



Arboricultural Assessment

Site Area: State Highway 16 Stage 2 - Brigham Creek to Kumeū

Prepared for: Beca
New Zealand Transport Agency – Waka Kotahi

Purpose of Report: Arboricultural Assessment of the enlargement of the existing strategic transport corridor designation to enable the proposed upgrades

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Abbreviation	Definition
SRZ	Structural Root Zone - Australian Standard 4970-2009 – radius area around the tree(s) designated as protection for its structural roots. Calculated from the trunk diameter above the root buttress
TPZ	Tree Protection Zone - Australian Standard 4970-2009 - radius area around the tree(s) indicating the wider protection area for the tree roots (including feeder roots). Calculated from the trunk diameter at 1.4m in height
PRZ	Protected Root Zone – AUP Standard, calculated as the circular area of ground around the trunk of a protected tree, the radius of which is taken from the greatest distance between the trunk and the outer edge of the canopy. For trees with a columnar canopy, the PRZ radius is calculated as ½ the height of the tree.
AUP:OP	Auckland Unitary Plan: Operative in Part
NOR	Notice Of Requirement
PBM	Peers Brown Miller Ltd

Due to the adoption of Australian Standard (AS) 4970-2009 by some Auckland Council arborists for assessing levels of works within the root zones of trees, reference is given to this standard, as well as the AUP definition of root zone areas – as detailed above.

1.0 Introduction

Peers Brown Miller Ltd (PBM) has been commissioned by *Beca* on behalf of Waka Kotahi NZ Transport Agency (Waka Kotahi) to prepare this arboricultural assessment to support the proposed project as summarised below.

Waka Kotahi is seeking to undertake safety, capacity, walking and cycling improvements to State Highway 16 (SH16) between Whenuapai and Kumeū. These proposed improvements form Stage 2 of the wider SH16 Brigham Creek to Waimauku Project, which was identified as a section of rural state highway that qualifies for the Safe Roads and Roadsides Programme. The safety improvements involve retrofitting the corridor with short-term safety mechanisms specifically designed to reduce the incidents of deaths and serious injuries.

The SH16 Stage 2 Project corridor extends from the end of the Auckland North-Western Motorway at the intersection of SH16, Brigham Creek Road and Fred Taylor Drive (Whenuapai) through to Weza Lane (east of Kumeū), and is a total distance of approximately 4.3km (See Figure 1 of this report). This SH16 corridor is zoned Strategic Transport Corridor within the Auckland Unitary Plan: Operative in Part (AUP:OP) and is also designated by Waka Kotahi. The corridor has been divided into four sections, based on key characteristics, so that appropriate treatments and options could be developed and assessed. The sections include:

- Section A: From Brigham Creek roundabout through to Coatesville-Riverhead Highway intersection.
- Section B: The SH16 / Coatesville-Riverhead Highway intersection.
- Section C: From Coatesville-Riverhead Highway intersection through to Taupaki Road / Old North Road roundabout.
- Section D: From Taupaki Road / Old North Road roundabout through to Weza Lane, east of Kumeū.

The Project comprises the following physical changes to the SH16 corridor:

- Additional traffic lanes between Brigham Creek roundabout and Coatesville-Riverhead Highway
- A new two-lane roundabout at the intersection of Coatesville-Riverhead Highway
- Widened road shoulders
- Flexible median safety barrier between Brigham Creek roundabout and Taupaki Road
- A flush median between Taupaki Road and Kumeū

- A new 3 metre wide shared-use path between Brigham Creek and Kumeū on the south side of SH16 including new footbridges over Ngongetepara Stream and Kumeū River
- Retaining walls
- Stormwater network improvements; and
- Landscaping

This report assesses the arboriculture effects of the Project works within the altered areas of Designations 6740 and 6766 and recommends mitigation and management measures to address potential adverse effects. All the trees within the designation areas affected by both the permanent and temporary works have been assessed on a worst-case scenario for removal to enable the new roading layout. It is likely to be possible to avoid some of the vegetation removal in the temporary works area but in the meantime, a conservative approach has been taken in terms of the amount of vegetation required to be removed.

An onsite survey of the vegetation was carried out by PBM in May 2022. The results of this are detailed/summarised in the Tree Schedule (Appendix 1). Overall, the vegetation is of varying quality, and consists of a combination of pest plant, native and exotic species.

Five permanent or intermittent streams and wetlands have been identified along the route (refer to Ecological Impact Assessment), as well as one group of Notable Trees whose root zones extend into the existing designation.

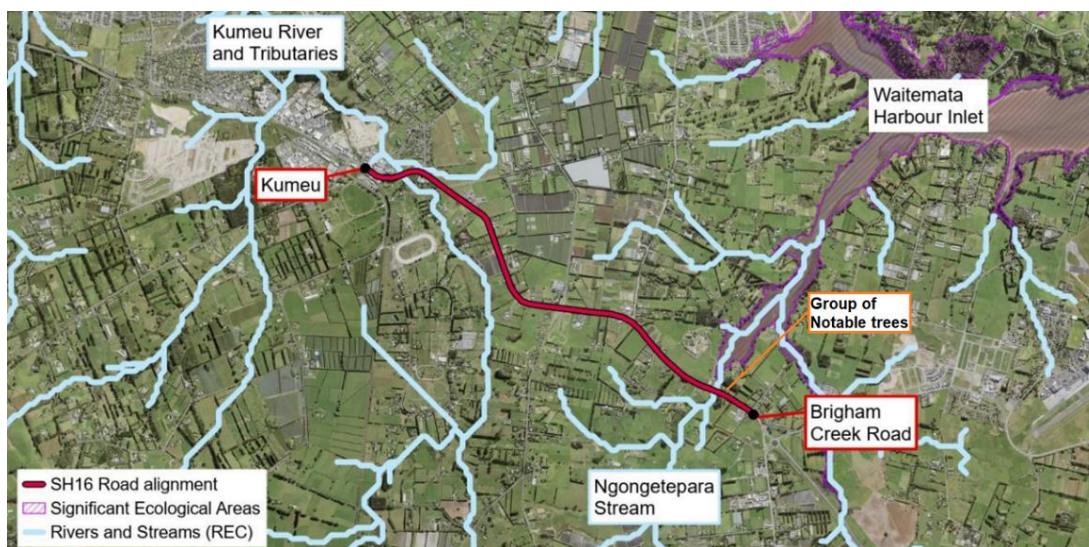


Figure 1.0 – Overall Project Area including the location of the notable trees and the larger of the stream locations. This image is taken from the Beca Ecological Impact Assessment, with overlay of Notable Tree locations added by PBM

1.1 Plan References

The following plans and assessments are relevant to the content of this report;

- Ecological Impact Assessment for the SH16 Stage 2: Brigham Creek Road to Kumeū Bridge – By Beca November 2022, Rev 3
- General arrangement plan set for SH16 Safety Improvements Stage 2: Brigham Creek to Kumeū– By Beca Rev G, 25.10.22
- Stormwater Plan set for SH16 Safety Improvements Stage 2: Brigham Creek to Kumeū– By Beca Rev C, 27.10.22
- Landscape plans for SH16 Safety Improvements Stage 2: Brigham Creek to Kumeū– By Beca Rev D, 02.11.22

2.0 Existing environment

2.1 Proposed Works/overview

The general arrangement plan set (Drawing numbers 3235084-SK-8501 - 3235084-SK-8513) is broken down into thirteen pages which span the length of the project area (see Appendix 2). The extent of the existing and proposed designations are illustrated on these pages, as well as those activities pertinent to these sections. Some of these activities include:

- Widening/alteration to the road including additional lanes in Sections A-C.
- Removal and replacement of existing infrastructure associated with the road, including (but not limited to) light poles, signs, culverts, drainage swales, private property access points, retaining walls, barriers etc.
- Construction of a Shared Use Path
- Earthworks to facilitate the above (cut/fill)

A tree survey was carried out in May 2022 by PBM. A set of Tree Location plans and corresponding schedule of tree information has been prepared. The tree locations were plotted using GIS software (Fulcrum). These locations have since been transferred onto

the general arrangement plans to indicate the location of the trees in relation to the designations and proposed works. Four separate colours have been assigned to the trees to help indicate the locations/protection status of the individual trees/tree groups. These are identified below:

- **Green:** Vegetation within current designation and pest plant species within altered designations (non-protected vegetation)
- **Orange:** Vegetation within altered designation less than 6m in height and 600mm in girth
- **Red:** Vegetation within altered designation greater than 6m in height and 600mm in girth
- **Blue:** Vegetation located beyond altered designation (to be retained where practicable). The root zones of these trees overlap with the construction works in places

The information collected onsite grouped trees together under a single identification number where it was logical to do so (e.g. contiguous canopy). Some of these groups include pest plants, as well as trees above and below the 6m height threshold. The colour assigned to a group in such instances has taken a conservative approach. E.g. the highest tree in the group sets the height threshold, and if there are any non-pest plants then these would override the pest plant status of the group as a whole.

Due to the scale of the project area, individual trunk locations have not been surveyed by a topographic surveyor. Nor were the extents of the designations accurately distinguishable when standing onsite. The uncertainties regarding site setup and curtilage requirements (constantly evolving), have meant that it is not possible to accurately itemise individual trees that can be retained within the designation at this stage. However, arboricultural input will be sought during the construction stage of the project (including when the designation areas have been surveyed and marked onsite), with all specimen trees retained where practicable.

A number of such specimen trees within the proposed altered designation have already been highlighted to the project team as worthy of retention, and work is ongoing to retain these trees – where practicable. However, for the sake of this assessment, and uncertainties detailed above, this assessment takes a worst-case envelope approach, so is assessing all trees within the Project for removal.

Information on the total numbers of vegetation alteration and removal within the four coloured groups are detailed in the following sub-sections.

2.2 Summary of total numbers of trees within the four groups

2.2.1 Green identification - Vegetation within current designation and pest plant species within altered designation (non-protected vegetation)

The alteration or removal of trees from the existing SH16 corridor (designated area) can occur as of right by Waka Kotahi as the requiring authority. These subject trees are identified by a **green** pin symbol on the tree location plans and **green** text in the Tree Schedule. Note, the green tree symbol on the plans also includes pest plant species in the altered designation because these trees are not protected.

In total, **sixty-seven (67) trees** have been identified under the green symbol. The removal of these trees do not require consent.

2.2.2 Orange identification - Vegetation within altered designation less than 6m in height and 600mm in girth

There are **twenty-one (21) trees/tree groups identified (in orange)** as being less than 6m in height, non pest plant species, and within the altered designation area. Out of these, three are located outside of the rural zoning. Therefore, a total of **eighteen (18) trees/tree groups are proposed for removal**. The total area of vegetation proposed for removal exceeds 250m² (Standard E26.3.5.2.(6)) and a regional consent for a restricted discretionary activity is required under E26.3.3.1(A77).

2.2.3 Red identification - Vegetation within altered designation greater than 6m in height and 600mm in girth

There are **seventy-one (71) trees/tree groups identified (in red)** as being greater than 6m in height, non pest plant species, and within the altered designations. Nine of these are within Future Urban Zoning, so are not protected under the above detailed Rural zoning rule. Therefore, there are a total of **Sixty-two (62) trees/tree groups proposed for removal which require regional consent under E26.3.3.1(A77) as a restricted discretionary activity due to non-compliance with the Standards E26.3.5.2.(1 & 3).**

2.2.4 Blue identification - Vegetation located beyond designation (to be retained where practicable)

There are a total of **forty-four (44) trees/tree groups** identified by blue symbols in the tree schedule. These trees will all be retained, although some alteration (root zone alteration and/or pruning) will be required in places. All works within the root zone and pruning of trees proposed for retention must be supervised by a works arborist who shall help ensure the works are carried out in accordance with best arboricultural practice and will also consult on the practicability of a subject tree's retention.

2.3 Riparian areas

There are three permanent stream/watercourses and two wetland areas identified in the ecological assessment. These are identified below:

Number	Watercourse and wetland	Classification
WC1	Ngongetepara Stream (at Brigham Creek)	Permanent river or stream
WC5	Stream at 436 SH16	Permanent watercourse
WC7	Kumeū River	Permanent river or stream
WL2	Potential wetland at 522 SH16	Wetland
WL4	Potential wetland at 436 SH16	Natural wetland

The above schedule of information is referenced from the ecological assessment. Please refer to this document for further information on the above classifications. The trees in each area have been mapped as set out in section 2.2 above. The sections below provide a general overview of the vegetation within each of these areas.

2.3.1 Watercourse 1, Ngongetepara Stream (at Brigham Creek)

There is an existing culvert beneath the road at Ngongetepara stream. The vegetation within the extent of the altered designations proposed for removal on either side of the culvert consists of a canopy of pest plants (Privet and Willow), with other pest plant species and various other small indigenous tree species beneath (cabbage tree, coprosma etc.). Overall, these areas are infested with pest plant species. The proposal includes the removal of this vegetation and significant replanting of indigenous species in these areas. This will provide a better long-term outcome from an environmental/arboricultural perspective.

On the southern side of the watercourse there is a group of Kanuka trees on the outer edge of the works area, one of which requires removal for the installation of the new stormwater riprap structure. This tree is within the footprint of the altered designations.

This is the only tree from the strip of Open Space Zoning that requires removal in this area.

On the northern side, a large Macrocarpa within the works area. This Macrocarpa and the Kanuka trees that stand adjacent to the altered designation have been highlighted to the project team and effort will be made to retain these trees.



Figure 2.0 – riparian vegetation on the southern side of the road and surrounding Ngongetepara stream. The Kanuka trees proposed for retention are ringed in green. The other vegetation in this area consists predominantly of Privet (pest plant), with one of the Kanuka trees proposed for removal. With reference to the Arrangement plans and Tree Schedule, this vegetation is identified as Group 7.



Figure 3.0 – riparian vegetation on the northern side of the road and surrounding Ngongetepara stream. The Macrocarpa tree detailed above is ringed in green. The other vegetation (ringed in red) in this area consists predominantly of Privet (pest plant). One pine tree proposed for removal is also ringed in red. With reference to the Arrangement plans and Tree Schedule, this vegetation is identified as Group 181.

2.3.2 Watercourse 5, Stream at 436 SH16

Watercourse 5 is the smaller of the three permanent streams. The riparian vegetation at Watercourse 5 on the eastern side of SH16 consists of several Willows, small cabbage trees and a Kauri tree. This vegetation is of medium quality from arboricultural perspective. This vegetation is itemised on the Tree Schedule and general arrangement plans with trees (Appendix 1) as tree 130 and Tree group 131.

On the western side of the road the vegetation around this watercourse includes Chinese privet, Karamu and English oak. These trees will be removed to facilitate the works. Comprehensive replanting of this riparian area will follow (refer to Beca Landscape plan set).



Figure 4.0 – riparian vegetation on the eastern side of the road and surrounding Watercourse 5. The removal of and works within the root zone of the Kauri tree shall be carried out in accordance with the Kauri dieback protocols (see Section 7.0)



Figure 5.0 – riparian vegetation on the western side of the road and surrounding Watercourse 5

2.3.3 Kumeū River

The vegetation surrounding Kumeū River and within the altered designations is of low ecological quality. On the northern side of the road this consists of Black wattle, Woolly nightshade & Tree privet (Tree group 106), and on the southern site, Poplar and Chinese privet (Tree group 87). If this area is cleared of vegetation, it will be replanted.



Figure 6.0 – riparian vegetation on the northern side of the road and surrounding Kumeū River



Figure 7.0 – riparian vegetation on the southern side of the road and surrounding Kumeū River. Where possible, pruning of the Poplars will be carried out rather than removal – to facilitate the retention of the subject tree(s)

2.3.4 Wetlands

The two wetlands within the project area are located at 436 SH16 and 522 SH16.

The wetland at 436 SH16 is on the western side of the road and is connected to Watercourse 5 (detailed in Section 4.3.2 above). No further vegetation removal other than that detailed above is required in this area.

The wetland at 522 SH16 does not have any adjacent shrubs or trees.



Figure 8.0 – wetland at 522 SH16

Please refer to the Ecological Assessment for further information on wetlands/streams within the project area.

2.4 Alteration and removal of trees within road reserve zoning

There are two areas where vegetation in the existing road reserve of local roads requires alteration/removal. These are itemised in the following sub-sections. Tree removal within the road reserve is a district (not regional) issue, therefore there is no need to assess against the AUP requirements.

It is noted the Tree Owner Approval (TOA) is required for the alteration and removal of Council owned trees.

2.4.1 Tree group 168

Tree group 168 is within the road reserve of Coatesville Riverhead Highway and will require removal to facilitate widening of the existing state highway corridor in this area. TOA will be sought for this activity. This vegetation is resident planted and consists of 2 x Kohuhu, 1 x Lancewood (5m in height), 1 x Flax (cultivar), 2 x Muehlenbeckia and a prostate Manuka variety.



Figure 9.0 – part of tree group 168 including the 5m tall Lancewood. The Pohutukawa hedge/shelterbelt behind is on private property

2.4.2 Tree/Tree groups 188 & 189

Tree 189 is a 9m high Southern Magnolia. Tree group 188 consists of a row of Tree privet (pest plant species) and a Cabbage tree (7m in height). The row of tree privet forms a hedge that appears to be maintained by the adjacent property owner.

The Magnolia and Cabbage tree are proposed for retention with no alteration proposed. However, some fill material is proposed adjacent to the Privet hedge to facilitate the road works in this area.

These trees are located on the road reserve, and within the altered designation. TOA is required for the works within the root zone of the Privet trees.



Figure 10.0 – Magnolia tree (Tree 189), Cabbage tree and Privet hedge (Tree group 188). With reference to the general arrangement plans, a thin strip of fill is proposed to the right of the privet hedge (western side)

2.5 Notable trees

Plan Change 29 of the Auckland Unitary Plan (AUP) lists 11 notable trees within a site (191 SH16, ID 1808) that fronts onto the site works. The trees are:

- 4 x Totara (*Podocarpus totara*)
- 5 x Kauri (*Agathis australis*)
- 1 x Rimu (*Dacrydium cupressinum*)
- 1 x Karaka (*Corynocarpus laevigatus*)

(identified in the Tree Schedule as Tree group 184 – coloured blue).



Figure 11.0 – the notable trees as viewed from within 191 SH16



Figure 12.0 – the notable trees as viewed from SH16

A site visit was carried out in January 2020 in order to gather information on the stature and condition of the notable trees. An arboricultural memorandum was issued to the project team, which provided recommendations to limit the level of root zone alteration and therefore potential for any adverse effects on the notable trees. As a result, several design alterations were made during the preliminary design phase – in order to provide a better outcome for these trees. This included:

- Shifting the proposed road alignment further from the trees in order to limit the levels of root zone alteration and ground level alterations (including retaining walls) within the root zones of the trees
- Realignment of the proposed underground stormwater connection, to reduce any potential open trench excavations within the root zones of the trees

The above design alterations have minimised the potential adverse effects on the identified trees.

2.5.2 Assessment of works within vicinity of the notable trees

There are different ways of analysing the root zone areas of the trees in relation to the works area. For the purpose of this assessment, reference is made to both root zone assessment methodologies:

- The Protected Root Zones (PRZ) (AUP definition) of the trees closest to the road, which extend into the grass berm area/shoulder of SH16 – but not beneath the existing road surface.
- The Tree Protection Zones (TPZ) (Australian Standard 4970-2009), which is commonly adopted by Auckland Council arborists for assessing works in relation to street trees. For this project, the TPZ of one of the trees extends beyond the grass berm area and beneath the existing road.
- Finally, the Structural Root Zones (SRZ) (also as per the Australian Standard), relating to roots that do not extend into the road designation or beyond the property boundary.

Following arboricultural feedback to the project team, the design of the project has been altered so that the new edge of road will remain in the same location as that of the existing, with no alteration to the berm area levels between the road edge and the trees.

It is noted that an existing stormwater pipe within the root zone of the trees will be abandoned as part of the project and the new pipe is on the other side of the road (away from the tree root zones). The section of pipe adjacent to the trees will be left in place – to avoid the requirement for any trench excavations.

SWMH-A5 DN 1800

DN 600 SW

HYNDS STANDARD SUPERPIT WITH 2.4m LINTEL

SWCP-A1.5.1

15 PE

0.6

10.5

CONTRACTOR TO COORDINATE STORMWATER WITH EXISTING WATERMAIN

SWRCP-A5.1.1

DN 1200

SWMH-A5.1

DN 1800

SWMH-A5.2

TO BE JED CE

COORDINATE CABLE

EXISTING CHANNEL LEVELS TO BE RESHAPED WITH A BASE WIDTH OF 1m AND 1.4 SIDE SLOPES, DEPTH OF 0.5m MODIFY EXISTING CULVERT INLET WITH A LOW PROFILE SCRUFFY DOME

CONTRACTOR TO CCTV AND CONFIRM CONDITION OF PIPE INVERT LEVELS AND CONNECTIONS AND REPORT TO ENGINEER BEFORE START OF WORKS

PROPERTY SH16 - 191

EXTENT OF TREE PROTECTION ZONE

1 2 3 4 5 6 7 8 9 10 11 12

As is evident in Figure 1 above, Tree 9 is the only tree whose TPZ encroaches beneath the road/into the works area. The TPZ of this tree is 11.28m. However, with reference to the AUP rules/definitions, the PRZ for this tree is 8m. Therefore, no works are proposed within the PRZ of any of the Notable trees for the upgrading of the road. Therefore, the project

does not involve any works within the PRZ of the trees, so there are no applicable rules within the AUP.

The upgrading of the road will involve the removal of the existing asphalt layer and basecourse, followed by the construction of the new road. As above, the proposed road edge will not extend any closer to the trees than that of the existing.

It is not likely that significant root structures are located beneath the road because of the distance between the road and the trees, and because these trees have good access to permeable ground on all other aspects. The proposed road upgrade will not generate any adverse effects, for the trees. Furthermore, any potential roots located beneath the road would remain largely undisturbed because there will be no requirement to excavate beneath the existing basecourse material.

These works shall be carried out in accordance with the Tree Protection Methodologies that are detailed in Section 4.0 of this report to ensure that the works are carried out in accordance with modern arboricultural standards.

2.6 Summary of proposed works

The project encompasses a large area which spans across a number of different land zone types and vegetation protection rules.

As noted previously, due to the scale of the project, all vegetation within the altered designation area is assessed for removal. Arboricultural input should be sought throughout the project to ensure that trees within this envelope can be retained where practicable, and to ensure that pruning and works within the root zones of subject trees are carried out within best arboricultural practice and under supervision of the works arborist. The tree protection methodologies detailed in Section 4.0 will ensure that this is the case.

In summary, the following regional resource consents are required:

Orange Category: **To remove eighteen (18) trees/tree groups** which are less than 6m in height and 600mm in girth and that **will not comply with standard E26.3.5.2.(6), requires regional consent under E26.3.3.1(A77) as a restricted discretionary activity.**

Red Category: To remove Sixty-two (62) trees/tree groups in the rural zone which are greater than 6m in height and 600mm in girth, that are non pest plant species and/or are located within a coastal or riparian area, **will not comply with standards E26.3.5.2.(1 & 3), which requires regional consent under E26.3.3.1(A77) as a restricted discretionary activity.**

The mitigation planting proposed (as detailed on the landscape plan) is comprehensive and will enhance the long-term indigenous biodiversity values for the wider area.

3.0 Statutory Framework – Tree Protection

The district level tree protection rules do not apply to the trees within the existing or proposed alteration to the designation. There are no regional rules for tree removals in the Open Space – Conservation Zone.

However, the alteration and removal of trees within rural zoned properties and riparian areas (streams/wetlands) is covered by the table below from the Auckland Unitary Plan (AUP). The following rules are relevant to this proposal.

E26 Infrastructure

Table E26.3.3.1 Activity table

Activity		Auckland wide rules Vegetation Management
		Rural zones, coastal areas and riparian areas [rp]
Operation, maintenance, renewal, repair, construction and removal of network utilities and electricity generation facilities and minor infrastructure upgrading		
(A74)	Pest plant removal	P
(A76)	Vegetation alteration or removal	P
(A77)	Vegetation alteration or removal that does not comply with Standards E26.3.5.1 to E26.3.5.4	RD

Trees beyond the existing designation (and within rural zoned areas) are offered a level of protection under Table E26.3.3.1 of the AUP. Non-compliance with the standards detailed in E26.3.5.1 to E26.3.5.4 trigger a restricted discretionary consent. In this instance, E26.3.5.2. (1), (3) and (6) are relevant. These are copied in italics below:

E26.3.5.2. Vegetation alteration or removal

(1) Must not include trees over 6m in height, or 600mm in girth unless their removal is otherwise permitted by a rule in this Plan.

(3) Must not result in the removal of more than 50m² of vegetation within a coastal area or riparian area not identified as a significant ecological area.

(6) Must not result in the removal of more than 250m² of vegetation outside the legal road or the formation width of the road in a rural zone.

As part of the project works, Standards E26.3.5.2(1), (3) and (6) (above) will not be complied with.

The tree survey has identified trees that are over 6m in height or 600mm in girth. However, cumulatively, more than 50m² of vegetation is proposed for removal within the various riparian areas and more than 250m² of vegetation is proposed for removal within the rural zone. Therefore, **all vegetation proposed for removal within the rural zoned areas is assessed as a Restricted Discretionary Activity – regardless of height or girth (excluding pest plant species).**

Chapter E26 Infrastructure also contains district rules relating to tree alteration and tree removal for Trees in Roads and Open Space Zones. As an alteration to the designation is sought for the project, these rules do not apply for trees within the altered designation.

The works proposed within the vicinity of the group of Notable Trees (ID 1808) do not encroach into their PRZ (AUP standard), therefore, the works do not trigger any rules. A description of the works within the vicinity of these trees is detailed in Section 2.5 of this report.

3.1 Assessment of proposed vegetation alteration and removal from Rural Zone rules (E26)

As detailed in Section 2.0, all vegetation proposed for removal within rural zoned land is assessed as a Restricted Discretionary Activity – regardless of height or girth (excluding pest plant species) as cumulatively, more than 50m² of vegetation is proposed for removal within the various riparian areas and more than 250m² of vegetation is proposed for removal.

As such, resource consent is required for the removal of 80 protected tree/tree groups, assessed as a Restricted Discretionary Activity under Rule E26.3.3.1 (A77). The following table provides an assessment of the proposed works against the relevant AUP assessment criteria.

E26.3.7.1 Assessment Criteria for restricted discretionary activities – regional rules	
(1) Regional rules - vegetation management in rural zones, coastal areas, riparian areas and the D9 Significant Ecological Areas Overlay that do not comply with the permitted activity standards [rp]:	
(a) Ecological values	
(i) the extent to which the vegetation alteration or removal is minimised and adverse effects on the ecological and indigenous biodiversity values of the vegetation are able to be avoided, remedied or mitigated;	Ongoing arboricultural input will identify any significant trees that are worthy of retention within the project area – such as the Kanuka trees itemised in Section 4.3.1. Comprehensive replanting forms part of the proposal. These are mitigation measures will help avoid and mitigate effects.
(ii) whether vegetation removal will have an adverse effect on threatened species or ecosystems; and	The Ecological Impact Assessment focuses on the streams and wetlands that intersect the road corridor, as well as their resident native fauna. The assessment has summarised that following the proposed management actions (detailed in the Ecological Impact Assessment), the works involved to upgrade SH16 will overall result in Very Low to Low ecological effects. Only one of the subject tree species (proposed for removal) are considered threatened, a relatively insignificant Kauri tree –See Figure 4.0 of this report.
(iii) the extent to which the proposal for vegetation alteration or removal has taken into account relevant objectives and policies in D9 Significant Ecological Areas Overlay, D10 Outstanding Natural Features Overlay and Outstanding Natural Landscapes Overlay and E15 Vegetation management and biodiversity.	Where possible vegetation alteration will be minimised or avoided. Due to the scale of the project this is not possible in all locations. As a result, some temporary loss to the values pertinent to the listed objectives and policies will occur. However, the proposed planting includes a greater number and diversity of vegetation that will be planted within the wider project area
(aa) hazard mitigation:	

(i) the extent to which the vegetation alteration or removal will increase natural hazard risks.	The proposed vegetation removal will not result in an increase to natural hazard risks. Sections of the project require vegetation removal to install infrastructure that will improve the resilience of the infrastructure network in this area, such as upgraded stormwater networks.
(b) sediment, water quality and hydrology:	
(i) the extent to which vegetation alteration or removal will adversely affect soil conservation, water quality and the hydrological function of the catchment and measures to avoid remedy or mitigate any adverse effects.	Appropriate sediment capture measures will be implemented. There will be some temporary loss of vegetation surrounding the three watercourses (identified in Section 4.3). However, the predominant vegetation in these areas consists of pest plant species. Following the works, these areas will be replanted with a swathe of native vegetation.
(c) use	
(i) whether the vegetation alteration or removal will improve the reliance and security of the network utility;	This project will improve transport options, reliability and safety. Vegetation removal is required to enable the works.
(ii) whether the vegetation alteration or removal is necessary for a structure that has a functional or operational need to be in the proposed location; and	SH16 is being widened on both sides of the designation. The existing designation has set the location/parameters of this.
(iii) the extent of the benefits derived from infrastructure.	The benefits derived from this project are vast. This is a busy stretch of road that will have improved safety and efficiency.

4.0 Recommendations (Tree protection methodologies)

This section outlines a set of appropriate works methods and tree protection measures that should be adopted to ensure that the project is carried out in accordance with best arboricultural practice, and so that any actual or potential adverse effects on the subject trees proposed for retention are minimised and/or avoided. It is anticipated that these methodologies will be made conditions of consent or referenced in the consent document.

- (a) Prior to any works commencing on the site in the vicinity of any of the trees, a meeting should be held at the site to discuss all issues pertaining to the protection of the trees and to gain a common understanding of the relevant conditions of consent. Present at the meeting should be;

- The consent holder or consent holder's contractor
 - The site foreman or project manager
 - The worksite supervisory arborist
 - Council Compliance Officer
 - Any other relevant personnel
- (b) Protective fencing should be installed wherever practicable at the root zone edge of trees being retained. This fencing shall remain in place for the duration of the project (when works are being carried out in adjacent areas) in order to best protect the subject trees. The fencing is to be rent-o-style 1.8 metre steel mesh sections. The location of this fencing is to be confirmed and approved at the pre-commencement meeting(s).
- (c) Temporary relocation of the fencing can be undertaken at the point when specific works are to be carried out within the root zones of the subject trees - with the fencing to be re-erected following that specific activity.
- (d) The following activities shall not take place within the protective fences or the root zone of any tree that is proposed for retention;
- No storage of materials, spoil or equipment of any sort
 - No discharge or washings from fuels, oils or other toxic liquids including paint and concrete
 - No passage of vehicles or machinery – unless located on existing hard surfaces or approved by the works arborist and appropriate ground protection measures are put in place to reduce compaction of the ground (e.g. track-mats and/or a layer of mulch). Materials shall be installed progressively from the previously metalled surface where practicable
- (e) The worksite arborist should be present during any excavations (including the removal of hard surfaces) through the root zone of any tree to be retained. Any scraping of soil within the root zone of trees shall be discussed and approved by the works arborist, prior to works commencing.
- (f) Any roots encountered that originate from trees proposed for retention shall be treated by the works arborist in accordance with modern arboricultural practice

and retained where practicable. Retained roots shall be prevented from drying out with a layer of hessian, and protected from concrete with a barrier of polythene.

- (g) Any pruning of trees is to be undertaken by a suitably qualified and experienced arborist in accordance with modern arboricultural practice. All pruning is to be undertaken in consultation with the client's appointed works arborist.
- (h) Any silt fencing that is to be installed through the root zone of any tree that is proposed for retention shall not be toed into the ground in an excavated trench. Rather, mulch-filled filter socks shall be used to anchor the fence appropriately.
- (i) Compliance with all conditions of consent relating to tree protection would be monitored by the appointed works arborist - with the detail of each visit and communication being logged. The completed log would be provided to the consent holder at the completion of the project to serve as a compliance report.

4.1 Protocols for removal of and works within the vicinity of the Kauri tree

There are proposed ground alterations within the root zone of a Kauri tree at the site (Tree 130, this tree is proposed for removal). A 'kauri contamination zone' is defined as three times the dripline spread radii of a kauri tree (2.5m spread radius in this instance, therefore 7.5m zone).

Bio-security protocols are required when working within the above-referenced parameter, and for the disposal of cut material. The protocols are intended to control the removal of soil and Kauri tree material so as to minimise and limit the spread of the Kauri Dieback Disease.

As such, all works are to be undertaken in accordance with Chapter E11.6.2 – Note 1 (6) of the Unitary Plan, which states the following;

(6) To prevent the spread of contaminated soil and organic material with kauri dieback disease, vehicle and equipment hygiene procedures must be adopted when working within 3 times the radius of the canopy drip line of a New Zealand kauri tree. Soil and organic material from land disturbance within 3 times the radius of the canopy drip line must not be transported beyond that area unless being transported to landfill for disposal.

Furthermore, all footwear, clothing, tools, vehicles and equipment used within the Kauri contamination zone shall be cleaned of all soil, vegetation, or other materials, and thoroughly washed with Sterigene (or other suitable agent) on entry and exit from the site, on every occasion, to avoid the spread of kauri dieback (*Phytophthora agathidicida* (formerly PTA)).

Further information pertaining to Kauri Dieback protocols, and on any activity proposed to be undertaken in the vicinity of any Kauri tree, can be obtained from Peers Brown Miller Ltd or by visiting this website – www.kauridieback.co.nz

4.2 Mitigation planting

The project includes comprehensive planting plans that span the length of the route. In total, these plans include over 75,000 new plants, including more than 250 45-litre grade sized specimen trees. This new vegetation cover will enhance the indigenous biodiversity values of the surrounding area. Please refer to the Beca planting plans for further information (Drawing numbers 3235084-AL-6000 - 3235084-AL-6013).

5.0 Conclusion

This report has been prepared to accompany the Notice of Requirement and resource consent application for the SH16 Stage 2 project. It provides information that will assist Council in assessing the activities that affect protected trees - under the relevant tree protection rules.

Orange Category: **To remove eighteen (18) trees/tree groups** which are less than 6m in height and 600mm in girth and that **will not comply with standard E26.3.5.2.(6), requires regional consent under E26.3.3.1(A77) as a restricted discretionary activity.**

Red Category: **To remove Sixty-two (62) trees/tree groups** in the rural zone which are greater than 6m in height and 600mm in girth, that are non pest plant species and/or are located within a coastal or riparian area, **will not comply with standards E26.3.5.2.(1 & 3), which requires regional consent under E26.3.3.1(A77) as a restricted discretionary activity.**

The subject trees are of varying quality – as detailed in the appended tree schedule. The mitigation planting will have a positive impact on the indigenous biodiversity cover and wider values associated with this vegetation.

The activities that are proposed to take place within the root zones of trees proposed for retention as part of this project can be managed in such that any adverse effect on any tree can be restricted to being less than minor. This would be especially the case if the tree protection recommendations outlined in Section 4.0 and Section 4.1 of this report are adopted as contract specifications of the project.

Any pruning required is to be undertaken in accordance with accepted arboricultural practice.

Please feel free to contact the undersigned if any further information is required.



Chris Scott-Dye
Consultant Arborist
Peers Brown Miller Ltd

Reviewed By:



Matthew Paul
Director
Peers Brown Miller Ltd

Appendix 1 – Tree Schedule

Four separate colours have been assigned to the trees within the following tree Schedule to help indicate the locations/protection status of the individual trees/tree groups. These are identified below:

- **Green:** Vegetation within current designation and pest plant species within altered designation (non-protected vegetation)
- **Orange:** Vegetation within altered designation less than 6m in height and 600mm in girth
- **Red:** Vegetation within altered designation greater than 6m in height and 600mm in girth
- **Blue:** Vegetation located beyond designation (to be retained where practicable). The root zones of these trees overlap with the construction works in places

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
1	Hedge of Monkey apple, Tree privet, Lilly pilly	4	5	50	Orange	Future Urban Zone, Existing SH16 designation	Moderate	Hedge, spanning between designation and private land. Will be removed due to the construction of the proposed shared path
2	Silver Birch x4	6.5	6	200	Red	Future Urban Zone	Moderate	Powerlines above, will be removed due to the construction of the proposed shared path
3	Tree privet x2	5	5	300	Green	Existing SH16 designation	Moderate	Pest plant. Will be removed due to the construction of the proposed shared path
4	Group of Tree privet, Chinese privet	6	6	300	Green	Existing SH16 designation	Moderate	Pest plant. Some of the trees are over 6m. Will be removed due to the construction of the proposed shared path and formation of the proposed conveyance and diversion bund.
5	Row of Tree privet	7	6	300	Green	Existing SH16 designation	Moderate	Pest plant. Span between designation and private land. Will be removed due to the construction of the proposed shared path and formation of the proposed conveyance and diversion bund.
6	Group of Radiata pine, Tree privet	20	14	1500	Red	Future Urban Zone	Moderate	Pest plant (Tree Privet). Will be removed for the formation of the proposed conveyance and diversion bund.
7	Group of Tree privet, willow, kanuka	16	10	400	Red	Riparian Margin	Good, Moderate	kanuka located at the edge of the project area, potential to retain. The remaining vegetation and one protected Willow will be removed due to the construction of the proposed shared path.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
8	Group of English oak, Lilly pilly, tree privet, Manuka, Chinese privet	4	4	100	Orange	Rural Zone	Good, Moderate	Will be removed due to the reconstruction of the existing property access.
9	Row of Karo, flax, tree privet	5	4	200	Red	Rural Zone	Moderate	Pest plant (Tree Privet). Will be removed due to the proposed shared path and its associated earthworks.
10	Row of Cabbage tree, kohuhu, tree privet, Karamu, Manuka, flax, woolly nightshade	6	4	150	Red	Rural Zone	Good, Moderate	One cabbage tree is greater than 6m. Will be removed due to the proposed shared path and its associated earthworks.
11	Row of Lilly Pilly, poplar, River she-oak, Manuka	16	8	400	Blue	Rural Zone, Existing SH16 designation	Good, Moderate	Spanning between designation and private land. Will be affected by the construction of the proposed retaining wall.
12	Row of Monkey apple	9	7	300	Green	Existing SH16 designation	Good	Pest plant. Will be removed due to the construction of the proposed shared path and its associated earthworks.
13	Row of monkey apple	8	6	400	Green	Existing SH16 designation	Good	Pest plant. Will be removed due to the construction of the proposed shared path and its associated earthworks.
14	English oak, pine	18	10	1000	Blue	Rural Zone	Good	Adjacent to the project area. Both trees have potential to be retained.
15	Silver Birch x5	6	3	200	Red	Rural Zone	Moderate	Three protected Silver Birch will be removed. The remaining trees will be affected due to the reconstruction of the existing crossing.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
16	Row of Kanuka, willow, Chinese Privet, poplar	8	5	150	Green	Existing SH16 designation	Moderate	Pest plant (Chinese Privet). Poplars are greater than 6m. All vegetation will be removed due to the construction of the proposed shared path and its associated earthworks.
17	Row of Japanese cedar	16	7	400	Red	Rural Zone	Moderate	10 trees greater than 6m. Will be removed due to the construction of the proposed conveyance and diversion channel and its associated earthworks.
18	Group of Wheki, Chinese Privet, tree privet, China doll, woolly nightshade, macrocarpa, magnolia, totara	7	5	300	Green	Existing SH16 designation	Dead, Moderate	Some trees are dead. Pest plant (Chinese Privet, Tree Privet, Woolly Nightshade). Will be removed due to the construction of the proposed shared path.
19	Karamu, Cabbage tree, Chinese Privet, tree privet	7	4	300	Green	Existing SH16 designation	Moderate	Pest plant (Chinese Privet, Tree Privet). 3 trees greater than 6m. All vegetation will be removed due to the construction of the proposed shared path.
20	Sweetgum x2	10	7	300	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
21	Group of Pohutukawa, Cabbage tree, kowhai	3	3	150	Orange	Rural Zone	Moderate	Newly planted. Will be removed due to the construction of the proposed retaining wall.
22	Oak	8	7	300	Green	Rural Zone	Good	Will be removed due to the construction of the proposed retaining wall.
23	Oak	8	6	200	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
24	Melia	7	8	300	Red	Rural Zone	Good	Will be removed due to the construction of the proposed retaining wall.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
25	Southern magnolia	6	6	250	Red	Rural Zone	Good	Will be removed due to the construction of the proposed retaining wall.
26	California fan palm x4	10	4	500	Red	Rural Zone	Good	Two of them are within the project area. Will be removed due to the construction of the proposed retaining wall.
27	California fan palm x6	11	4	500	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
28	Flowering cherry	5.5	6	300	Green	Rural Zone	Good	Will be removed due to the construction of the proposed retaining wall.
29	Southern magnolia	6	7	300	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
30	Sweetgum	6.5	8	300	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
31	Magnolia	3	3	100	Green	Existing SH16 designation	Moderate	Outside the project area. Will not be affected by the works.
32	Silver Birch x2	6	5	100	Green	Rural Zone	Good	Will be removed due to the construction of the proposed retaining wall.
33	London Plane	10	10	400	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
34	London Plane	10	10	300	Red	Rural Zone	Good	Mature specimen. Will be removed due to the construction of the proposed retaining wall.
35	Southern magnolia	4	5	200	Red	Rural Zone	Good	Will be removed due to the construction of the proposed retaining wall.
36	Melia	6	4	250	Green	Rural Zone	Good	Will be removed due to the construction of the proposed retaining wall.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
37	Melia	6	6	300	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
38	Sweetgum	4	4	100	Orange	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.
39	Sweetgum	6	4	150	Red	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.
40	Sweetgum	6	4	200	Red	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.
41	Sweetgum	5.5	4	150	Green	Existing SH16 designation	Moderate	Will be removed due to the construction of the proposed shared path and its associated earthworks.
42	Sweetgum	5.5	4	200	Green	Existing SH16 designation	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.
43	Sweetgum	6	4	200	Red	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.
44	Sweetgum	8	4	200	Red	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.
45	Sweetgum	8	4	200	Red	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
46	Chinese privet hedge	2	1	50	Blue	Rural Zone	Moderate	Pest plant. Adjacent to the project area. Will not be affected.
47	Chinese Privet, karamu	2	2	50	Green	Existing SH16 designation	Moderate	Adjacent to the project area. Will not be affected by the works.
48	Group of Karamu, English oak	10	9	500	Red	Riparian Margin	Good, Moderate	Some vegetation and 1 protected English Oak will be removed due to the formation of the proposed retention swale and its associated earthworks.
49	English oak	9	8	200	Red	Riparian Margin	Moderate	Will be removed due to the formation of the proposed retention swale and its associated earthworks.
50	Magnolia	8	8	400	Blue	Rural Zone	Moderate	Adjacent to the project area. Will not be affected by the works.
51	Norway maple, karamu	4	3	100	Orange	Rural Zone	Moderate	Will be removed due to the construction of the proposed shared path.
52	Persian Silk tree	5	8	400	Blue	Rural Zone	Poor	Rotted trunk, leaning towards the fence. Will not be affected by the works.
53	Chinese privet	2	2	50	Green	Existing SH16 designation	Moderate	Pest plant. Will be removed due to the construction of the proposed shared path.
54	Row of Chinese Privet, dead trees	2	2	50	Green	Existing SH16 designation	Dead, Moderate	Pest plant. Some vegetation will be removed due to the construction of the proposed shared path and its associated earthworks.
55	Karamu, Ginkgo, Chinese Privet, Sweetgum, tree privet, bottlebrush,	8	4	200	Green	Existing SH16 designation	Good, Moderate	Spans between designation and private land. Pest plant (Chinese Privet, Tree Privet). All vegetation includes 10 over 6m in height will be removed due to the construction of the proposed shared path.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
	Lemonwood, kohuhu, Cabbage tree							
56	Chinese Privet, gorse, flax, Karamu, yucca, Sweet Gum	3	2	100	Orange	Rural Zone	Moderate	Pest plant (Chinese Privet, gorse). Will be removed due to the construction of the proposed shared path.
57	Chinese privet	3	2	50	Green	Rural Zone	Moderate	Pest plant. Will be removed due to the proposed earthworks.
58	Row of poplar	10	3	300	Red	Rural Zone	Moderate	15 trees greater than 6m in height. Will be removed due to the proposed earthworks.
59	Sweetgum	14	10	400	Blue	Rural Zone	Good	Adjacent to the project area. Will not be affected by the works.
60	Sweetgum	14	10	400	Blue	Rural Zone	Good	Adjacent to the project area. Will not be affected by the works.
61	Yucca, coastal banksia, chinese privet	6	3	300	Red	Rural Zone	Moderate	Pest plant (Chinese Privet and Banksia). All vegetation will be removed by the construction of the proposed shared path and its associated earthworks.
62	Chinese privet, sweetgum	3	2	100	Green	Existing SH16 designation	Moderate	Pest plant (Chinese Privet). Will be removed due to the proposed earthworks.
63	Southern magnolia	12	8	400	Red	Rural Zone	Good	Mature specimen. Will be removed due to the construction of the proposed retaining wall.
64	Southern magnolia	12	8	500	Red	Rural Zone	Good	Mature specimen. Will be removed due to the construction of the proposed retaining wall.
65	Row of Chinese privet	2	2	50	Green	Existing SH16 designation	Moderate	Will be removed due to the construction of the proposed shared path.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
66	Tulip tree	3	3	100	Blue	Rural Zone	Moderate	Outside the project area. Will not be affected by the works.
67	Tulip tree	4	3	100	Orange	Rural Zone	Moderate	Will be removed due to the construction of the proposed shared path and reconstruction of the existing property access
68	Flowering Pear	5	5	150	Blue	Rural Zone	Good	Outside the project area. Will not be affected by the works.
69	Pin oak	15	9	400	Red	Rural Zone	Moderate	Mature specimen. Will be removed due to the construction of the proposed retaining wall.
70	Pin oak	15	7	300	Red	Rural Zone	Moderate	Mature specimen. Will be removed due to the construction of the proposed retaining wall.
71	Lemonwood x2	4	3	100	Orange	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and its associated earthworks.
72	Lemonwood x 6	5	5	200	Red	Rural Zone	Good, Moderate	One of the trees is protected. All vegetation will be removed by the works.
73	Chinese Privet, poplar	3	2	50	Orange	Rural Zone	Moderate	Pest plant (Chinese Privet). Will be removed by the proposed works.
74	Phoenix palm	7	7	800	Green	Riparian Margin	Moderate	Pest plant. Will be removed by the works.
75	Poplar	22	16	1500	Blue	Riparian Margin	Moderate	Adjacent to the project area. Will not be affected by the works.
76	Row of poplar	24	14	1500	Blue	Riparian Margin	Moderate	Outside the project area. Will not be affected by the works.
77	Swamp cypress, sweetgum x4, eucalyptus	10	6	200	Red	Riparian Margin, Rural Zone	Dead, Moderate	Spans between riparian margin and private land. 10 trees greater than 6m. Will be removed due to the construction of the proposed shared path.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
	x3, kapuka, karo, karamu, kohuhu, birch							
78	Tree privet x2, kanuka, kohuhu, feijoa, juniper x4, oleander	12	10	800	Green	Existing SH16 designation	Moderate	Spans between designation and private land. Pest plant (Tree Privet). Vegetation includes 5 trees greater than 6m in height. Will be removed due to the construction of the proposed shared path.
79	Cypress, Camellia group, Cabbage tree	4	3	100	Green	Existing SH16 designation	Moderate	Some vegetation will be removed due to the construction of the proposed shared path.
80	Southern magnolia	8	10	400	Red	Rural Zone	Good	Will be removed due to the proposed earthworks.
81	Persian Silk tree	8	7	300	Red	Rural Zone	Moderate	Will be removed by the proposed works.
82	Lemonwood x2	5	4	200	Green	Existing SH16 designation	Moderate	Will be removed due to the proposed earthworks.
83	Pin oak	16	12	700	Blue	Rural Zone	Moderate	Outside the project area. Will not be affected by the works.
84	Pin oak	16	12	700	Blue	Rural Zone	Moderate	Outside the project area. Will not be affected by the works.
85	Kauri	12	3	300	Red	Rural Zone	Good	Will be removed due to the construction of the proposed shared path and reconstruction of the existing property access. Sanitization for Kauri Dieback will be required (precautionary).
86	Pin oak	10	11	300	Blue	Rural Zone	Moderate	Adjacent to the project area. Will not be affected by the works.
87	Group of Poplar, Chinese privet	25	16	2000	Red	Riparian Margin	Moderate	Will be affected by the proposed earthworks. Non-protected vegetation and three protected poplars will be removed due to the proposed works.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
88	Row of poplar, English oak, Chinese privet, tree privet	12	6	500	Red	Rural Zone, Existing SH16 designation	Moderate	Spans between designation and private land. Climber attached. Will be removed by the construction of the proposed retaining wall and its associated earthworks.
89	Flowering Cherry x2, sweetgum x3	3	2	50	Green	Existing SH16 designation	Moderate	Recently planted. Will be removed due to the proposed earthworks.
90	Sweetgum	18	14	1500	Green	Rural Zone	Moderate	Stub. Will be removed due to the construction of the proposed shared path.
91	Claret ash	14	10	1000	Green	Rural Zone	Moderate	Dead branches, large cavity, included bark. Will be removed by the construction of the shared path.
92	Titoki x2	3	1	30	Green	Existing SH16 designation	Moderate	Newly planted. Will be removed due to the construction of the proposed shared path.
93	Kapuka hedge	2	1	50	Orange	Business Zone	Moderate	Hedge. Adjacent to the proposed shared path.
94	Flowering Cherry	3.8	3	100	Green	Existing SH16 designation	Moderate	Outside the project area.
95	Totara	5	4	150	Green	Existing SH16 designation	Good	Outside the project area.
96	Titoki x4	3	1	30	Green	Existing SH16 designation	Moderate	Newly planted, not affected by the works.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
97	Flowering Cherry	3	3	80	Green	Existing SH16 designation	Moderate	Not affected by the works.
98	Flowering Cherry	3.7	3	100	Green	Existing SH16 designation	Moderate	Suckers at trunk base. Not affected by the works.
99	Flowering Cherry	3	3	100	Green	Existing SH16 designation	Moderate	Not affected by the works.
100	Flowering Cherry	3	3	80	Green	Existing SH16 designation	Moderate	Not affected by the works.
101	Manuka hedge	3	3	150	Green	Existing SH16 designation	Moderate	Not affected by the works.
102	Flowering Cherry	4.5	4	150	Green	Existing SH16 designation	Moderate	Not affected by the works.
103	Flowering Cherry	4.5	4	100	Green	Existing SH16 designation	Moderate	Not affected by the works.
104	Row of flowering cherry, kapuka	4.5	4	250	Green	Existing SH16 designation	Moderate	Not affected by the works.
105	Chinese Privet	5	4	100	Green	Existing SH16 designation	Moderate	Pest plant. Not affected by the works.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
106	Group of black wattle, woolly nightshade, tree privet	12	5	400	Green	Riparian Margin	Dead, Moderate	A cluster of weeds. Will not be affected by the works.
107	Sweetgum x3	2	1	30	Green	Existing SH16 designation	Moderate , Poor	Newly planted. Will not be affected by the works.
108	Sweetgum x6	3	1	30	Green	Existing SH16 designation	Moderate , Poor	Will not be affected by the works.
109	Pin Oak x2	2	1	10	Green	Existing SH16 designation	Moderate	Newly planted. Will not be affected by the works.
110	Row of Japanese cedar, swamp cypress	16	5	700	Red	Rural Zone, Existing SH16 designation	Moderate , Poor	Spans between designation and private land. Dieback. Will be removed by the proposed earthworks.
111	Kapuka hedge	2	1	50	Orange	Rural Zone, Existing SH16 designation	Moderate	Hedge. Span between designation and private land. Some vegetation will be removed due to the construction of the proposed noise wall.
112	Pin Oak x6	6	5	200	Red	Rural Zone	Moderate	Mature specimens. Will be removed by the works.
113	Red Flowering Gum	7	7	500	Red	Rural Zone, Existing SH16 designation	Moderate	Span between designation and private land. Dead branches. Will be removed due to the construction of the proposed noise wall.
114	Pin oak	8	6	300	Blue	Rural Zone	Moderate	Adjacent to the project area. Will not be affected by the works.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
115	Southern magnolia	5.5	6	400	Blue	Rural Zone	Good	Adjacent to the existing vehicle crossing and power lines, in planter. Will not be affected by the works.
116	Poplar x2, bamboo, Karamu, karo, pin oak x2	16	11	800	Red	Rural Zone	Moderate	All vegetation includes 4 trees greater than 6m. Will be removed by the proposed earthworks.
117	Pin oak	10	7	300	Red	Rural Zone	Moderate	Adjacent to the project area. Will be removed due to the reconstruction of the existing property access.
118	Titoki x2	3	4	100	Orange	Rural Zone	Moderate	Will be removed due to the construction of the proposed noise wall.
119	Willow	16	14	1500	Green	Existing SH16 designation	Moderate	Will be removed due to the construction of the proposed retaining wall and its associated earthworks.
120	Group of Macrocarpa, radiata pine, Japanese cedar, karo, Karamu, tree privet, silky oak, river Sheoak, wattle, Chinese Privet, Himalayan cedar, Brazilian pepper tree	18	10	1000	Red	Rural Zone	Dead, Moderate, Poor	Dieback. Will be removed due to the construction of the proposed retaining wall and its associated earthworks.
121	Himalayan cedar, Brazilian pepper tree, flax, Lemonwood	12	8	500	Red	Rural Zone	Moderate	Pest plant (Brazilian Pepper Tree). All vegetation includes 2 protected trees will be removed due to the proposed earthworks.
122	Sweetgum	14	8	300	Blue	Rural Zone	Moderate	Adjacent to the project area. Will not be affected by the works.
123	Sweetgum	8	9	200	Blue	Rural Zone	Moderate	Suppressed by a neighbouring tree. Will not be affected by the works.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
124	Sweetgum	14	12	500	Blue	Rural Zone	Moderate	Adjacent to the project area. Will not be affected by the works.
125	Lemon x3, aloe	4	4	150	Orange	Rural Zone	Moderate	Adjacent to the project area. Will be removed by the works.
126	Row of Japanese cedar, bamboo, kapuka, English oak	16	8	1000	Red	Rural Zone, Existing SH16 designation	Good	Shelterbelt. Spans between designation and private land. Pest plant (bamboo). Will be removed due to the construction of the proposed retaining wall and its associated earthworks.
127	Row of Japanese cedar, bamboo, Karamu, tree privet	14	6	400	Red	Rural Zone, Existing SH16 designation	Good, Poor	Shelterbelt. Span between designation and private land. Pest plant (bamboo, Tree Privet). Will be removed due to the construction of the proposed retaining wall and its associated earthworks.
128	Row of willow	20	12	400	Red	Rural Zone	Moderate	10 trees greater than 6m. Will be removed due to the proposed earthworks.
129	Row of Japanese cedar, Camellia, river sheoak	12	7	500	Red	Rural Zone, Existing SH16 designation	Dead, Good, Poor	Shelterbelt. Spans between designation and private land. Dieback. Will be removed due to the proposed earthworks.
130	Kauri	12	4	300	Red	Riparian Margin	Moderate	Will be removed by the proposed works. Sanitization of Kauri Dieback will be required (precautionary).
131	Kapuka, Cabbage tree, English oak, willow	12	10	700	Red	Riparian Margin	Moderate	10 trees greater than 6m. Will be removed due to the construction of the proposed retaining wall and retention swale.
132	Row of Japanese cedar, karo, English oak, kapuka	12	5	400	Red	Rural Zone	Good	Shelterbelt. Will be removed due to the proposed earthworks.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
133	English oak	12	12	500	Blue	Rural Zone	Good	Adjacent to the project area. Will not be affected by the works.
134	Kapuka hedge	1	0.5	50	Orange	Rural Zone	Moderate	Will be removed by the proposed works.
135	Juniper x3	3	3	400	Blue	Rural Zone	Moderate	Outside the project area. Will not be affected by the works.
136	Phoenix palm	12	8	1000	Blue	Rural Zone	Moderate	Pest plant. Outside the project area. Will not be affected by the works.
137	Row of sacred bamboo and rose	4	1	30	Orange	Rural Zone	Moderate	No works proposed near the vegetation.
138	Row of eucalyptus, Karamu, kohuhu	20	14	1000	Blue	Rural Zone	Good	Shelterbelt. Outside the project area. Will not be affected by the works.
139	Totara	6.5	3	150	Blue	Rural Zone	Moderate	Outside the project area. Will not be affected by the works.
140	Totara	10	10	500	Blue	Rural Zone	Good	Adjacent to the project area. Will not be affected by the works.
141	Row of California fan palm	10	4	400	Blue	Rural Zone	Good	Adjacent to the project area. Will not be affected by the works.
142	Totara	10	8	600	Blue	Rural Zone	Good	Adjacent to the project area. Will not be affected by the works.
143	Totara	13	9	1000	Blue	Rural Zone	Good	Adjacent to the project area, climber attached. Will not be affected by the works.
144	Macrocarpa x2, Karamu, Cabbage tree, karo	14	12	500	Blue	Rural Zone	Good, Moderate	Adjacent to the project area. Will not be affected by the works.
145	Row of Japanese cedar	12	2	400	Blue	Rural Zone	Poor	Adjacent to the project area. Heavily pruned. Will not be affected by the works.
146	Row of Japanese cedar	10	2	300	Red	Rural Zone	Poor	Adjacent to the project area and the existing property access. Heavily pruned. 5 trees greater

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
								than 6m in height. Will be removed due to the proposed works.
147	Row of Japanese cedar, karo, Karamu, macrocarpa, houpapa, Japanese spindle tree, radiata pine	20	12	1000	Red	Rural Zone, Existing SH16 designation	Moderate	Shelterbelt. Spans between designation and private land. Will be removed due to the proposed earthworks.
148	Row of Lemon	4	4	150	Orange	Rural Zone	Moderate	Will be removed due to the proposed earthworks.
149	Row of Red Matipo, Puriri, kohuhu, Japanese cedar, houpapa, monkey apple, rimu, Phoenix palm	16	8	500	Red	Rural Zone, Existing SH16 designation	Moderate	Spans between designation and private land. Includes 10 trees greater than 6m. Will be removed due to the proposed road widening and carpark entrance.
150	Rimu	10	6	400	Green	Existing SH16 designation	Good	Potential to be retained. Included bark. Adjacent to the proposed carpark and earthworks.
151	Totara	10	7	500	Green	Existing SH16 designation	Moderate	Potential to be retained. Adjacent to the proposed carpark and earthworks.
152	Titoki	9	7	400	Green	Existing SH16 designation	Moderate	Potential to be retained. Adjacent to the proposed carpark and earthworks.
153	Group of Kauri, Karamu, Karaka, Cabbage tree, Totara x3	8	4	300	Red	Rural Zone	Moderate	Most of the trees are greater than 6m in height. Sanitization of Kauri dieback is required (precautionary). Will be removed due to the construction of the proposed roundabout and shared path.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
154	Manuka, houpara	4	4	150	Orange	Rural Zone	Moderate	Will be removed due to the construction of the shared path.
155	Pohutukawa	8	7	1000	Red	Rural Zone	Good	Adjacent to the proposed shared path. Will be removed by the proposed works.
156	Totara, coastal banksia, Mahoe, dead tree	10	7	900	Red	Rural Zone	Dead, Good, Poor	Adjacent to the proposed shared path. Will be removed by the proposed works.
157	Norfolk Island Hibiscus, dead tree	10	8	1000	Green	Rural Zone	Dead, Good	Pest plant. Will be removed due to the construction of the shared path.
158	Pohutukawa	8	10	600	Red	Rural Zone	Good	Will be removed due to the construction of the reconstruction of the existing vehicle crossing.
159	Sweetgum	8	8	300	Red	Rural Zone	Moderate	Will be removed due to the construction of the reconstruction of the existing vehicle crossing.
160	Row of citrus	2	2	100	Orange	Rural Zone	Moderate	Will be removed due to the proposed earthworks.
161	Group of coastal banksia, Camellia, karo, Japanese spindle tree, houpara, dead tree	10	6	400	Red	Rural Zone	Dead, Moderate	Pest plant (Japanese Spindle Tree). Will be removed due to the proposed earthworks.
162	Cabbage tree, kohuhu, Pittosporum Stephens Island hedge	3	2	150	Orange	Rural Zone	Moderate	Some vegetation will be removed by the proposed works.
163	Row of River Sheoak, English oak, Coastal Redwood	20	10	600	Blue	Rural Zone	Good, Moderate	Dieback. Will not be affected by the proposed works.
164	Row of Chinese Privet, Karamu, karo	4	3	150	Orange	Rural Zone	Moderate	Pest plant. Will be removed due to the formation of the proposed bio-retention swale and its associated earthworks.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
165	Macrocarpa	20	16	2000	Red	Rural Zone	Good	Exposed surface roots. Will be removed by the proposed earthworks.
166	Japanese cedar x2, karo, poplar x2, row of willow	12	9	1000	Red	Rural Zone	Moderate	Will be removed by the reconstruction of the existing property access.
167	Row of Pohutukawa	6	4	300	Red	Rural Zone	Good	Will be removed due to the reconstruction of the existing property access.
168	Kohuhu x2, Lancewood, Flax (cultivar), 2 x Muehlenbeckia and a prostate Manuka variety	5	1	50	Red	Road reserve	Moderate	Will be removed due to the reconstruction of the existing property access.
169	Row of Pohutukawa	7	4	300	Red	Rural Zone	Good	Will be removed due to the reconstruction of the existing property access.
170	Monkey apple, Karamu, honey locust x2	7	6	800	Green	Existing SH16 designation	Moderate	Pest plant (Monkey Apple). Will be removed due to the reconstruction of the existing property access.
171	Row of monkey apple, karamu, Australian Blackwood, tree privet	7	5	300	Green	Existing SH16 designation	Moderate	Pest plant (Monkey Apple, Tree Privet). Will be removed due to the construction of the proposed roundabout.
172	Feijoa x7, macadamia, magnolia, orange	6	4	200	Red	Rural Zone	Moderate	All vegetation includes 3 protected trees will be removed due to the construction of the proposed shared path and its associated earthworks.
173	Row of Japanese cedar, Cabbage tree x3, wattle	18	6	800	Red	Rural Zone	Good	Shelterbelt. Will be removed due to the proposed road widening and its associated earthworks.
174	Row of Japanese cedar, wattle, English oak, Totara, pohutukawa	16	8	500	Green	Existing SH16 designation	Moderate	Shelterbelt. Will be removed due to the proposed earthworks.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
175	Sweetgum, Phoenix palm	14	10	400	Blue	Rural Zone	Good	Adjacent to the proposed earthworks. Not affected by the works.
176	Radiata pine x2, willow, silver dollar gum	16	8	1500	Blue	Rural Zone	Moderate	Outside the project area. Will not be affected by the works.
177	Wattle x2	8	8	200	Green	Existing SH16 designation	Moderate	Leaning trees. Will be removed due to the proposed earthworks.
178	Wattle, dead tree, kanuka,	8	7	300	Green	Existing SH16 designation	Dead, Moderate	Pest plant (Wattle). Will be removed due to the proposed earthworks.
179	Kanuka, Karamu, wattle	8	6	200	Green	Existing SH16 designation	Moderate	Pest plant (Wattle). Will be removed due to the proposed earthworks.
180	Cabbage tree x 2	5	3	200	Red	Rural Zone	Moderate	Adjacent to the proposed earthworks and vehicle crossing reconstruction. Will be removed by the works.
181	Group of macrocarpa, tree privet, willow, Karamu, Cabbage tree	20	14	2000	Red	Riparian Margin	Good, Moderate	Works within root zone and pruning of the macrocarpa is required. The vegetation stands next to the carriageway will be removed due to the construction of the proposed retaining wall.
182	Lemonwood, Lilly Philly, wattle, tree privet	10	6	500	Green	Future Urban Zone, Existing SH16 designation	Good	Span between designation and private land. Pest plant (Wattle, Tree Privet). Will be removed due to the construction of the proposed retaining wall.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
183	Row of Monkey apple, tree privet, Cabbage tree, dead tree, bottlebrush	8	6	400	Blue	Future Urban Zone, Existing SH16 designation	Dead, Good, Moderate	Span between designation and private land. Pest plant (Monkey Apple, Tree Privet). Will not be affected by the works.
184	Kauri x5, Totara x4, Rimu x1, Karaka x1	16	8	600	Blue	Notable Tree	Good	Mature specimens. Not affected by the works. Refer to the notable tree section in report.
185	Griselinia hedge, privet	2-4	1-3	50	Orange	Future Urban Zone	Moderate	Adjacent to the new kerb and channel. Will be removed. Hedge spans into 191 SH16 site where there is a group of privet trees that also requires removal. These trees are distanced beyond the root zone of the notable trees
186	Row of poplar, tree privet, willow	12	4	400	Red	Future Urban Zone	Moderate	Shelterbelt. Pest plant (Tree Privet). Adjacent to the new kerb and channel. Works within their root zones.
187	Row of Japanese cedar, tree privet, flowering cherry, Camellia	10	4	400	Red	Future Urban Zone, Existing SH16 designation	Moderate	Span between designation and private land. Pest plant (Tree Privet). Will be removed due to the proposed earthworks.
188	Row of tree privet, Cabbage tree	7	5	300	Blue	Road Reserve	Good, Moderate	Pest plant (Tree Privet). Cabbage tree is protected. Will be affected by the new kerb and channel.
189	Southern magnolia	9	10	600	Blue	Road Reserve	Good	Mature specimen. Not affected by the works.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
190	Pohutukawa	8	8	400	Green	Existing SH16 designation	Good	Will be removed due to the construction of the proposed kerb and channel.
191	Red Matipo, yucca, Cabbage tree	7	4	200	Red	Future Urban Zone	Moderate	Will be removed due to the construction of the proposed kerb and channel.
192	Row of monkey apple, tree privet, Karaka, Cabbage tree	10	6	800	Red	Future Urban Zone, Existing SH16 designation	Moderate	Spans between designation and private land. Pest plant (Monkey Apple, Tree Privet). Will be removed by the works.
193	Karaka, kohuhu, tree privet, Chinese Privet, karamu, camellia	6	4	500	Red	Future Urban Zone, Existing SH16 designation	Dead, Good, Moderate	Span between designation and private land. Pest plant (Chinese Privet, Tree Privet). Will be removed by the new kerb and channel.
194	Phoenix palm, Chinese Fan Palm	8	6	1000	Green	Existing SH16 designation	Moderate	Pest plant. Will be removed by the reconstruction of the existing property access.
195	Tree privet, Phoenix palm, Bangalow palm, Coral tree, Cabbage tree, Mahoe	7	5	300	Red	Future Urban Zone	Moderate	Pest plant (Tree Privet, Phoenix Palm, Coral Tree). Will be removed by the new kerb and channel.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
196	Himalayan cedar, Lemonwood, coastal banksia, karo, watergum, monkey apple, tree privet	8	6	400	Red	Future Urban Zone	Moderate	Pest plant (Monkey Apple, Tree Privet). Will be removed by the new kerb and channel.
197	Hedge of karo, Chinese Privet, tree privet, Japanese cedar	4	4	200	Blue	Future Urban Zone, Existing SH16 designation	Moderate, Poor	Pest plant (Chinese Privet, Tree Privet). Heavily pruned, outside the project area.
198	Radiata pine	20	14	1500	Green	Existing SH16 designation	Good	Outside the project area.
199	Monkey apple, Karamu, karo	4	2	150	Green	Existing SH16 designation	Moderate	Outside the project area.
200	Cabbage tree	6.5	4	300	Green	Existing SH16 designation	Good	Adjacent to the new kerb and channel.
201	Macrocarpa	14	10	1500	Green	Existing SH16 designation	Good	Outside the project area.
202	Cabbage tree, karo	4	2	100	Green	Existing SH16 designation	Moderate	Outside the project area.

ID #	Species	Height (m)	Canopy spread radius (m)	Diameter @ 1.4m (mm)	Colour assigned	Location	Condition	Comments
203	Macrocarpa	20	14	1500	Green	Existing SH16 designation	Good	Outside the project area.

