Landscape / Natural Character	Low – moderate	Minor alteration to key elements and features
Overall – Pre-mitigation	Moderate – high	
Mitigation		
Overall – Post-mitigation	Moderate	



## 6. Construction Effects

#### 6.1 Potential construction effects

The extent and scale of the development will mean that some adverse effects are unavoidable. Such effects will be most prevalent during the construction period when the associated activities will be very disruptive due to the extent of modification they will bring to the existing environment, in particular, the visual change and contrast caused by modification to the landform and exposed earthworks contrasting with the surrounding areas of pasture and vegetation.

Biophysical landscape effects during the construction stage of the Project include alteration to streams and watercourses including culverts and stream diversion and vegetation clearance.

Landscape amenity effects will result from the extent and exposure of earthworks and construction activity including noise, dust and lighting (if applicable). Visual amenity effects will result from vegetation clearance and earthworks.

Construction effects are, however, relatively short term and regarded as temporary effects. The effects will be mitigated progressively following completion of each stage of works. The main effects will be generated by large scale earthworks, vegetation removal, and general construction activity, noise, dust and nuisance.

Although such activities will often have enduring effects into the operational phase of the highway, in many instances the initial severity is temporary, and can be successfully mitigated to a significant degree post-construction.

Those areas where the visual effects of constructing the Project are likely to be the most severe are where there are high existing natural character and landscape values and high levels of exposure to the large audience using SH1, or established permanent residential populations. The main landscape character areas likely to be affected during construction therefore include the Puhoi and Perry Road landscape character areas. The landscape and visual effects during the construction phase of the Project are discussed in chapter 5 above.

In addition to route selection, construction effects can be alleviated to a certain extent through forward planning particularly where there are specific effects on local populations. Such preemptive mitigation prior to or during construction may include the establishment of strategic screen planting within the designation and, where practicable, the construction of permanent or temporary bunding.

Another strategy to mitigate construction effects is the sequential rehabilitation of highway verges and adjacent areas of pasture and vegetation immediately following completion of construction where feasible.

#### 6.2 Mitigation of construction effects

The construction of a highway is a hugely transformative process in the landscape and consequently may have adverse effects on natural character, landscape and amenity values. The potential impacts of the Project during construction have been mitigated in a number of ways commencing at the planning and route selection stage.

Thorough analysis of many variables, selection of the indicative alignment has minimised the potential landscape and visual effects of the Project as much as is practicable for a proposal of this nature and scale.

#### **Landscape and Visual Assessment Report**



#### Specific considerations to date include:

- avoidance of construction in sensitive areas such as outstanding natural landscapes, SNAs, DOC reserves, riparian zones, wetlands and areas of indigenous bush
- minimisation of extensive cut batters and fill embankments
- maximised retention of existing indigenous vegetation
- retention of key landscape features
- use of bridges and viaducts to span waterways and local roads.



# 7. Recommended mitigation measures

Appropriate, sensitive and well-designed mitigation techniques can successfully integrate highways into the landscape and minimise any potential adverse effects of construction and ongoing operation.

In relation to landscape and visual effects, we propose a number of mitigation measures for the Project. These include:

- Construction of cut slopes and fill embankments to provide more natural integration with the surrounding landform
- Appropriate surface treatment of cut slopes grassing, hydroseeding, revegetation or naturally exposed rock face
- Revegetation of fill embankments where practicable
- Contouring of spoil disposal sites and integration with adjoining landforms
- Well-designed bridges and viaducts to reduce the physical and visual effects on the wetland and river flat areas
- Retention of existing vegetation and extensive planting between the new alignment and the existing SH1 in areas where the new alignment is not contained by the landform, to provide screening and visual integration
- Extensive planting based on established vegetation patterns along the alignment to integrate the highway and screen it from the residential settlement areas

As a result of our assessment of landscape and visual effects for the individual landscape character areas, we have recommended specific mitigation measures to address adverse effects in each area.

The following section outlines the more detailed landscape mitigation measures for the Project.

I have also recommended conditions requiring these measures to be undertaken.

Each of these landscape and visual mitigation measures are discussed in further detail below.

Appropriate, sensitive and well-designed mitigation techniques can successfully integrate highways into the landscape and minimise any potential adverse effects of construction and ongoing operation.

In relation to landscape and visual effects, we propose a number of mitigation measures for the Project. These include:

- Construction of cut slopes and fill embankments to provide more natural integration with the surrounding landform
- Appropriate surface treatment of cut slopes grassing, hydroseeding, revegetation or naturally exposed rock face
- Revegetation of fill embankments where practicable
- Contouring of spoil disposal sites and integration with adjoining landforms
- Well-designed bridges and viaducts to reduce the physical and visual effects on the wetland and river flat areas
- Retention of existing vegetation and extensive planting between the new alignment and the
  existing SH1 in areas where the new alignment is not contained by the landform, to provide
  screening and visual integration



• Extensive planting based on established vegetation patterns along the alignment to integrate the highway and screen it from the residential settlement areas

#### 7.1 Construction and Earthworks

Construction techniques and earthworks can influence the successful physical and visual integration of a project as much, if not more, than planting. Earthworks can also be used to provide effective visual screening and noise attenuation.

Where possible, we consider Project earthworks should be designed and graded out to integrate with the surrounding landscape. Grading out involves reducing the steepness of earthworks and blending them into the natural landform adjacent to the highway.

Methods of minimising the impact of the effects of earthworks on the Project include:

- blending and feathering of the edges of slopes into the adjacent landform;
- avoidance of creating 'engineered' looking landforms;
- avoidance of benching;
- use of MSE retaining slopes and walls instead of hard engineered retaining structures;
- use of bridges and viaducts to minimise earthworks;
- utilisation of locally sourced rock typical in scale and formation to that occurring naturally where rip-rap is required for erosion protection;
- maximising the fill embankment slope to help integrate it into the surrounding landform;
- grassing and/or revegetation of areas of earthworks in keeping with, and merging into the adjoining vegetation characteristics;
- blending and feathering of the edges of embankments; and
- retention and incorporation of naturally occurring landforms and features within the area of earthworks including natural ridgelines and features such as rock outcrops where practicable, natural drainage channels, watercourses and valley floors.

We consider earthworks should visually and physically transition into the natural landform and land cover and avoid streams or ephemeral watercourses where practicable. Replanting of embankments should be undertaken as early as possible following construction to avoid erosion.

For successful landscape and visual integration of the alignment, earthworks should reflect and integrate with the surrounding topography. Earthworks should respond to both the wider topography and smaller scale local landforms.

The strategies outlined below should be implemented as part of the Project works.

#### 7.1.1 Retention of Existing Vegetation

Where practicable all effort should be made to retain existing areas of significant vegetation as this provides:

- a significant influence of the existing landscape character;
- visual interest, landmarks and natural features;
- a sense of place and establishment to the landscape;
- more rapid visual integration of the highway development with the surrounding area;
- protection for newly planted vegetation; and
- habitat diversity and ecological linkages.



Where retention is not possible, we consider mitigation planting should be undertaken to areas disturbed by the works, using appropriate indigenous species sourced from the local area. Mitigation planting is discussed in detail in the Terrestrial Ecology Assessment Report.

#### 7.1.2 Spoil Disposal Areas

All disposal areas for excess fill should be designed and contoured in keeping with the general form of the surrounding landscape. They should also be revegetated in keeping with, and merging into the adjoining vegetation patterns and compositions.

#### 7.1.3 Terracing and Benching

The proposed designation boundaries adopted allow for 'mono-slope' cuts because these are favoured over terracing and benching from a visual, safety and whole-of-life maintenance perspective.

#### 7.1.4 Rock Cuttings

Different rock types give rise to variations in natural slope. We consider cuttings should reflect this and blend sensitively into the surrounds. Rock cuttings and blasting can provide features within the local landscape. When exposing rock, and stability is not an issue, a random cutting/blasting method should be employed to ensure the rock face resembles natural fractures.

#### 7.1.5 Mounding and Berms

Mounding and berms can be used to assist in screening the highway and areas adjacent to it. Their screening function and visual integration can be enhanced considerably when combined with planting.

We consider any sensitive mounding and ground modelling provided as part of the Project should respond to the landform and be designed to appear as natural as possible, in keeping with the characteristics of the surrounding landform. To achieve this mounding should be of variable length, height and alignment to avoid visual monotony and be blended to avoid sharp profiles and transitions with the base landform.

#### 7.1.6 Drainage Channels

We believe the visual impact of roadside drainage channels can be minimised and more successfully integrated into the surrounding landscape by:

- integrating drains with the natural drainage of adjacent land;
- limiting the depth to the minimum required by hydrological and geo-technical considerations;
- creating a shallow transition to allow for the establishment of riparian vegetation;
- varying the distance between the drain and the edge of the road in accordance with the adjacent terrain, where space allows; and
- constructing wide transition areas where the drain intersects with a natural drainage gully.



# 7.2 Structures and Detailed Design Elements

Except for landmark structures, such as viaducts and bridges, the emphasis for detailed design of structural elements within this largely rural setting should be on visual integration, with avoidance of complicated detailing that is more suited to urban areas.

#### 7.2.1 Structures Design

Bridges and viaducts are proposed in a number of locations to cross major watercourses and local roads. Structures including bridges, overpasses and underpasses should be designed to enhance the landscape context and road user experience. The bridge spans have been designed with widely spaced piers with spans between 35 m and 70 m apart, which will minimise the visual and physical impact of structures. Any design elements should be integrated into the overall structure rather than 'bolt-on' additions.

#### 7.2.2 Retaining Walls

We consider the emphasis for retaining walls along the Project alignment should be on visual integration. The design anticipates mechanically stabilised earth slopes and walls, which will be hydroseeded following construction, resulting in a green vegetated wall that will minimise adverse effects normally associated with hard constructed retaining walls.

Mounding and planting can also be used to reduce the apparent mass of retaining walls. Designing retaining walls with a balance of vertical and horizontal elements and simple relief can reduce their scale and visual impact.

#### 7.2.3 Split Carriageways

The splitting of dual carriageways enables the planting of the central median and/or grade separation, which ensures a better physical and visual integration of the carriageways into the landform. Spilt carriageways have been incorporated between the Schedewys and Moirs Hill Road landscape character areas.

### 7.3 Mitigation Planting

Vegetation themes occur naturally, by chance and design, throughout the landscape. Often vegetation themes are intrinsic components of the landscape character of an area. Planting design for the Project should draw from the existing patterns and compositions within the landscape (both natural and culturally induced, e.g. shelter belts, where applicable) to ensure appropriate aesthetic and environmental outcomes.

New planting should reflect subtleties in local landscape character. Opportunities should also be explored to develop wider landscape strategies and planting schemes with adjoining landowners to further integrate the alignment into its setting.

We consider the following principles should be applied to the planting design for the Project:

- planting should be site specific and appropriate to the existing soil and environmental conditions;
- planting should respond to the natural vegetation patterns by fragmenting and feathering the edges of planting to reflect naturally occurring gradations;

#### **Landscape and Visual Assessment Report**



- planting should extend beyond the boundaries of the designation where practicable to mitigate the loss of vegetation and to provide screening for adjoining landowners;
- planting should evoke a 'sense of place' and emphasise the contrasting character areas along the route;
- a more structured or designed approach to planting may be appropriate in some areas, such as interchanges, to provide visual interest and strengthen local identity; and
- planting should be used to assist in mitigating any adverse effects of the highway on surrounding areas by providing screening or filtering of views to and from the route from existing residential areas.

These principles are in line with NZTA's 'Guidelines for Highway Landscaping' (2006).

#### 7.3.1 Edge Effects

Edge effects result in changes to the vegetation composition and structure between the forest margins and forest interior, due to variations in microclimate. The removal of the natural edge and fragmentation of stands of vegetation consequently have potential implications for the health and structure of existing stands.

Consideration must be given to the effects of the removal of the natural edge of existing vegetation during Project construction, particularly where the alignment disturbs an area of indigenous vegetation.

Establishing a nurse crop of fast growing indigenous pioneer species, following the removal of the edge of the vegetation, can successfully re-establish a buffer zone between a new road and the forestry. Ideally, this should occur a minimum of 12-18 months prior to road construction, if practicable.

Providing a buffer of extensive planting of indigenous vegetation along the Project alignment through the exotic forestry plantations will provide an edge and buffer to the forestry behind, and improve the visual experience of the highway user.

#### 7.3.2 Screen Planting

Screen planting is an effective technique to mitigate many of the potential adverse visual effects of a highway on the surrounding area. The vegetative screening function and visual integration can be enhanced considerably when combined with earth mounding. Screen planting should be designed to appear as natural as possible and in keeping with the characteristics of the surrounding area. Planting may include dense planting of indigenous species or a simple shelterbelt, depending on the local characteristics.

Strategic planting and localised earthworks will provide physical separation and screening for nearby residents. Extensive planting between the Project alignment and the existing State highway, in areas where the new highway is not contained by the landform, will provide suitable visual screening and visual integration.



## 8. Conclusion

The NZTA's route selection process for the Project has meant that the alignment largely avoids the most sensitive landscapes in this part of the region. In some areas there will be high landscape and visual effects, from both the construction and operation of the Project.

The Project will introduce changes to the various landscape character areas along the route including the Puhoi River and estuary. The majority of the route however traverses landscapes that are already highly modified by farming and forestry activities, and the existing SH1.

The Project's adverse effects on natural character are limited, given the modified nature of the route. Adverse effects on natural character have been reduced through the use of bridges and viaducts across the Okahu Stream, Puhoi River, tributaries of the Mahurangi River, and the Mahurangi River. The most extensive areas of earthworks are largely restricted to existing areas of exotic forestry.

The most significant changes and resultant effects on visual amenity will arise from earthworks (in particular cut batters and fill embankments), retaining walls, bridges and viaducts. These effects will be more prominent in areas where there is a permanent residential population, including Puhoi Close, Perry Road and Viv Davie-Martin Drive.

The main visual effects of the Project will be during and soon after its construction. These effects will diminish over a short time (approximately 3-5 years) once pasture and vegetation in the disturbed areas re-establishes, and the cut faces take on a more weathered appearance as experienced with the construction of SH1 between Orewa and the Johnstone's Hill Tunnels.

In summary, while a project of this nature and scale will inevitably have some adverse landscape and visual effects, the NZTA has taken a best practice approach to avoid such effects as far as practicable. Where avoidance of effects has not been practicable, we have identified a number of mitigation measures to ensure these effects are reduced. At the detailed design stage, the mitigation measures will provide scope to reduce many of the temporary construction effects and the operational effects of the highway within a period of between 3-5 years.



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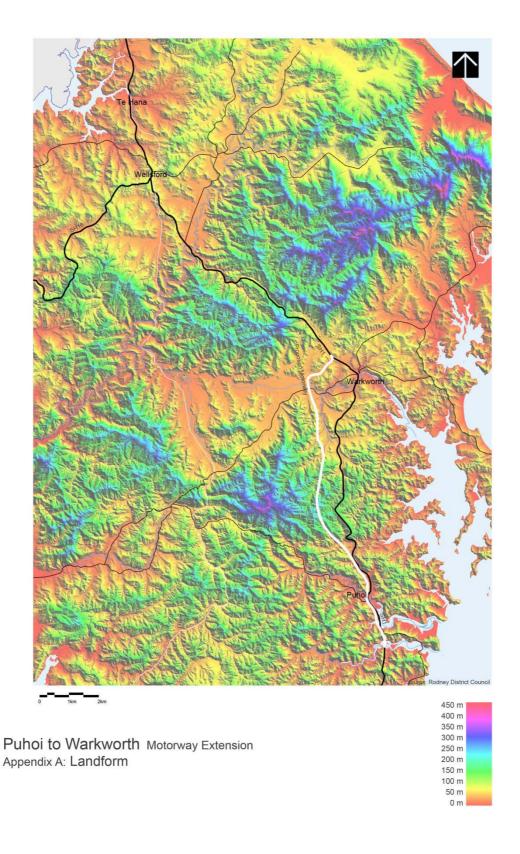
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# Appendix A. Landform





# **Appendix B. Existing Land Use and Vegetation**

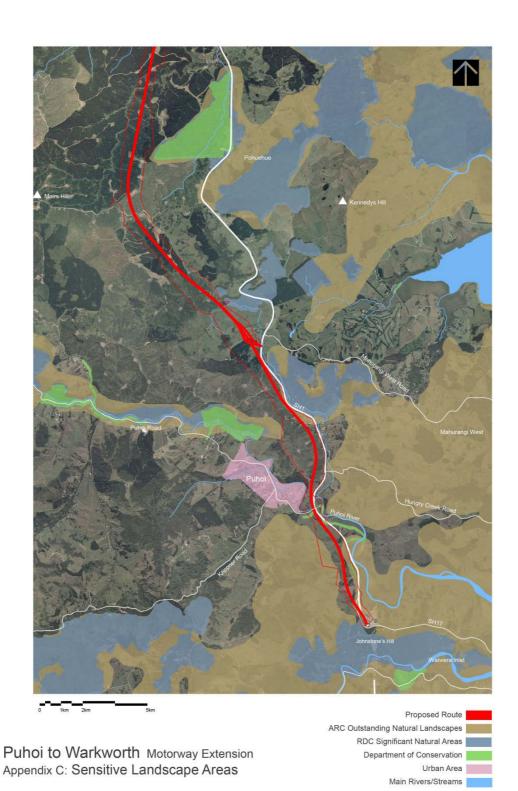




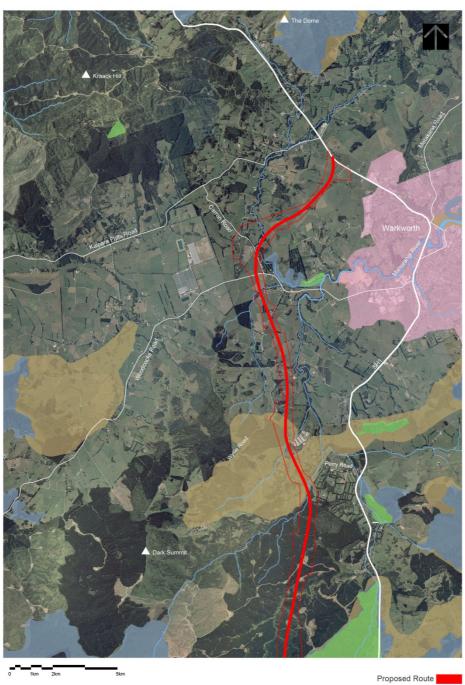




# **Appendix C. Sensitive Landscape Areas**



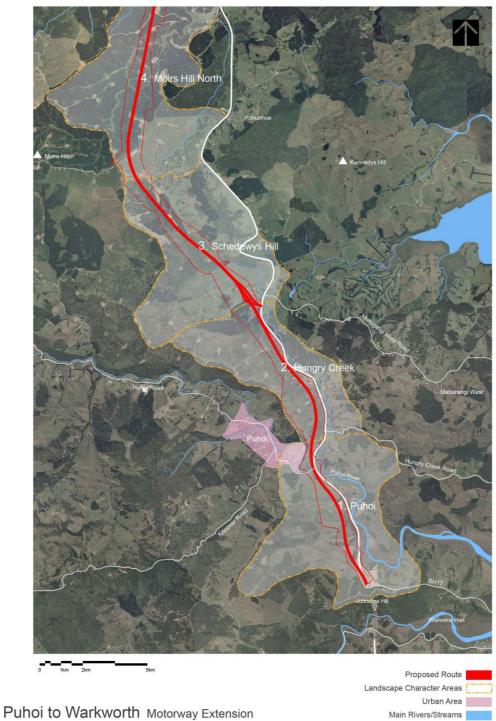




Puhoi to Warkworth Motorway Extension Appendix C: Sensitive Landscape Areas Proposed Route
ARC Outstanding Natural Landscapes
RDC Significant Natural Areas
Department of Conservation
Urban Area
Main Rivers/Streams



# **Appendix D. Indicative Alignment and Landscape Character Areas**



Appendix D : Proposed Alignment and Landscape Character Areas





Appendix D: Proposed Alignment and Landscape Character Areas