



TE TUPU NGĀTAHI
SUPPORTING GROWTH

Warkworth Assessment of Arboricultural Effects

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Appendix A: Tree Information

Glossary of Defined Terms and Acronyms

Acronym/Term	Description
AEE	Assessment of Effects on the Environment report
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
ATCOP	AT Code of Practice
AUP:OP	Auckland Unitary Plan: Operative in Part
CEDF	Cultural and Environmental Design Framework
CEMP	Construction Environmental Management Plan
CHI	Cultural Heritage Inventory
CIA	Cultural Impact Assessment
CLMP	Contaminated Land Management Plan
CNVMP	Construction Noise and Vibration Monitoring Plan
CoPTTM	Code of Practice for Temporary Traffic Management
CPTED	Crime Prevention through Environmental Design
CTMP	Construction Traffic Management Plan
DBC	Detailed Business Case
DEB	Decanting Earth Bunds
DSI	Detailed Site Investigation
ECR	Auckland Council Environmental Compensation Ratio
EIANZ	Ecological Impact Assessment New Zealand: terrestrial and freshwater ecosystems
EPA	Environmental Protection Authority
ESCP	Erosion and Sediment Control Plan
FESCP	Final Erosion and Sediment Control Plan
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban Zone
GHG	Greenhouse Gas emissions
GPS	Government Policy Statement
HNZPT / Heritage NZ	Heritage New Zealand Pouhere Taonga

Acronym/Term	Description
IBC	Indicative Business Case
LGA	Local Government (Auckland Council) Act 2009
MCA	Multi-Criteria Assessment
MHUD	Ministry of Housing and Urban Development
N/A	Not Applicable
NES	National Environmental Standard
NES:FW	Resource Management (National Environmental Standards for Freshwater) Regulations 2020
NPS	National Policy Statement
NPS:FM	National Policy Statement on Freshwater Management
NPS:UD	National Policy Statement on Urban Development
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
NOR	Notice of Requirement
NOR 1	Northern Public Transport Hub + Park and Ride and Western Link North
NOR 2	Woodcocks Road Upgrade (Western Section)
NOR 3	State Highway 1 Upgrade – South
NOR 4	Matakana Road Upgrade
NOR 5	Sandspit Road Upgrade
NOR 6	Western Link South
NOR 7	Sandspit Link
NOR 8	Wider Western Link (Northern Section)
NZ	New Zealand
NZUP	New Zealand Upgrade Programme
ONF	Outstanding Natural Features
ONL	Outstanding Natural Landscapes
PBC	Programme Business Case
PSI	Preliminary Site Investigation
RCA	Road Controlling Authority

Acronym/Term	Description
RLTP	Auckland Regional Land Transport Plan
RMA	Resource Management Act 1991
SEA	Significant Ecological Area
SEV	Stream Ecological Valuation
SH1	State Highway 1
SMAF	Stormwater Management Area: Flow
SQEP	Suitably Qualified and Experienced Practitioner
SL	Sandspit Link
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth Alliance
UDEF	Urban Design Evaluation and Framework
ULDMP	Urban Landscape and Design Management Plan
Watercare	Watercare Services Limited
Waka Kotahi	Waka Kotahi New Zealand Transport Agency
WL	Western Link
Zero Carbon Act	Climate Change Response (Zero Carbon) Amendment Act 2018

Executive Summary

Overview

The Warkworth Assessment Package is a network of planned transport infrastructure with the purpose of responding to planned future growth in the Warkworth growth areas. The transport network is made of eight NoRs including new corridors, existing road upgrades, and a public transport interchange with park and ride.

Table 1. Warkworth Assessment Package – NoR and Project Overview

Notice	Project
NOR 1	Northern Public Transport Hub and Western Link - North
NOR 2	Woodcocks Road Upgrade (Western Section)
NOR 3	State Highway 1 Upgrade – South
NOR 4	Matakana Road Upgrade
NOR 5	Sandspit Road Upgrade
NOR 6	Western Link - South
NOR 7	Sandspit Link
NOR 8	Wider Western Link – North

Methodology

This Report has been prepared following site visits that were undertaken for the collection of suitable data to inform an Assessment of Arboricultural Effects of the Warkworth project (the **Project**). The site visits and desktop review involved recording details of all relevant trees (as described further in this Report) within the Notices of Requirement (**NORs**).

Trees were recorded singularly, or in groups where logical groupings could be made based on species, configuration and/or size. Sufficient information was gathered to allow an assessment of the existing environment and consideration of the future environment. Tree details are presented in table and in GIS mapping formats (contained in the Appendices of this Report).

The existing environment for the majority of the Project corridor is primarily rural, the exception being the residential zoned land on Matakana Road and the existing more intensified urban land uses adjacent to SH1. Tree cover associated with the existing urbanised area typically include plantings of amenity trees and riparian vegetation.

The future environment is likely to change over the next 10 – 25 years as intensification occurs along the corridor as a result of recent changes in national policy direction and changes to the Resource Management Act 1991 (**RMA**). This will likely result in a reduction of trees adjoining the corridors, on business and residentially zoned land, which are not afforded any protection in the Auckland Unitary Plan: Operative in part (**AUP:OP**).

A summary of the trees or vegetation requiring removal for each NoR where relevant is provided in the table below with future discussion of the affected vegetation outlined in Sections 5 to 8 of this Report:

NoR	Number of Protected Trees/ Requiring Removal	Mass planted areas/groups of protected vegetation requiring removal
NOR 1	0	0
NOR 2	0	2
NOR 3	0	0
NoR 4	5	2
NOR 5	0	1
NOR 6	0	0
NOR 7	0	0
NOR 8	0	0
Total	5	21

Given that the Project is to be delivered in 10 – 30 years' time, a tree and vegetation assessment at the time of implementation is recommended to ensure the current conditions are still relevant. Any future tree removal, tree planting or mass planted vegetation should be assessed at that time, with this Report intended to provide a baseline survey.

Mitigation measures commensurate with the anticipated effects on the environment from impacts on protected trees have been considered, with the aim of avoiding, remedying and mitigating effects on trees. It is recommended that a Tree Management Plan (**TMP**) be developed where construction work impacts on trees and groups of trees that are protected under the District Plan provisions (trees protected under Regional Plan provisions will be addressed as part of a future regional resource consent process). Replacement planting protocols are proposed to be developed further as part of the TMP where protected trees are to be removed.

Opportunities for replanting within the berms of the proposed cross section provides the potential for significant mitigation of effects arising from tree removal associated with the Project. The long-term outcome of comprehensive street tree planting will be more trees in the public realm and increased amenity value within the public transport corridor.

Overall, the effects on trees protected by the District Plan will be mitigated by replacement planting within the corridor and on adjacent land.

Summary of Assessment of Effects and Recommendations

Effect	Assessment	Recommendation
Construction		
Removal of trees to enable the Project	A total of 5 individual trees and 21 tree groups are potentially required to be removed as part of the Project. Confirmation as to whether all trees or groups of trees will require removal will be determined as part of the detailed design phase.	<p>As part of the TMP a verification assessment at the time of implementation is recommended to ensure the current conditions are still relevant.</p> <p>Any future tree removal, tree planting or mass planted vegetation should be added and/or assessed at that time, with this Report intended to provide a baseline survey. Given this, it is recommended that a TMP be prepared.</p> <p>A tree transplant assessment is recommended for any trees considered worthy or relocation as part of the Project.</p>
Effects on retained vegetation	Works are proposed within the protected root zones of retained vegetation at the edge of the corridor.	It is recommended that a TMP be prepared prior to construction to address future tree removals, plantings and growth of areas of vegetation beyond the scope of this Report.
Replacement of trees lost in order to construct the Project	Replacement planting is recommended at a minimum of 2:1 for removed trees and a minimum of like for like (in m ²) of mass vegetation will require replanting	<p>A detailed landscape plan with replacement planting at a minimum ratio of 2:1 is to be prepared as part of the Urban Landscape Design Management Plan (ULDMP) and detailed design.</p> <p>It is recommended that arboricultural input be sought at the detailed design phase. The specific tree locations and/or tree species are to be reviewed and input provided in order to achieve the best outcome from a long term perspective.</p>
Operation		
Tree trimming or alteration	Replacement trees may require maintenance to retain sight lines and the overhead and lateral clearances of general traffic lanes and the high quality walking and cycling facilities	New street trees or mass planted vegetation (trees specifically) are planted no closer to the future general traffic lanes than 1 m.

1 Introduction

1.1 Purpose and scope of this Report

This Assessment of Arboricultural Effects report (**Report**) has been prepared to inform the Assessment of Effects on the Environment (**AEE**) for eight (8) Notices of Requirement (**NoR**) being sought by Waka Kotahi NZ Transport Agency (**Waka Kotahi**) and Auckland Transport (**AT**) for the Warkworth project (the **Project**) under the Resource Management Act 1991 (**RMA**). Specifically, this Report considers the actual and potential effects associated with the construction and operation of the Project on the existing and likely future environment as it relates to arboricultural effects and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

This Report should be read alongside the AEE, which contains further details on the history and context of the Project. The AEE also contains a detailed description of works to be authorised within each NOR, and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this report and have been considered as part of this assessment of arboricultural effects. As such, they are not repeated here. Where a description of an activity is necessary to understand the potential effects, it has been included in this Report for clarity.

1.2 Report structure

In order to provide a clear assessment of each NOR, this Report follows the structure set out in the AEE. That is, each notice has been separated out into its own section, and each section contains an assessment of the actual and potential effects for the specific NOR. Where appropriate, measures to avoid, remedy or mitigate effects are recommended.

Each section is arranged, starting from the easternmost point of the proposed NOR, to the westernmost point. Table 1 below describes the extent of each section, and where the description of effects can be found in this Report.

Table 2 Report Structure

Sections	Section number
Description of the Project	3
Overview of the methodology used to undertake the assessment and identification of the assessment criteria and any relevant standards or guidelines	4
Identification and description of the existing and likely receiving arboricultural environment;	5.2, 6.1.2, 6.2.2, 6.3.2, 7.2 and 8.2
Assessment of general arboricultural matters for all NORs	5
Assessment of specific arboricultural matters for NOR 1	5
Assessment of specific arboricultural matters for NOR 2	6

Sections	Section number
Assessment of specific arboricultural matters for NOR 3	7
Assessment of specific arboricultural matters for NOR 4	8
Assessment of specific arboricultural matters for NOR 5	9
Assessment of specific arboricultural matters for NOR 6	10
Assessment of specific arboricultural matters for NOR 7	11
Assessment of specific arboricultural matters for NOR 8	12

2 Introduction

This arboricultural assessment has been prepared for the Te Tupu Ngātahi Supporting Growth Alliance, Warkworth Package of Notices of Requirement (NORs) for Auckland Transport (AT) and Waka Kotahi NZ Transport Agency (WK) as requiring authorities under the Resource Management Act 1991 (RMA). The notices are to designate land for future strategic transport corridors as part of Te Tupu Ngātahi Supporting Growth Alliance to enable the future construction, operation and maintenance of transport infrastructure in the Warkworth area of Auckland.

2.1 Warkworth Growth Area

Warkworth is located at the northernmost extent of the Auckland Region, approximately 60km from the Auckland city centre, and 30km north of Orewa. It is identified as a satellite town in the Auckland Unitary Plan: Operative in Part (AUP:OP) and will act as a rural node that serves both the surrounding rural communities as well as connecting to urban Auckland.

The Warkworth growth area will be less than 5km north-south and east-west and will make a significant contribution to the future growth of Auckland's population. A 1000ha of currently rural land has been rezoned (Future Urban Zone) to support significant business and residential growth. At full build out it is anticipated to provide for approximately 8,200 new dwellings and employment activities that will contribute to 4,600 new jobs across Warkworth. This growth area will be development ready in the stages outlined below:

- **Stage 1** Warkworth North – Business land is already live zoned and remainder to be development ready by 2022.
- **Stage 2** Warkworth South – To be development ready between 2028 – 2032
- **Stage 3** Warkworth Northeast – To be development ready between 2033 – 2037

Furthermore, the Warkworth Structure Plan was adopted by the Council in 2019 and sets out the framework for transforming Warkworth from a rural environment to an urbanised community over the next 15 - 20 years.

The Warkworth Assessment Package will provide route protection for the local arterials, which include walking, cycling and public transport linkages needed to support the expected growth in Warkworth. The Warkworth Package of projects is summarised in Section 2.

This report addresses the arboricultural effects of the Warkworth Package (NOR 1 - NOR 8) identified in Table 1 in section 2.

Refer to the Assessment of Effects on the Environment (AEE) for a more detailed project description.

2.2 Purpose and scope of this Report

This arboricultural assessment forms part of the suite of technical reports prepared to support the assessment of effects (AEE) for the Warkworth Package. Its purpose is to inform the AEE that accompanies the eight Warkworth Network NORs sought by AT).

This report considers the actual and potential effects associated with the construction, operation and maintenance of the Warkworth Package on the existing and likely future environment as it relates to

arboricultural effects and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

The key matters addressed in this report are as follows:

- a) Identify and describe the arboricultural context of the Warkworth Assessment Package area;
- b) Identify and describe the actual and potential arboricultural effects of each NOR within the Warkworth Assessment Package;
- c) Recommend measures as appropriate to avoid, remedy or mitigate actual and potential arboricultural effects (including any conditions/management plan required) for each Project corridor within the Warkworth Assessment Package; and
- d) Present an overall conclusion of the level of actual and potential effects for each Project corridor within the Warkworth Assessment Package after recommended measures are implemented.

This report should be read alongside the AEE, which contains further details on the history and context of the Warkworth project. The AEE also contains a detailed description of works to be authorised within each NOR, and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this report and have been considered as part of this assessment of arboricultural effects. As such, they are not repeated here. Where a description of an activity is necessary to understand the potential effects, it has been included in this report for clarity.

3 Warkworth Package Overview

The Warkworth package is a network of planned transport infrastructure with the purpose of responding to planned future growth in the Warkworth growth areas. The transport network is made of eight NORs including public transport interchange, existing road upgrades, and new corridors.

An overview of the Warkworth NOR package is set out in Table 3 and shown in Figure.

Table 3. Warkworth NOR Package

Corridor	NOR	Description	Requiring Authority
Northern Public Transport Hub and Western Link – North	1	New northern public transport hub and associated facilities including a park and ride at the corner of State Highway 1 (SH1) and the new Western Link – North. New urban arterial cross-section with active mode facilities between the intersection of SH1 and Te Honohono ki Tai (Matakana Link Road) to the proposed bridge crossing, enabling a connection for development in the Warkworth Northern Precinct as provided for in the Warkworth North Precinct.	Auckland Transport
Woodcocks Road - West	2	Upgrade of the existing Woodcocks Road corridor between Mansel Drive and Ara Tūhono (Puhoi to Warkworth) to an urban arterial cross-section with active mode facilities.	Auckland Transport

Corridor	NOR	Description	Requiring Authority
State Highway 1 – South Upgrade	3	Upgrade of the existing SH1 corridor between Fairwater Road and the southern Rural Urban Boundary to an urban arterial cross-section with active mode facilities.	Auckland Transport
Matakana Road Upgrade	4	Upgrade of the existing Matakana Road corridor between the Hill Street intersection and the northern Rural Urban Boundary to an urban arterial cross-section with active mode facilities.	Auckland Transport
Sandspit Road Upgrade	5	Upgrade of the existing Sandspit Road corridor between the Hill Street intersection and the eastern Rural Urban Boundary to an urban arterial cross-section with active mode facilities.	Auckland Transport
Western Link – South	6	New urban arterial cross-section with active mode facilities between the intersection of SH1 and McKinney Road and Evelyn Street.	Auckland Transport
Sandspit Link	7	New urban arterial cross-section with active mode facilities between the intersection of Matakana Road and Te Honohono ki Tai (Matakana Link Road) and Sandspit Road.	Auckland Transport
Wider Western Link – North	8	New urban arterial cross-section with active mode facilities between Woodcocks Road and the Mahurangi River.	Auckland Transport

Figure 1. Warkworth NOR package Overview



4 Assessment methodology and statutory context

4.1 Preparation for this Report

This Report has been prepared in accordance with the typical arboricultural assessment process of large-scale infrastructure projects.

We have also drawn on experience gained through providing specialist arboricultural input and reporting as part of other Te Tupu Ngātahi Projects, on behalf of Waka Kotahi and AT.

4.2 Methodology

The Arboricultural Assessment methodology involved recording details of all trees that may be impacted by the construction and operation of the Project within the proposed designations. Trees in this instance will be any woody plant that is 4 m or greater in height, or that may reach this dimension in the future. In particular, trees that are protected by the AUP:OP, under the District Plan provisions were recorded (e.g. if scheduled (i.e. a Notable Tree), within the road reserve, open space zone or located in an AUP:OP overlay).

The protection status of trees was recorded, based on the current District Plan rules that apply to the tree/s growing location. Those trees protected through District Plan provisions are discussed in this Report in terms of an assessment of effects and potential mitigation measures to address these effects. Those trees protected through Regional Plan provisions are included in this Report to Any regional consent requirements in relation to removal or works proximate to trees covered by the Regional Plan provisions will be assessed through a future resource consent process.

Specifically, this assessment was undertaken using the following methodology:

- An overview Project Team workshop. This workshop defined the proposed corridor and detailed the eight NORs to be assessed as part of the Project;
- A review of the project corridor. Additional information was requested from the Project Team and this informed the initial survey works;
- A high-level desktop survey of all trees and vegetation affected by the Project corridor was undertaken. A high-level route and works footprint plan set were used to inform the initial survey in order to assess the presence of street trees, large areas of densely planted vegetation or significant individual trees (such as Notable Trees);
- The initial survey information was provided to the Project Team in the form of GIS co-ordinates and a excel table with baseline information. The Project Team then transposed this information onto Te Tupu Ngātahi GIS viewer;
- The exact number of trees, areas of vegetation and Notable Trees affected by the proposed works were then refined. This information was then provided to the Project Team and a discussion was held with other discipline specialists including landscape architecture and ecology on potential mitigation;
- For the purposes of this assessment, groups of vegetation were recorded based on the estimated area to be removed. This was measured using the Auckland Council Unitary Plan GIS viewer measurement tool. It was not considered reasonable or practical to record every tree in each group. Furthermore, it is considered the value of this vegetation type is based on its function in that

group as opposed to its value as an individual specimen. A site drive over was undertaken by car to confirm the information was accurate at the time of the desktop survey (March 2022);

- The initial tree and vegetation information has been used to inform the proposed tree and landscape mitigation assessment; and
- This arboricultural assessment has then been prepared to summarise the anticipated arboricultural effects. This Report provides a recommended mitigation strategy, assessment of arboricultural effects in terms of the AUP:OP provisions pertaining to trees and vegetation on roads and open space zoned land and general recommendations from an arboricultural perspective to inform the NORs and supporting documentation.

For the purposes of this Report, vegetation standing on private property is not assessed in terms of effects unless it is subject to a specific overlay in the AUP:OP and is impacted by the Project.

4.3 Statutory Context

4.3.1 Notice of Requirement – district plan requirements

This assessment has been prepared to support the AEE and NOR process. If confirmed, the designations will authorise the District Plan land use components of the Project. Accordingly, when assessing the actual or potential effects on the environment of allowing the requirement in terms of section 171 of the RMA, this assessment has been limited to matters that would trigger a District Plan consent requirement. Where regional consenting requirements are triggered, these will not be authorised by the designation, and will require further regional consents.

In order to demonstrate the split between Regional and District Plan matters, protected trees (under either the Regional or District provisions of the AUP:OP) have been listed in tables and plotted on site plans in the Appendices of this Report. The tables and site plans assist to identify the potential arboricultural effects of the construction of the Project, and whether these are Regional Plan, or District Plan matters under the AUP: OP.

4.3.2 Future Regional Resource Consents

No regional resource consents are currently being sought for the Project. As required these will be sought at a later date during the detailed design and regional consent phase, before construction commences.

4.3.3 District Plan rules

The following tables set out the relevant rules that apply tree protection for the Project under the District Plan and the Regional Plan jurisdiction of the AUP: OP.

AUP:OP jurisdiction	Reference	Rule	Where rule applies	Activity status
DP	E26.4.3 Activity Table	All activities (must) obtain the approval of the Tree Asset Manager	Trees in roads and on open space zones	Mandatory requirement

AUP:OP jurisdiction	Reference	Rule	Where rule applies	Activity status
DP	E26.4.3.1 (A83)	Tree trimming or alteration	Trees in roads and on open space zones	Permitted Activity
DP	E26.4.3.1 (A84)	Tree trimming or alteration that does not comply with Standard E26.4.5.1 (Trees in streets and open space zones) or Standard E.26.4.5.3 (Notable Trees)	Trees in roads and on open space zones	Restricted Discretionary Activity
DP	E26.4.3.1 (A87)	Works within the protected root zone that comply with Standard E26.4.5.2	Trees in roads and on open space zones	Permitted Activity
DP	E26.4.3.1 (A88)	Works within the protected root zone not otherwise provided for	Trees in roads and on open space zones	Restricted Discretionary Activity
DP	E26.4.3.1 (A91)	Tree removal of Notable Trees	Notable Tree overlay	Discretionary
DP	E26.4.3.1 (A91)	Tree alteration or removal of any tree less than 4m in height and/or less than 400mm in girth	Trees in roads and on open space zones	Permitted Activity
DP	E26.4.3.1 (A92)	Tree alteration or removal of any tree greater than 4m in height and/or greater than 400mm in girth (See note 2)	Trees in roads and on open space zones	Restricted Discretionary Activity
DP	E26.4.3.1 (A93)	Tree trimming, alteration or removal not otherwise provided for	Trees in roads and on open space zones	Discretionary Activity
DP	E26.4.3.1	Where land is zoned 'Strategic Transport Corridor' zone, trees are not subject to protection as this land is specified as a 'zone' the relevant zone provisions take precedence over the underlying 'road' which is not a zone under the AUP:OP.. An exception would occur when trees are protected under rules pertaining an AUP rule on adjacent land (such as Open Space zoned land)	Trees in roads	Permitted Activity

Note 1:

Standard E26.5.3.2 Vegetation alteration or removal states:

- (1) Must not include trees over 6 m in height, or 600 mm in girth unless their removal is otherwise permitted by a rule in this Plan.*
- (2) Must not result in the removal of more than 20 m² of vegetation within a significant ecological area, except within the formation width of the road.*
- (3) Must not result in the removal of more than 50 m² of vegetation within a coastal area or riparian area not identified as a significant ecological area.*
- (5) Must not result in the removal of more than 500 m² of vegetation within the legal road or the formation width of the road in a rural zone.*
- (6) Must not result in the removal of more than 250 m² of vegetation outside the legal road or the formation width of the road in a rural zone.*

5 Existing and likely receiving Arboricultural environment

The projects encompassing the Warkworth NOR package will be constructed 15-25 years from now. The implementation timeframe for each project will vary and correspond with future land release within the area. Assessing the effects on the environment solely as it exists today (i.e., at the time of assessment) will not provide an accurate reflection of the environment in which some of the effects will be experienced. Accordingly, the assessment of effects considers both the existing environment, and the likely receiving environment in which the effects will likely occur.

The Warkworth NOR package will be constructed and will operate alongside existing urban environments or planned future environments (i.e. what can be built under the existing Auckland Unitary Plan: Operative in Part (AUP:OP) and what is identified in the Warkworth Structure Plan):

1. **Existing environment:** A number of corridors comprising the Warkworth NOR package are partially located within/alongside existing urban areas.
 - a) Matakana Road – residential land uses (single house zone, mixed housing suburban zone, mixed housing urban zone) comprise the western and north-western extents of the corridor.
 - b) Western Link - South – residential land uses are situated to the north and northwest of the corridor and existing industrial land use on the eastern extent of the corridor.
 - c) State Highway 1 – South – residential land uses are adjacent to the northwest and southeast of the northern extent of the corridor, additionally there are established business land uses to the northeast of the northern extent of the corridor.
 - d) Woodcocks Road (Western Section) – the eastern extent of the corridor has existing residential land uses to the north and south.
2. **Future environment:** All the corridors in the Warkworth NOR package will partially or wholly be constructed and implemented on land identified for future growth (future urban zone) and as a result are anticipated to change to urban or industrial land uses.

The likelihood and magnitude of land use change regarding the land use planning context has been identified in Table 4 below. This has been used to inform the assumptions made on the likely future environment

Table 4. Likelihood and magnitude of land use change

Existing environment	Current AUP:OP Zoning	Likelihood of Change for the environment ¹	Magnitude of potential change	Likely Receiving Environment ²
Residential³	Residential (Mixed Housing Suburban)	Low	Low	Residential
	Residential (Mixed Housing Urban)	Low	Low	Residential
	Residential (Single House)	Low	Low	Residential
Business	Business (Mixed Use)	Low	Low	Business (Industrial)
	Business (General Business)			Business (General Business)
	Business (Light Industry)	Low	Low	Business (Industrial)
	Business (Local Centre Zone)	Low	Low	Business (Neighbourhood Centre)
Open Space	Open Space – Conservation Zone	Low	Low	Informal Recreation
Greenfield areas	Future Urban Zone	High	High	Urban
Other	Special Purpose – Quarry Zone	Low	Med	Quarry

Refer to the AEE in Volume 2 for a detailed description of the existing and likely receiving environment for the Warkworth NOR package.

¹ Based on AUP:OP zoning/policy direction

² Based on Warkworth Structure Plan and AUP:OP zoning/policy direction

6 Warkworth NORs – Overall network

This section assesses common or general arboricultural matters across the overall Warkworth Project i.e. the combination of public transport interchanges, existing road upgrades and new corridors. This section also recommends measures to avoid, remedy, or mitigate actual or potential adverse effects for the overall network.

6.1 Overview and description of works

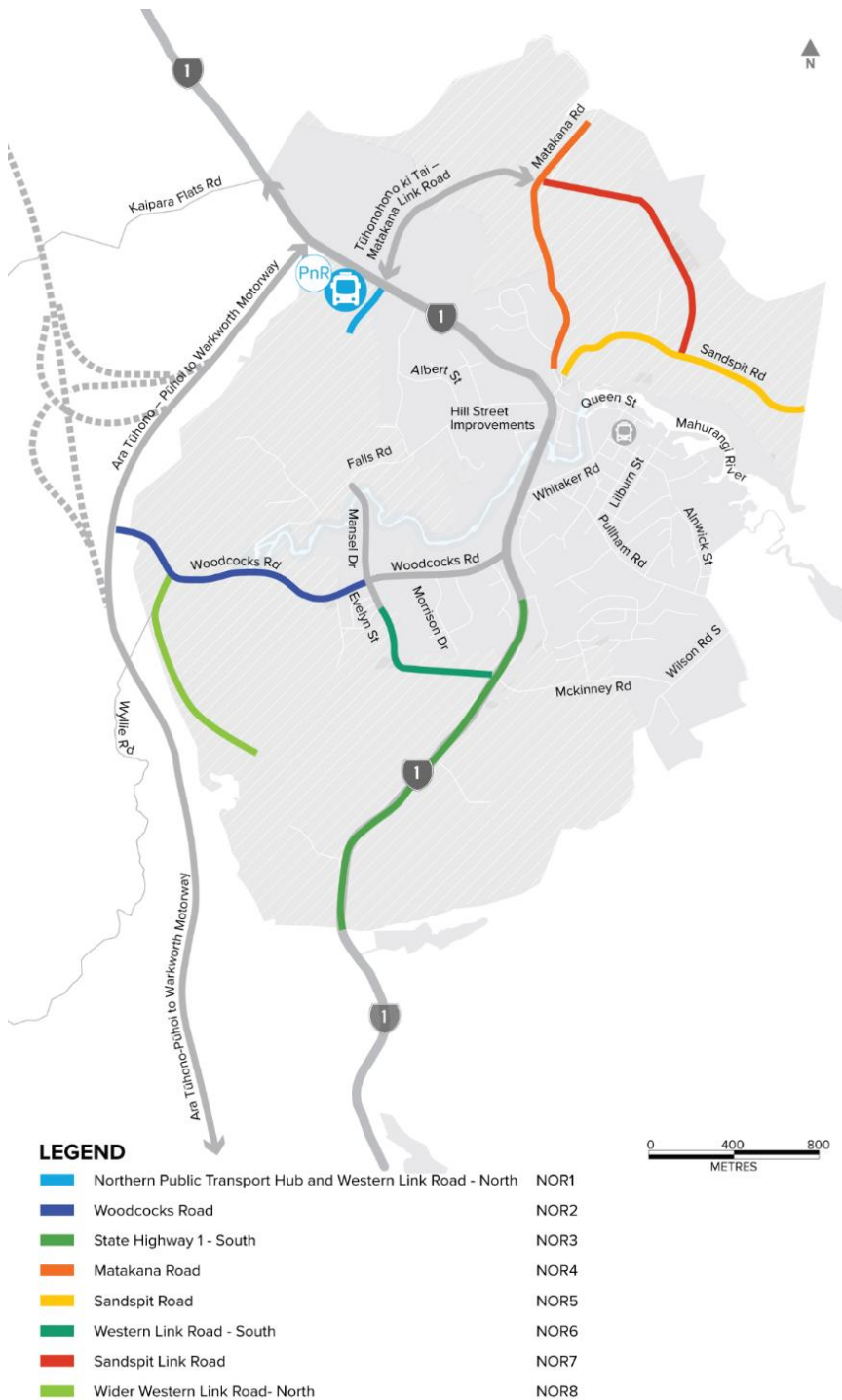


Figure 2 - Overview of project extent

6.2 Positive arboricultural effects

Positive arboricultural effects will occur within all proposed NOR areas when considering the existing land use. No formal public tree plantings on formalised grass berms or within dedicated open space parks or recreational areas occur within NORs 2,3,5 with NoR 3, 6 & 7. These NORs are new connections through greenfield rural environments with little existing tree cover.

The proposed corridor cross sections include sufficient space for a formal berm on both sides of the new corridor for the majority of each route. This will allow for the replanting of new trees in an environment conducive to good tree growth with suitable setbacks provided from future roading infrastructure.

It is noted that in some cases, such as near intersections, that further planting may not be possible.

The full extent of replacement planting cannot be determined at this stage of the process, due to the detailed design to be completed in the future and likely construction timeline for the final Projects being 10 to 25 years into the future.



Figure 3 – Proposed cross section of new roadway demonstrating ability to plant new street trees in a berm area.

6.3 Assessment of operational effects

Operational effects of the Project are largely limited to the maintenance of sight lines and the overhead and lateral clearances of general traffic lanes and the high-quality walking and cycling facilities. The required clearances will largely be limited to existing retained vegetation and newly planted vegetation within the proposed berm area will only require management in the medium term.

6.4 Recommended measures to avoid, remedy or mitigate operational effects

It is recommended that any new street trees or mass planted vegetation (trees specifically) are planted no closer to the future general traffic lanes than 1 m to enable unrestricted future growth.

Once the Project has been constructed, no further effects on trees are anticipated. Ongoing maintenance of street trees and trees retained adjacent to the corridor is a standard operational requirement.

6.5 Summary and Conclusions

Effect	Assessment	Recommendation
Operational		
Tree trimming or alteration	New or replacement trees may require maintenance to retain sight lines and the overhead and lateral clearances of general traffic lanes and the high-quality walking and cycling facilities	New street trees or mass planted vegetation (trees specifically) are planted no closer to the future general traffic lanes than 1 m. This is to be addressed in the ULDMP

Table 5. Summary of Assessment of Effects of Recommendations - Overall network

7 NOR 1 – Northern Public Transport Hub and Western Link - North

The proposed works area for NOR 1 is located on Future Urban zoned land. There are no vegetation areas that are subject to (district) protection. As such, no assessment of trees and vegetation has been undertaken within the NOR 1 area.

It is noted that a permanent stream runs to the south of the main PT hub, with a portion of the Western Link crossing this stream. Any vegetation alteration removal or disturbance would be assessed in the future to determine whether a regional Resource Consent is required (as outlined in Section 4.3.2).

8 NOR 2 – Woodcocks Road (Western Section)

This section assesses specific arboricultural matters relating to NOR 2 – Woodcocks Road (Western Section).

8.1 Overview and description of works

Woodcocks Road (western section) is an existing arterial extending from the interchange with Ara Tūhono in the west to the Mansell Drive intersection in the east. It is proposed to upgrade the existing corridor to a two-lane urban arterial with cycling and walking facilities on both sides of the corridor.

The proposed upgrade will provide a key east-west connection for all modes between existing SH1 and the western growth area in Warkworth. Additionally, the corridor connects to key future north south links including the Wider Western Link – North and Western Link - South. The upgrade will also improve active mode user safety along the corridor.

The proposed works will include the removal of all trees and vegetation along the existing road corridor. The adjacent land is zoned Future Urban, with vegetation within the road corridor, for the most part, not subject to protection due to this adjacent zoning.

8.2 Existing Environment

Woodcocks Road is largely typical of a rural road with predominately self-seeded weed species and indigenous vegetation growing along the road frontages and private property vegetation extending into Road Reserve.

Two small areas adjacent to the existing road corridor are subject to an Open Space-Conservation Zone overlay. This land is adjacent to an existing stream and 286 Woodcocks Road, with this zoning applicable to both the northern and southern sides of Woodcocks Road.

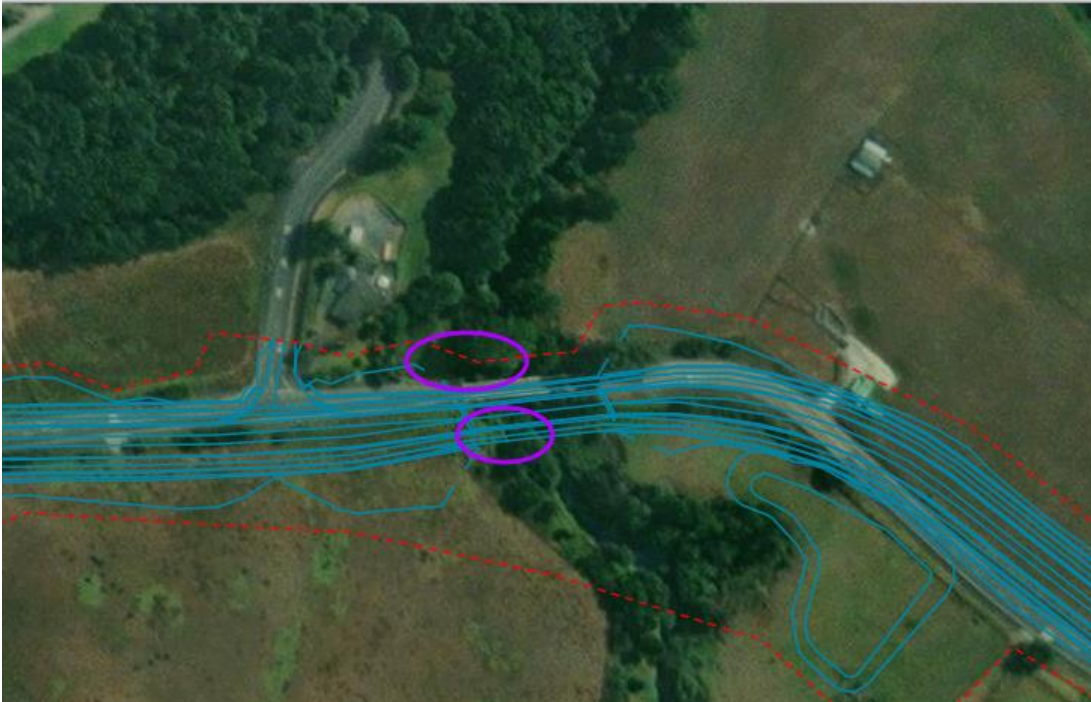


Figure 4 – Two protected open space areas circled in Purple above within NOR 2

8.2.1 286 Woodcocks Road

The proposed works footprint will largely involve the removal of vegetation to the south of the existing bridge area. However, it is anticipated that some tree and vegetation disturbance will occur to the north in the area directly adjacent to the existing bridge structure. Vegetation within this area includes a mixture of exotic and indigenous species including some weed species vegetation. The most significant trees in this location include a number of large Totara (*Podocarpus totara*) on the northern side and mixed weed species vegetation including Hawthorn (*Crataegus monogyna*) and Willow (*Salix sp.*) and at least (2) semi-mature Totara growing on the southern side. It is anticipated that all vegetation to the south of the bridge within the designated area would be removed. Works within the protected root zone of vegetation to the north would also be anticipated but would be subject to detailed design.

8.2.2 Road Reserve adjacent to 141 Carran Road

This particular area is heavily vegetated with predominantly indigenous vegetation. The trees and vegetation directly adjacent to the road largely include Manuka (*Leptospermum scorparium*), Ti Kouka (*Cordyline australis*), Karamu (*Coprosma robusta*) and a variety of weed species. The more significant vegetation, being primarily mature Totara, is set back further from the existing road edge and largely stands outside of the proposed designation area. Approximately eight (8) Totara stand within the designated area. Currently they are shown outside of the main works area. However, as with all NOR sections, detailed design is required to determine the exact level of impact.

Refer back to the AEE in Volume 2 for a detailed description of the existing and likely receiving environment for the overall Warkworth package.

8.3 Positive Arboricultural effects

The proposed infrastructure upgrades will include the formation of a new formal road corridor. This road corridor includes a provision for a new grass berm to be formally planted with street trees. Considering the largely sporadic nature of vegetation within a rural road setting, formal street tree plantings will improve the overall structure and number of trees planted within this section.

Overall, it is anticipated that the number of new plantings would outweigh the number of trees proposed for removal within the designated area, both protected and non-protected.

8.4 Assessment of construction effects

The Key features of the proposed new corridor affecting trees and vegetation will include the following:

- Upgrading the corridor to a two-lane urban arterial with walking and cycling facilities on both sides of the corridor.
- Tie-ins with existing roads, stormwater wetland and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Upgraded crossing over the Mahurangi River– Other construction related activities required outside the permanent corridor including the re-grade

of driveways, construction traffic manoeuvring and construction laydown areas.

An indicative Construction Methodology is provided at Appendix 1.

In order to undertake the above works, it is anticipated that all vegetation within the footprint of the proposed alignment would require removal. Further assessment would be required at the time of detailed design to establish the viability of the retention of any trees at the edge or overhanging the proposed alignment or associated earthworks.

8.5 Recommended measures to avoid, remedy or mitigate construction effects

8.5.1.1 Tree Removal and Replacement Planting

As noted previously, the removal of trees on both sides of the proposed corridor will be required throughout the entire corridor to enable the works.

The new berm areas will be available for replacement planting, with it recommended that all available berm be utilised for new tree plantings. The final landscape design should be reviewed and arboricultural input provided prior to implementation to ensure tree species selection and locations are suitable from a long-term perspective.

A Tree Management Plan (**TMP**) should be developed prior to construction to identify existing trees protected under the District Plan provisions that require removal and detail methods for all work within the root zone of trees that are to be retained. The TMP should include:

- Confirmation that protected trees identified in **Appendix A** still exist;
- Advice on how the design and location of works can avoid, remedy or mitigate effects on the existing trees;
- Recommended planting to replace trees that require removal;
- Establishing tree protection zones and specifying tree protection measures such as protective fencing, ground protection and physical protection of roots, trunks and branches; and
- Detailing methods for all work within the root zone of trees that are to be retained in line with appropriate arboricultural standards.

Replacement planting will be decided through planting details for the Project under the Urban Landscape Design Management Plan (**ULDMP**) proposed as a condition on the designation. The ULDMP should also include detail of methodologies to establish new trees within the road reserve, including creation of quality below ground environments, correct planting and appropriate maintenance.

For the NORs, the TMP will be limited to the identification of trees protected under the District Plan, as trees protected under Regional Plan provisions will be addressed as part of a future resource consent process. Consideration of tree transplanting should be included in the TMP, where good quality trees in the road reserve are identified for removal. An assessment of the quality of the trees and the feasibility of transplantation should form part of the TMP.

8.5.1.2 Mass vegetation removal

In the case of the removal of the naturally occurring or planted vegetation near the bridge (Groups 201 & 202), care must be taken to minimise any construction impacts in terms of the fragmentation of the remaining vegetation beyond the proposed removed areas.

Where practicable, the works area must be kept to a minimum, with retaining walls utilised in place of batters where adjacent to retained vegetation. Edge effects must be managed appropriately in the management of construction machinery required to avoid unnecessary temporary effects.

A specific assessment and recommendations are to be provided as part of the preparation of the TMP. These recommendations must include a tree protection methodology and set out parameters for the management of the ongoing health of any retained trees.

In some cases, it may be possible to transplant/relocate some specimen trees in these areas. A detailed transplant assessment should be prepared at the time of detailed design. The transplant assessment is to include maintenance periods, methodology of transplant and the new location for each relocated tree.

8.6 Assessment of operational effects

No additional effects to those overall effects identified in section 6.3 of this Report

8.7 Recommended measures to avoid, remedy or mitigate operational effects

Nil. Refer to section 6.4 of this Report.

8.8 Summary and Conclusions

The Project works affect two (2) groups in the road reserve with an adjacent open space zoning. The works are likely to have adverse effects on these trees. The extent of clearance where practical should be minimised, with all remaining significant trees retained and protected where possible during the Project works. Where retention is not possible any removed tree is to be replaced with new trees as part of the TMP. Provided this can be achieved, the effects on these trees will be mitigated.

Effect	Assessment	Recommendation
Construction		
Removal of trees to enable the Project	The removal of 2 tree groups will require removal to enable the Project in this section	Replacement planting at a minimum of 2:1. The replacement of mass planted indigenous vegetation is recommended for this section. Replacement planting will be decided through planting details for the Project under the ULDMP proposed as a condition on the designation. The methodology for protection is to be included in the TMP.
Operation		
Tree trimming or alteration	Replacement trees may require maintenance to retain sight lines and the overhead and lateral clearances of general traffic lanes and the high quality walking and cycling facilities	New street trees or mass planted vegetation (trees specifically) are planted no closer to the future general traffic lanes than 1 m.

9 NOR 3 – State Highway 1 – South

This section assesses specific arboricultural matters relating to NOR 3 – State Highway 1 - South.

9.1 Overview and description of works

NOR 3 comprises of a section of SH1 running from just south of the intersection of Valerie Road northwards to just north of 'The Grange' shopping mall (Fairwater Road Intersection)

The land adjacent to SH1 from Valerie Close to McKinney Road is zoned 'Future Urban Zone'. From that point north, the adjacent land is zoned residential or business zone. The existing road corridor is also subject to a 'Strategic Transport Corridor Zoning'.

All trees within Road Reserve for this portion of the route are not subject to protection due to either the adjacent FUZ zoning or their location being within the 'Strategic Corridor' zoned land parcel.

Refer back to the AEE in Volume 2 for a more detailed description of works to be authorised.

9.2 Assessment Features

While no tree protection is afforded to vegetation within this NOR, it is considered important to record significant trees and vegetation within the road corridor for consideration in a future assessment. The locations and general details of this vegetation is outlined in Appendix A of this report.

Refer back to the AEE in Volume 2 for a detailed description of the existing and likely receiving environment for the overall Warkworth package.

10 NOR 4 – Matakana Road

This section assesses specific arboricultural matters relating to NOR 4 – Matakana Road.

10.1 Overview and description of works

NOR 4 comprises of a section of Matakana Road from the Sandspit Road intersection in the south to just north of Clayden Road (adjacent to 306 Matakana Road).

The western side of Matakana Road throughout this section transitions from residential zoned land to rural zoned land. The eastern side is almost exclusively zoned 'Future Urban'.

In consideration of these adjacent zones, vegetation on the western side of Matakana Road is subject to protection under the relevant E26. provisions relating to vegetation on Road Reserve. Trees on the eastern side are not protected due to the adjacent land zoning being either FUZ or Rural.

Refer back to the AEE in Volume 2 for a more detailed description of works to be authorised.

10.2 Assessment Features

The most significant vegetation within the NOR 4 designation is located in the southern portion either on or adjacent to the existing Road Reserve. Dense areas/plantings of mixed exotic and indigenous vegetation is growing adjacent to the road corridor from the Matakana Road/Sandspit Road intersection adjacent to the residential zoned land. This planting reduces in density from where the residential land transitions from Residential - Single House zoned land (19 Northwood Close southward) to Residential -Mixed Housing Urban zoned land (165 Matakana Road northward).

The main vegetation within this area is identified as emergent to semi-mature Totara, large areas of Tree Privet (*Ligustrum lucidum*) and an area of SEA characterized by a mixture of weed species vegetation, planted exotic garden variety species, as well as planted and emergent pioneer indigenous species. Emergent species include Karamu (*Coprosma robusta*), Ti Kouka (*Cordyline*

australis), Tarata (*Pittosporum eugenioides*), Kohuhu (*Pittosporum tenuifolium*) and Karo (*Pittosporum crassifolium*).

Two (2) Notable trees and a Notable tree grouping (AUP ID 2421 & 2422), being a Deodar Cedar (*Cedrus deodara*) and Sweet Gum (*Liquidambar styraciflua*) and a group of Totara (*Podocarpus totara*) are growing within 3 Matakana Road. Based on a review of proposed designation boundary, any future works will be largely clear of the root zone of the Cedar tree and the Totara grouping, located near to the existing public footpath. The Liquidambar is further within the site and will not be affected. All works near to the Cedar tree are to be assessed from an arboricultural perspective, with the management of works near these trees to be included in the future TMP.

A scattering of planted street trees are growing on the western side of Matakana Road adjacent to the residential zoned land. These include two (2) Pohutukawa (*Metrosideros excelsa*) and a cluster of three (3) exotic trees which include a Sweet Chestnut (*Castanea sativa*) Gleditsia (*Gleditsia triacanthos*) and Pin Oak (*Quercus palustris*).

The proposed works within the designation will include cut/fill works adjacent to the new roading layout. As such, it is anticipated that all vegetation growing within Road Reserve would be removed.

Trees and vegetation growing within the adjacent properties are likely to be affected by these works and may require removal. In the case of the eastern side of Matakana Road, this area is zoned FUZ and as such the existing vegetation densities on private property is likely to change in the future.

Refer back to the AEE in Volume 2 for a detailed description of the existing and likely receiving environment for the overall Warkworth package.



Figure 5 – Notable trees within Matakana Road as seen from the Matakana Road carriageway



Figure 6 – Image showing typical mass vegetation within this NOR

10.3 Positive arboricultural effects

As with the previous sections, the proposed infrastructure upgrades will include the formation of a new formal road corridor. This road corridor includes a provision for a new grass berm to be formally planted with street trees. Considering the largely sporadic nature of vegetation within a rural road setting, formal street tree plantings will improve the overall structure and number of trees planted within this section within the public realm.

10.4 Assessment of construction effects

The Key features of the proposed new corridor affecting trees and vegetation will include the following:

Upgrading Matakana Road to accommodate the above-mentioned section cross-sections with cycle lanes and footpaths on both sides of the corridor.

- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Likely posted speed of 50kph, design speed (of which effects will be assessed on) is 60 kph
- Batter slopes to enable widening of the corridor, and associated cut and fill activities.
- Vegetation removal along the existing road corridor
- Other construction related activities required outside the permanent corridor including the re-grade

of driveways, construction traffic maneuvering and construction laydown areas.

The indicative form and function details and a cross section of the Matakana Road Upgrade are identified in the figure below:

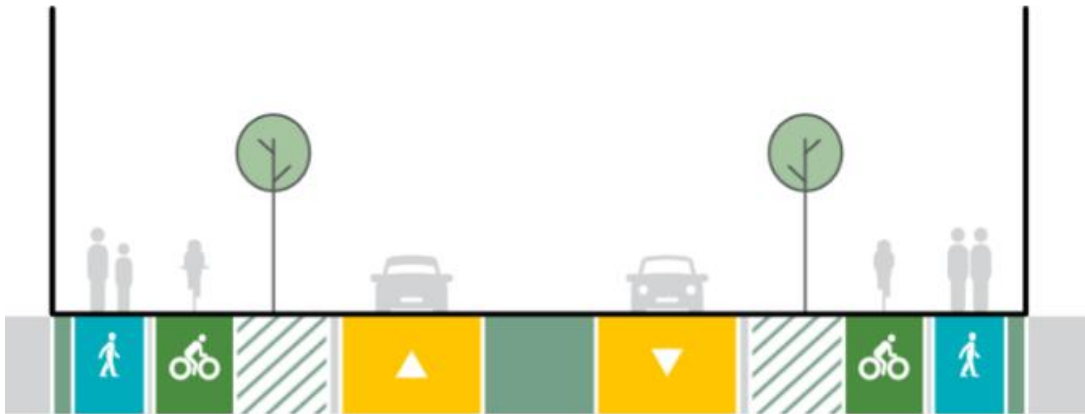


Figure7 – Overview of the Matakana Road Upgrade

10.5 Recommended measures to avoid, remedy or mitigate construction effects

10.5.1.1 Tree Removal and Replacement Planting

As noted previously, the removal of trees or groups of trees on both sides of the proposed corridor will be required throughout the entire corridor to enable the works.

The new berm areas will be available for replacement planting, with it recommended that all available berm be utilised for new tree plantings. The final landscape design should be reviewed and arboricultural input provided prior to implementation to ensure tree species selection and locations are suitable from a long-term perspective.

A Tree Management Plan (**TMP**) should be developed prior to construction to identify existing trees protected under the District Plan provisions that require removal and detail methods for all work within the root zone of trees that are to be retained. The TMP should include:

- Confirmation that protected trees identified in **Appendix A** still exist;
- Advice on how the design and location of works can avoid, remedy or mitigate effects on the existing trees;
- Recommended planting to replace trees that require removal;
- Establishing tree protection zones and specifying tree protection measures such as protective fencing, ground protection and physical protection of roots, trunks and branches; and
- Detailing methods for all work within the root zone of trees that are to be retained in line with appropriate arboricultural standards.

Replacement planting will be decided through planting details for the Project under the Urban Landscape Design Management Plan (**ULDMP**) proposed as a condition on the designation. The ULDMP should also include detail of methodologies to establish new trees within the road reserve, including creation of quality below ground environments, correct planting and appropriate maintenance.

For the NORs, the TMP will be limited to the identification of trees protected under the District Plan, as trees protected under Regional Plan provisions will be addressed as part of a future resource consent process. Consideration of tree transplanting should be included in the TMP, where good quality trees in the road reserve are identified for removal. An assessment of the quality of the trees and the feasibility of transplantation should form part of the TMP.

10.5.1.2 Mass vegetation removal

In the case of the removal of the mass planted or naturally occurring vegetation throughout NOR 3 within the existing road reserve, care must be taken to minimise any construction impacts in terms of the fragmentation of the remaining vegetation on adjacent private land or on residual land beyond the proposed removed areas.

Where practicable, the works area must be kept to a minimum, with retaining walls utilised in place of batters where adjacent to retained vegetation. Edge effects must be managed appropriately in the management of construction machinery required to avoid unnecessary temporary effects.

A specific assessment and recommendations are to be provided as part of the preparation of the TMP. These recommendations must include a tree protection methodology and set out parameters for the management of the ongoing health of any retained trees.

In some cases, it may be possible to transplant/relocate some specimen trees in these areas. A detailed transplant assessment should be prepared at the time of detailed design. The transplant assessment is to include maintenance periods, methodology of transplant and the new location for each relocated tree.

10.6 Assessment of operational effects

Refer to section 6.3 of this Report

10.7 Recommended measures to avoid, remedy or mitigate operational effects

Refer to section 6.4 of this Report.

10.8 Summary and Conclusions

The Project works directly affect 5 protected trees and 3 groups in the road reserve and open space zoned areas. The works are likely to have adverse effects on these trees. Provided that these trees are retained and protected where possible during the Project works, or they are replaced with new trees as part of the CDEMP the effects on these trees will be mitigated.

Effect	Assessment	Recommendation
Construction		
Removal of trees to enable the Project	The removal of 5 individual trees and 3 tree groups will require removal to enable the Project in this section	Replacement planting at a minimum of 2:1. The replacement of mass planted indigenous vegetation is recommended for this section. Replacement planting will be decided through planting details for the Project under the ULDMMP proposed as a condition on the designation. The methodology for protection is to be included in the TMP.
Operation		
Tree trimming or alteration	Replacement trees may require maintenance to retain sight lines and the overhead and lateral clearances of general traffic lanes and the high quality walking and cycling facilities	New street trees or mass planted vegetation (trees specifically) are planted no closer to the future general traffic lanes than 1 m.

11 NOR 5 – Sandspit Road

This section assesses specific arboricultural matters relating to NOR 5 – Sandspit Road.

11.1 Overview and description of works

Sandspit Road is an existing arterial providing east-west connection between the Warkworth growth area and the towns of Sandspit and Snells Beach. This project extends from the tie in with the Hill Street intersection upgrade Project (non-SGA project) in the west and to the eastern Future Urban Zone boundary.

The majority of road reserve in this section is adjacent to FUZ and as such those trees within such areas are not subject to protection. Near the southern end of Sandspit Road, three open space zoned areas are abutting road reserve on Sandspit road between the Matakana Road intersection and Withers Lane. Based on the current NOR designation layout, the main area to be effected will be the section on the southern side of Sandspit Road, identified as Lot 7 DP138902 in the AUP.

All vegetation in excess of 4.0m in height or 400mm in girth is subject to protection.

Refer back to the AEE in Volume 2 for a more detailed description of works to be authorized



Figure 8 – AUP viewer plan showing areas of Open Space zoned land (in green)

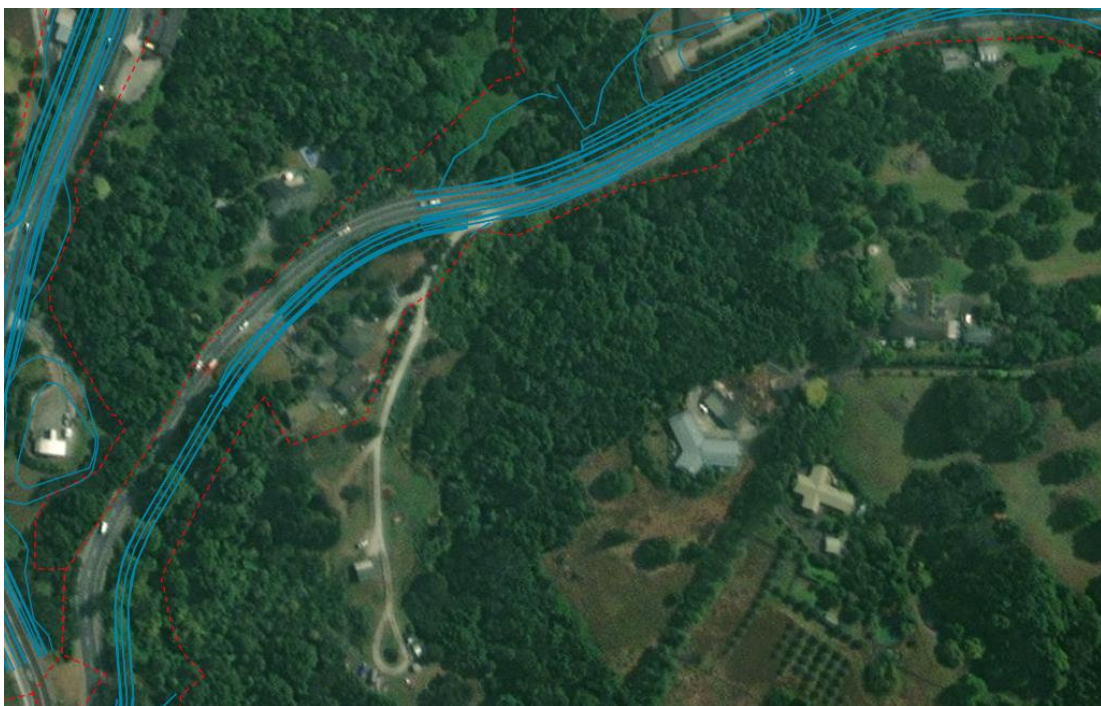


Figure 9 - Proposed Designation showing adjacent land effects.

11.2 Assessment Features

The protected areas outlined in the previous section are typical of the wider indigenous vegetation, as described in Section 10.2 and is heavily weed infested.

The larger, more significant trees, being largely mature Totara, are located on the upper bank section of the two northern sections (Lot 5 DP208832 & 155310 respectively),. However, the large significant trees (also largely Totara) are at the edge or overhang the existing road corridor on the southern section side.

For this reason, the proposed designation alignment is largely to the north, to make use of the lesser value buffer vegetation directly adjacent to 89 Sandspit Road.

Care has been taken to anticipate a corridor that will reduce the effects on the more significant trees and vegetation within this section.

Refer back to the AEE in Volume 2 for a detailed description of the existing and likely receiving environment for the overall Warkworth package.



Figure 10 – Vegetation within Open Space areas adjacent to Sandspit Road

11.3 Positive arboricultural effects

As with the previous sections, the proposed infrastructure upgrades will include the formation of a new formal road corridor. This road corridor includes a provision for a new grass berm to be formally planted with street trees. Considering the largely sporadic nature of vegetation within a rural road setting, formal street tree plantings will improve the overall structure and number of trees planted within this section within the public realm. It is anticipated that, based on the designation boundaries, that the more significant vegetation growing within the SEA areas will be retained and protected as part of the future works.

11.4 Assessment of construction effects

The Key features of the proposed new corridor affecting trees and vegetation will include the following:

Upgrading Sandspit Road to accommodate a two-lane cross-section with cycle lanes and footpaths on both sides of the corridor.

- Construction of two stream bridges
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Likely posted speed of 50kph, design speed (of which effects will be assessed on) is 60 kph
- Batter slopes to enable widening of the corridor, and associated cut and fill activities.
- Vegetation removal along the existing road corridor
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

Figure 11– Sandspit Road Upgrade indicative layout



Recommended measures to avoid, remedy or mitigate construction effects

11.4.1.1 Tree Removal and Replacement Planting

As noted previously, the removal of trees on both sides of the proposed corridor will be required throughout the entire corridor to enable the works.

The new berm areas will be available for replacement planting, with it recommended that all available berm be utilised for new tree plantings. The final landscape design should be reviewed and arboricultural input provided prior to implementation to ensure tree species selection and locations are suitable from a long-term perspective.

A Tree Management Plan (**TMP**) should be developed prior to construction to identify existing trees protected under the District Plan provisions that require removal and detail methods for all work within the root zone of trees that are to be retained. The TMP should include:

- Confirmation that protected trees identified in **Appendix A** still exist;
- Advice on how the design and location of works can avoid, remedy or mitigate effects on the existing trees;
- Recommended planting to replace trees that require removal;
- Establishing tree protection zones and specifying tree protection measures such as protective fencing, ground protection and physical protection of roots, trunks and branches; and
- Detailing methods for all work within the root zone of trees that are to be retained in line with appropriate arboricultural standards.

Replacement planting will be decided through planting details for the Project under the Urban Landscape Design Management Plan (**ULDMP**) proposed as a condition on the designation. The ULDMP should also include detail of methodologies to establish new trees within the road reserve, including creation of quality below ground environments, correct planting and appropriate maintenance.

For the NORs, the TMP will be limited to the identification of trees protected under the District Plan, as trees protected under Regional Plan provisions will be addressed as part of a future resource consent process. Consideration of tree transplanting should be included in the TMP, where good quality trees in the road reserve are identified for removal. An assessment of the quality of the trees and the feasibility of transplantation should form part of the TMP.

11.4.1.2 Mass vegetation removal

In the case of the removal of the mass planted or naturally vegetation within the protected areas as part of NOR 5, care must be taken to minimise any construction impacts in terms of the fragmentation of the remaining vegetation beyond the proposed removed areas.

Where practicable, the works area must be kept to a minimum, with retaining walls utilised in place of batters where adjacent to retained vegetation. Edge effects must be management appropriately in the management of construction machinery required to avoid unnecessary temporary effects.

A specific assessment and recommendations are to be provided as part of the preparation of the TMP. These recommendations must include a tree protection methodology and set out parameters for the management of the ongoing health of any retained trees.

In some cases, it may be possible to transplant/relocate some specimen trees in these areas. A detailed transplant assessment should be prepared at the time of detailed design. The transplant assessment is to include maintenance periods, methodology of transplant and the new location for each relocated tree.

11.5 Assessment of operational effects

Nil. Refer to section 6.3 of this Report

11.6 Recommended measures to avoid, remedy or mitigate operational effects

Nil. Refer to section 6.4 of this Report.

11.7 Summary and Conclusions

The Project works affect 5 protected trees and 3 groups in the road reserve and open space zoned areas. The works are likely to have adverse effects on these trees. Provided that these trees are retained and protected where possible during the Project works, or they are replaced with new trees as part of the TMP the effects on these trees will be mitigated.

Effect	Assessment	Recommendation
Construction		
Removal of trees to enable the Project	The removal selected trees and vegetation from within road reserve (adjacent to open space zoned land) or within open space zoned land to enable the Project in this section	Replacement planting at a minimum of 2:1. The replacement of mass planted indigenous vegetation is recommended for this section. Replacement planting will be decided through planting details for the Project under the ULDMP proposed as a condition on the designation. The methodology for protection is to be included in the TMP.
Operation		
Tree trimming or alteration	Replacement trees may require maintenance to retain sight lines and the overhead and lateral clearances of general traffic lanes and the high quality walking and cycling facilities	New street trees or mass planted vegetation (trees specifically) are planted no closer to the future general traffic lanes than 1 m.

12 NOR 6 – Western Link - South

This section assesses specific arboricultural matters relating to NOR 6 – Western Link - South

12.1 Overview and description of works

The Western Link - South is located at the end of Evelyn Street in the north to SH1 in the south and runs through existing greenfield land. The Western Link - South Project involves the construction of a new two-lane urban arterial with walking and cycling facilities on both sides and upgrading the intersection with McKinney Road. The new corridor will provide key north-south connection in the Warkworth network.

The purpose of the Western Link is to enable development in west Warkworth and provide access to FUZ land and industrial areas while taking pressure off the existing SH1 and Hill Street intersection. Refer back to the AEE in Volume 2 for a detailed description of the existing and likely receiving environment for the overall Warkworth package.

The Western Link travels through an area of farmland largely devoid of trees and vegetation. No SEA areas or vegetation protected under district plan measures was identified.

As such, no further assessment of this NOR is provided in this assessment.

13 NOR 7 – Sandspit Link

This section assesses specific arboricultural matters relating to NOR 7 – Sandspit Link.

13.1 Overview and description of works

Sandspit Link is a proposed new road with the purpose of providing strategic east-west movements to Matakana and Kowhai Coasts and providing local access to the northern growth area. The corridor extends from Matakana Road in the north-west and connects to Sandspit Road in the southeast.

The alignment provides a resilient alternative to SH1 and Hill Street Intersection whilst improving dual accessibility between the northern growth area and Warkworth. The Sandspit Link Project involves the construction of a two-lane urban arterial with cycle lanes and footpaths on both sides and a new intersection at the connection with Sandspit Road.

The Sandspit Link travels through FUZ zoned land which is primarily in farmland largely devoid of trees and vegetation, with the exception of riparian areas adjacent to streams. No SEA areas or vegetation protected under district plan measures was identified.

As such, no further assessment of this NOR is provided in this assessment.

14 NOR 8 – Wider Western Link - North

This section assesses specific arboricultural matters relating to NOR 8 – Wider Western Link – North.

14.1 Overview and description of works

The Wider Western Link - North is a proposed new arterial extending from Woodcocks Road in the north to SH1 in the south. The extent of the proposed new Wider Western Link - North is from Woodcocks Road to the Mahurangi River crossing.

The Wider Western Link - North project involves the construction of a two-lane urban arterial with walking and cycling facilities on both sides. The corridor connects the Southern Interchange to Woodcocks Road and SH1 and, provides access into the southern FUZ where access will otherwise be difficult due to topography and streams.

No specific trees or vegetation have been assessed as part of this NOR. It is anticipated a regional resource consent will be required at a future stage for works involving the crossing at the Mahurangi stream.

Refer back to the AEE in Volume 2 for a more detailed description of works to be authorised.

15 Conclusions

The existing environment for the majority of the Project corridor is primarily rural or Future Urban Zone, the exception being areas of residential zoned land on Matakana Road, State Highway 1 and Woodcocks Road. Tree cover associated with the existing rural environments typically include plantings of amenity trees, naturally occurring emergent and established indigenous mass planted areas and riparian vegetation within the road reserve and open space zones.

The future environment is likely to change over the next 10 – 25 years as intensification occurs along the corridor as a result of recent changes in national policy direction and changes to the Resource Management Act 1991 (**RMA**). This will likely result in a reduction of trees adjoining the corridor, on business and residentially zoned land, which are not afforded any protection in the Auckland Unitary Plan: Operative in part (**AUP:OP**).

A summary of the trees or vegetation requiring removal for each NOR, which are protected by District Plan provisions in the AUP:OP is provided in the table below:

NoR	Number of Protected Trees/ Requiring Removal	Mass planted areas/groups of protected vegetation requiring removal
NOR 1	0	0
NOR 2	0	2
NOR 3	0	0
NOR 4	5	2
NOR 5	0	1
NOR 6	0	0

NoR	Number of Protected Trees/ Requiring Removal	Mass planted areas/groups of protected vegetation requiring removal
NOR 7	0	0
NOR 8	0	0
Total	5	21

It is recommended that a Tree Management Plan (**TMP**) be developed where construction work impacts on trees and groups of trees that are protected under the District Plan provisions. Trees protected under Regional Plan provisions will be addressed as part of a future regional resource consent process. Replacement planting protocols are proposed to be developed further as part of the TMP where protected trees are to be removed.

The designation provides for sufficient opportunities for replanting within the berms of the future potential corridor cross section(s) to provide mitigation of potential effects which may arise from tree removal associated with the Project. The long-term outcome of comprehensive street tree planting will be more trees in the public realm and increased amenity value within the public transport corridor.

Overall, the effects on trees protected by the District Plan by the NORs for the Project will be mitigated by replacement with new trees and mass planted vegetation as part of the corridor.

1 Appendix A: Tree Information

NOR 2							
Status	Tree No.	Vegetation Type	Protection	Location	Species	Age	Comments
Likely to be removed/ portion to be removed.	201	Group of Trees	Road Reserve (adjacent to open space zoned land)	Northern side of Woodcocks Road (adjacent to stream and 286 Woodcocks Road)	Totara & Poplar, mixed shrubs	Semi - Mature	Power lines crossing bridge in this location. Some effects as part of bridge works anticipated
Likely to be removed/ portion to be removed.	202	Group of Trees	Road Reserve (adjacent to open space zoned land)	Southern side of Woodcocks Road	Exotic and native shrubs / hedge/ small Totara	Young-semi-mature	Removal of trees/shrubs in this area for widening works.

NOR 3							
Status	Tree No.	Vegetation Type	Protection	Location	Species	Age	Comments
Strategic Corridor	330	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	329	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	328	Single tree	Road Reserve	SH1	Sophora teptraptera	Mature	
Strategic Corridor	327	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	326	Single tree	Road Reserve	SH1	Sophora teptraptera	Mature	
Strategic Corridor	325	Single tree	Road Reserve	SH1	Sophora teptraptera	Mature	
Strategic Corridor	324	Single tree	Road Reserve	SH1	Sophora teptraptera	Mature	
Strategic Corridor	323	Single tree	Road Reserve	SH1	Sophora teptraptera	Mature	
Strategic Corridor	342	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	341	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	340	Single tree	Road Reserve	SH1	London Plane	Mature	

NOR 3							
Strategic Corridor	339	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	338	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	337	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	322	Single tree	Road Reserve	SH1	Kowhai	Mature	
Strategic Corridor	321	Single tree	Road Reserve	SH1	Kowhai	Mature	
Strategic Corridor	320	Single tree	Road Reserve	SH1	Kowhai	Mature	
Strategic Corridor	335	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	334	Single tree	Open Space	SH1	London Plane	Mature	
Strategic Corridor	336	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	331	Group of Trees	Road Reserve	SH1	Black Wattle	Semi - Mature	
Strategic Corridor	319	Single tree	Road Reserve	SH1	London Plane	Mature	
Strategic Corridor	346	Single tree	Road Reserve	SH1	Kowhai	Mature	
Strategic Corridor	345	Single tree	Road Reserve	SH1	Plane tree	Semi - Mature	

NOR 3							
Strategic Corridor	344	Single tree	Road Reserve	SH1	Plane tree	Semi - Mature	
Strategic Corridor	315	Group of Trees	Road Reserve	SH1	Black Wattle		
Strategic Corridor	343	Group of Trees	Road Reserve	SH1	Privet. Nikau. Bottlebrush.	Young	
Strategic Corridor	308	Single tree	Road Reserve	SH1	Eucalypt	Mature	
Strategic Corridor	309	Single tree	Road Reserve	SH1	Melia	Mature	
Strategic Corridor	310	Single tree	Road Reserve	SH1	Melia		
Strategic Corridor	312	Group of Trees	SEA		Totara		
Strategic Corridor	311	Group of Trees	Road Reserve	SH1	Melia	Semi - Mature	
Strategic Corridor	306	Group of Trees	SEA	SH1	Totara		
Strategic Corridor	305	Group of Trees	Riparian Margin	SH1	Poplar, Privet, Totara, Willow		
Strategic Corridor	304	Group of Trees	Riparian Margin	SH1	Poplar Privet Totara Kowhai		
Strategic Corridor	303	Group of Trees	Road Reserve	SH1	Mixed, poplar, kanuka, Privet, Pohutukawa	Mature	
Strategic Corridor	333	Single tree	Road Reserve	SH1	Gum		

NOR 3							
Strategic Corridor	332	Group of Trees	Road Reserve	SH1	Kanuka	Semi - Mature	
Strategic Corridor	317	Group of Trees	Road Reserve	SH1	Pine	Young	
Strategic Corridor	316	Group of Trees	Road Reserve	SH1	Pine	Semi - Mature	
Strategic Corridor	314	Group of Trees	Road Reserve	SH1	Pine	Mature	
Strategic Corridor	318	Single tree	Road Reserve	SH1	Pine	Mature	
Strategic Corridor	313	Single tree	Road Reserve	SH1	Gum	Semi - Mature	
Within Designation - Effects Unknown	302	Group of Trees	Riparian Margin	SH1	Kanuka, Totara, Kowhai, Privet	Mature	

NOR 4							
Status	Tree No.	Vegetation Type	Protection	Location	Species	Age	Comments
Likely to be removed	407	Single tree	Road Reserve	Matakana Road	Pohutukawa	Semi - Mature	Adjacent to residential zoned land. Remove for future road works
Likely to be removed	408	Single tree	Road Reserve	Matakana Road	Pohutukawa	Semi - Mature	Adjacent to residential zoned land. Remove for future road works
Likely to be removed	405	Group of Trees	Road Reserve	Matakana Road	Totara/Weed Species/mixed pioneer natives	Mature	Adjacent to residential zoned land. Remove for future road works
Likely to be removed	404	Group of Trees	Road Reserve	Matakana Road	Totara/Weed Species/mixed pioneer natives	Mature	Adjacent to residential zoned land. Remove for future road works
Likely to be removed	403	Single tree	Road Reserve	Matakana Road	Sweet Chestnut	Semi - Mature	
Likely to be removed	402	Single tree	Road Reserve	Matakana Road	Gleditsia	Semi - Mature	
Likely to be removed	401	Single tree	Road Reserve	Matakana Road	Pin Oak	Mature	

NOR 4

Status	Tree No.	Vegetation Type	Protection	Location	Species	Age	Comments
Retain and Protect	409	Single Tree	Notable Tree	3 Matakana Road	Liquidambar	Mature	Retain and protect for duration of works. TMP protection measures to be applied
Retain and Protect	410	Single Tree	Notable Tree	3 Matakana Road	Deodar Cedar	Mature	Retain and protect for duration of works. TMP protection measures to be applied
Retain and Protect	411	Group of Trees	Notable Tree	3 Matakana Road	Totara Group	Mature	Retain and protect for duration of works. TMP protection measures to be applied

NOR 5

Status	Tree No.	Vegetation Type	Protection	Location	Species	Age	Comments
Within Designation - Effects Unknown	501	Group of Trees	Road Reserve (standing adjacent to open space zoned land	Sandspit road	Totara , Titoki, Karaka/ mixed native vegetation	Mature	No significant impacts anticipated. Main works on southern side of Sandspit road

NOR 5

Within Designation - Effects Unknown	503	Group of Trees	Road Reserve (standing adjacent to open space zoned land	Sandspit road	Nikau, Phoenix palm, Totara, Privet, Pohutukawa, Lemonwood/Mixed Native vegetation	Mature	No significant impacts anticipated. Main works on southern side of Sandspit road
Some trees/ portion to be removed.	502	Group of Trees	Road Reserve (standing adjacent to open space zoned land	Sandspit road	Totara , Titoki, Karaka/ mixed native vegetation/mixed climate species	Mature	Some removal of vegetation anticipated. Fringe effects will need to be monitored. Exact extent of removal to be measures and suitably mitigated.