Eastern Busway
EB2 and EB3 Residential

Arboricultural Effects Assessment

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Eastern Busway

Quality Information

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Table of Contents

Figures

Tables

List of Abbreviations and Definitions

Abbreviation and Definitions	Description
AEE	Assessment of Effects on the Environment
AUP(OP)	Auckland Unitary Plan (Operative in part) 2016
BPO	Best practicable option
EB1	Eastern Busway 1 (Panmure to Pakuranga)
EB2	Eastern Busway 2 (Pakuranga Town Centre)
EB3 Commercial/ EB3C	Eastern Busway 3 (Gossamer Drive to Botany)
EB3 Residential/ EB3R	Eastern Busway 3 (SEART to Pakuranga Creek)
EB4	Eastern Busway 4 (link between Ti Rakau Drive and Te Irirangi Drive, Botany Town Centre Station)
EBA	Eastern Busway Alliance
km	Kilometre(s)
m	Metre(s)
NoR	Notice of Requirement
AUP(OP)	Auckland Unitary Plan (Operative in part) 2016
RTN	Rapid Transit Network
RRF	Reeves Road Flyover
RMA	Resource Management Act 1991

Executive Summary

The Eastern Busway Project (the Project) is a package of works focusing on promoting an integrated, multi-modal transport system to support population and economic growth in southeast Auckland. The purpose of this Arboricultural Assessment is to assess the arboricultural effects of the proposal and inform the Assessment of Effects on the Environment (AEE) relating to the Notice of Requirement, and required regional consents and consents required under National Environment Standards for Eastern Busway 2 (EB2); and the AEE and district and regional consents applications for Eastern Busway 3 Residential (EB3R) and identify the ways in which any adverse effects will be mitigated.

The assessment has been undertaken by utilising a Visual Tree Assessment (VTA) consistent with modern arboricultural practices (Mattheck and Breloer, 1994) to gather the relevant data of trees growing within, and near to the EB2 and EB3R boundaries. Utilising the gathered data, and georeferencing, trees which require removal, or likely require removal have been identified as a worst-case scenario.

A total of sixty-one trees have been identified to require removal in the EB2 boundaries, which require resource consent, and one hundred and sixty-five trees have been identified to require removal in the EB3R project boundaries, which require resource consent. Removal of this number of mature trees from the urban ngahere (forest) is assessed to result in moderate adverse effects on the tree cover within the Project's boundaries which will require mitigating.

The overarching principles of the Project will be to retain mature trees where possible. One hundred and eighty-eight trees, which would require resource consent to remove, have been identified as likely to be able to be retained in EB2's boundaries; and one hundred and four trees which would require resource consent to remove, have been identified as likely to be able to be retained EB3R's boundaries.

A Tree Protection Management Plan (TMP) is to be prepared prior to construction which will provide the protocols and methodologies for tree management during construction.

Replacement planting is proposed to be undertaken within the road reserve, including central medians and berms, as well as within open space reserves in general accordance with the Landscape Ecological and Arboricultural mitigation plans submitted.

Following the mitigation planting and provided best practice tree management measures are followed, the adverse effects associated with tree removal and construction activities around retained trees are assessed to be suitably mitigated, and less than minor.

1 Introduction

1.1 Overview of the Eastern Busway Project

The Eastern Busway Project (the Project) is a package of works focusing on promoting an integrated, multi-modal transport system to support population and economic growth in southeast Auckland. This involves the provision of a greater number of improved public transport choices and aims to enhance the safety, quality and attractiveness of public transport and walking and cycling environments. The Project includes:

- 5km of two-lane busway
- New bridge for buses across Pakuranga Creek
- Improved active mode infrastructure (walking and cycling) along the length of the busway
- Three intermediate bus stations
- Two major interchange bus stations.

The project forms part of the previous Auckland Manukau Eastern Transport Initiative (AMETI) programme (the programme) which includes a dedicated busway and bus stations between Panmure, Pakuranga and Botany town centres. The dedicated busway will provide an efficient rapid transit network (RTN) service between the town centres, while local bus networks will continue to provide more direct local connections within the town centre areas. The project also includes new walking and cycling facilities, as well as modifications and improvements to the road network.

The programme includes the following works which do not form part of the Eastern Busway Project:

- Panmure Bus and Rail Station and construction of Te Horeta Road (completed)
- Eastern Busway 1 (EB1) – Panmure to Pakuranga (completed).

The Eastern Busway project consists of the following packages:

- Early Works Consents – William Roberts Road (WRR) extension from Reeves Road to Ti Rakau Drive (LUC60401706); and Project Construction Yard at 169 – 173 Pakuranga Road (LUC60403744).
- Eastern Busway 2 (EB2) – Pakuranga Town Centre, including the Reeves Road Flyover (RRF) and Pakuranga Bus Station **(this Assessment)**
- Eastern Busway 3 Residential (EB3R) – Ti Rakau Drive from the South Eastern Arterial (SEART) to Pakuranga Creek, including Edgewater and Gossamer Intermediate Bus Stations **(this Assessment)**
- Eastern Busway 3 Commercial (EB3 Commercial) – Gossamer Drive to Guys Reserve, including two new bridges, and an offline bus route through Burswood
- Eastern Busway 4 – Guys Reserve to a new bus station in the Botany Town Centre, including a link road through Guys Reserve.

The overall Project is shown in Figure 1 below.

Figure 1. Project alignment

Figure 2 – EB2 is identified by the purple shading while EB3R is identified by the yellow shading. The pink shading in Ti Rakau Park identifies the William Roberts Road Extension, which is dealt with by a separate RMA application package.

1.2 Project Objectives

The Project objectives are:

1. Provide a multi modal transport corridor that connects Pakuranga and Botany to the wider network and increases access to a choice of transport options
2. Provide transport infrastructure that integrates with existing land use and supports a quality, compact urban form
3. Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network
4. Contribute to accessibility and place shaping by providing better transport connections between, within and to the town centre
5. Provide transport infrastructure that is safe for everyone
6. Safeguard future transport infrastructure required at (or in vicinity of) Botany Town Centre to support the development of a strategic public transport connection to Auckland Airport.

2 Proposal Description

2.1 Eastern Busway 2

The EB2 section of the Project commences from the intersection of Ti Rakau Drive and Pakuranga Road, connecting with EB1, and traverses west along Ti Rakau Drive to the intersection of SEART. The north-south extent of EB2 is between SEART and Pakuranga Road along Reeves Road and William Roberts Road. The main components of EB2 are described below.

2.1.1 Busway and Pakuranga Town Centre Bus Station

A segregated dedicated two-way busway is proposed along Ti Rakau Drive to provide prioritised access for bus services between Pakuranga Town Centre and Botany. From Pakuranga Road to SEART, the busway will run on the northern side of Ti Rakau Drive.

The proposed Pakuranga bus station is a key facility for services running to and from the Panmure Station Interchange, Howick, Highland Park, Eastern Beach, Bucklands Beach and Sunnyhills. The bus station will be located along the northern side of Ti Rakau Drive, on land currently occupied for Pakuranga Plaza and 26 Ti Rakau Drive. The bus station will feature two platforms and will contain a mixture of street furniture and structures, including bus shelters, electronic messaging signage and seating. New proposed pedestrian crossings will provide connections to the bus station and Pakuranga Plaza. Modifications to the Ti Rakau Drive median strip, landscaping, and general traffic lane reconfiguration will enable safe and efficient bus movement for the busway once it becomes operative.

2.1.2 Reeves Road Flyover (RRF)

The RRF will provide two general traffic lanes in each direction connecting SEART to Pakuranga Road, to reduce local traffic congestion along Pakuranga Road and Ti Rakau Drive. The RRF will start opposite Paul Place Reserve, pass over Ti Rakau Drive and Reeves Road, before finishing at a new intersection with Pakuranga Road. Traffic lanes for the RRF will be elevated and run through the centre of SEART, requiring the relocation of the SEART off-ramp to the north of the existing off-ramp.

2.1.3 Walking and Cycling Facilities

EB2 includes improvements to active transport infrastructure and connections. This includes a new cycleway, improved footpaths, and new pedestrian crossings. These works will improve the safety and connectivity of walking and cycling links across Pakuranga Town Centre.

2.1.4 Supporting Works

A range of works will be undertaken in support of the EB2 package. This includes the relocation of network utility services, new street lighting, earthworks, removal of vegetation, landscaping, stormwater upgrades, environmental restoration and mitigation and temporary construction sites.

2.2 Eastern Busway 3 - Residential

The EB3R section of the busway is a continuation of EB2 from the intersection of SEART and Ti Rakau Drive, with the proposed dedicated busway proceeding centrally along Ti Rakau Drive towards Gossamer Drive and Riverhills Park in the east. EB3R will largely occur within land vested as road or land currently owned by Auckland Transport. The construction of EB3R will take a staged approach to

minimize disruption to the existing road network and its users. The main components of EB3R have been described below.

2.2.1 Edgewater and Gossamer Intermediate Bus Stations

EB3R includes two intermediate bus stations on Ti Rakau Drive, located within the vicinity of Edgewater Drive and Gossamer Drive. Both stations will have separate platforms for eastbound and westbound bus movements. A range of street furniture and structures will also be constructed, such as modular bus shelters pedestrian linkages, electronic messaging signage, seating and cycling storage facilities.

2.2.2 Western Bridge Abutment

EB3R includes construction of the western bridge abutment for a new future bridge across Pakuranga Creek. The abutment will be located within the area that is currently the southeastern section of Riverhills Park. Only the bridge abutment is included in the EB3R package of works. The remaining parts of the bridge will form part of the EB3C approval package.

2.2.3 Walking and Cycling Facilities

Provision has been made for walking and cycling along the route of EB3R. This includes footpaths and uni-directional cycleways located on either side of Ti Rakau Drive from SEART to Gossamer Drive. Signalised pedestrian crossings will be provided at key intersections along Ti Rakau Drive, including adjacent to the proposed Edgewater bus station.

2.2.4 Associated changes the road network

The proposed changes to the road network include lane arrangement and intersection reconfigurations and changes to the parking arrangement and access to Edgewater Drive Shops. Changes are also proposed to the access arrangements for residential properties along the EB3R alignment. New westbound lanes for general traffic will be established within the land which has been acquired by Auckland Transport and will be vested as road once it becomes operative, as the busway alignment replaces the existing westbound lanes.

2.2.5 Supporting Works

A range of works will be undertaken in support of the EB3R package. This includes the relocation of network utility services, new street lighting, removal of vegetation, earthworks, landscaping, stormwater upgrades, environmental restoration and mitigation and temporary construction sites.

3 Specialist Assessment

3.1 Assessment Content

This report describes the assessment of arboricultural effects associated with the operation and construction of EB2 and EB3R sections of the Eastern Busway Project.

Its purpose is to assess the arboricultural effects of the proposal and inform the AEE relating to the Notice of Requirement, and required regional consents and consents required under National Environment Standards for EB2; and the AEE and district and regional consents applications for EB3R and identify the ways in which any adverse effects will be mitigated.

This arboricultural assessment involves:

- Identifying the trees within the project area and providing a Tree Inventory and Tree Plans
- Determining which trees require removal, works within their root zones, and/or canopy pruning or relocation
- Identifying the extent of tree removal required and what replacement planting would be required to mitigate adverse effects
- Providing tree protection protocols and methodologies to minimise adverse effects on retained trees.

3.2 Specific Project Elements

The specific Project elements that are relevant to arboricultural effects relate to:

- The removal of trees that are located directly within the footprint of new roads, cycle/footpaths, and infrastructure
- Works (construction activities) and placement of permanent structures within the protected root zones of retained trees as defined in the Auckland Unitary Plan (Operative in Part) (AUP(OP))
- Pruning of retained trees to provide sufficient clearance to new infrastructure.

3.3 Reasons for Consent

Consent matters are set out in Section 7 of the EB2 AEE and Section 5 of the EB3R AEE. Consent matters relevant to this assessment include vegetation clearance within roads and open space zones, works within the protected root zone not otherwise provided for, and tree alteration.

There may be instances during the construction period where unforeseen activities in proximity to trees is required (for example - services are found in unexpected locations which need relocating). Such activities may affect more than 20% of a road reserve tree's protected root zone or require severance of a root measuring greater than 80mm in diameter or pruning of a branch greater than 100mm diameter. It may be assessed in these instances that this is preferable to removing the tree.

4 Methodology and Analysis

4.1 The methodology for this assessment involved the following steps:

- Review of scope of area to be surveyed
- Undertake physical site survey and collect relevant data with handheld devices
- Prepare tree plans utilising QGIS software and corresponding tree inventory
- Overlay tree plans with road plans (utilising QGIS software)
- Provide initial feedback to design team
- Meet with design team to discuss potential construction effect
- Assess which trees are directly affected by the road itself and which may be affected by construction activities
- Meeting with landscape / urban design team to discuss mitigation planting philosophy and possible tree retention
- Complete assessment of effects
- Identification and recommendation of potential mitigation and tree protection measures.

4.2 Tree Assessment Methodology

A Visual Tree Assessment (VTA) consistent with modern arboricultural practices (Mattheck and Breloer, 1994) was conducted. This assessment was carried out at ground level which is classified as a 'Level 2' assessment (Dunster et al. 2013).

Tree health assessments are generally based on experience and adaptation from generally accepted industry parameters. The indicators used to determine health are leaf shape, colour, size and form, foliage or bud formation, distribution within the canopy and canopy density. These indicators consider the tree's age and species type. The health is categorised as Good, Fair, Poor, Very Poor or Dead.

Form is generally assessed by symmetrical crown shape and categorised as Good, Fair, Poor or Very Poor.

No soil analysis, tissue sampling and/or geological investigations were carried out. All data was collected without the use of any invasive and/or diagnostic tools.

The tools used onsite to gather the necessary tree data were a measuring tape and hand-held devices. Measurements of trunk girths (measured at 1.4m above ground level) and trunk girths at root flare have been accurately measured, while heights and crown spreads have been estimated.

Tree locations are plotted using a combination of GIS and overhead mapping. This method, although generally accurate, can be inexact, especially when recording trees in groups, and should not therefore be considered precise.

Tree root zone measurements will be calculated using the principles of AS 4970-2007, as required when construction activities are proposed within the root zones of trees to be retained. These calculations have not been prepared for every tree in the project area at this stage. These will be determined at detailed design stage in order to confirm requirements for tree removal and retention.

For those trees growing within an Auckland Council reserve and road reserve, tree owner approval (TOA) is required from Council's Community Facilities arborist. In accordance with the TOA Guidance

Document, this report references the Structural Root Zone (SRZ)[1] and the Tree Protection Zone (TPZ)[2]. Any assessment of Council trees using these root zones is for TOA process only and are not relevant to the rules and standards outlined in the AUP(OP).

- SRZ, as defined in the Australian Standard AS 4970-2009, is the area of the root system used for stability, mechanical support, and anchorage of the tree. Construction and work activities in this area are avoided or heavily limited
- TPZ, as defined in the Australian Standard AS 4970-2009, is the optimal combination of crown and root area that requires protection during the construction process so that the tree can remain viable. The TPZ is an area that is isolated to ensure that tree sensitive construction measures are implemented so that any disturbance or encroachment is mitigated.

[1] SRZ calculation: $SRZ_{(m)} = 0.27 \times DBH_{(cm)}^{0.56}$
[2] TPZ calculation: $TPZ_{(m)} = DBH_{(m)} \times 12$

5 Existing Environment

Chapter Summary
This section of the report provides a description of the existing arboricultural values of the EB2 and EB3R areas of work. *The area identified as EB2 is at the Pakuranga end of the works area and is focused on the terminus of SEART, Pakuranga Road, Ti Rakau Drive and Reeves Road/William Roberts Road. Five hundred and ninety-three trees or groups of trees have been identified within the wider EB2 area of works. Species present include both native and exotic and are located in road reserve, reserves, residential and commercial properties.* *The area identified as EB3R extends along Ti Rakau Drive from Ti Rakau Drive/ Reeves Road in the west to Riverhills Park to the east. The section also extends for short distances into side streets and includes small portions of Auckland Council Reserves. Seven hundred and fifteen trees or groups of trees have been identified within the wider EB3R works area. Species present include both native and exotic and are located in road reserve, reserves, residential and commercial properties.*

5.1 Section EB2 Arboricultural Attributes

The area identified as EB2 is at the Pakuranga end of the works area and is focused on the terminus of SEART, Pakuranga Road, Ti Rakau Drive and Reeves Road/William Roberts Road.

Tree Plans relating to this section:

- LGS_36078_001A – EB2 Master Plan
- LGS_36078_01[A] – LGS_36078_12[A].

Six hundred and three trees or groups of trees have been identified within the wider EB2 area of works. This includes trees which are outside of, but near to the site boundaries. The following summary tables provide the quantities of trees by location.

Table 1 below provides a summary of trees located within road reserve and open space zoned land of the EB2 boundaries which measure greater than 4m in height and or 400mm in girth. These trees would require resource consent to remove or carry out certain activities within their protected root zones or more than the permitted levels of pruning.

Table 1: Trees within EB2 which would trigger resource consent to remove

Location	Total
Road Reserve	180
Open Space	66
Joint/Unclear	3
Total	**249**

Table 2 below provides a summary of trees located within road reserve and open space zoned land which measure less than 4m in height and or 400mm in girth or are located within land zonings (under the AUP(OP) which have no tree protection requirements. These trees could be removed as a Permitted Activity.

Table 2: Trees within EB2 which would not trigger resource consent (Permitted Activities)

Location	Total
Road Reserve	22
Open Space	4
Private (Residential/Business Zones)	317
Joint/Unclear	1
Total	**344**

To the north of SEART is an open grass area containing primarily specimen trees, with the predominant species being Pōhutukawa (*Metrosideros excelsa*) of an early-mature to mature age. Also within this location are a number of early mature – mature Pin oak (*Quercus palustris*) trees (Tree No's 1 – 22 – Refer LGS_36078_01).

To the south of SEART, similar planting has occurred, with early-mature – mature Pōhutukawa being prevalent. However, more intensive 'revegetation' planting has occurred more recently (approximately ten years) closer to the highway (Tree No. 112).

Ti Rakau Corner Reserve, at the south-western corner of Ti Rakau Drive and Pakuranga Road, contains a mixed species of mature exotic trees. Included within this reserve are two willow trees identified within the AUP(OP) as notable trees (reference 1495). However, three weeping willows were identified within the reserve, and it is unclear which of the three trees are the two notable specimens (Refer to Figure 3 below). Two of the trees have historically suffered significant storm damage and have been reduced in size. None of these Willow trees will be affected by the proposed works.

Figure 3 – Three Willow Trees Located within Ti Rakau Corner Reserve (Arborlab April 2022).

A group of Phoenix palms (Trees 220-224) and a weeping willow tree (Tree225) are located within Rotary Reserve where stormwater infrastructure works are proposed to be undertaken (Figure 4).

Figure 4 – Rotary Reserve Phoenix Palms (Arborlab April 2022).

The periphery of Pakuranga Town Centre has a mix of tree species including exotic and indigenous specimens (Figure 5). Typically, the planting includes mature specimens located within the road reserve, in grass berms between the footpath and the private property boundaries. Predominant species include; ash (*Fraxinus* sp.), Indian bead (*Melia azedarach*), pin oak, box gum (*Lophostemon confertus*) and Bull Bay magnolia (*Magnolia grandiflora*).

The entry to the Pakuranga Plaza carpark (which is an Auckland Council Utility Reserve) has four mature Araucaria species trees, which consists of three Norfolk Island pine (*Araucaria heterophylla*) and one Cooks pine (*A. columnaris*) (Tree No's 388-391) Figure 6. One of the Norfolk Island pine trees is suffering apical die back (death of the treetop).

To the south of these Araucaria is a row of closely spaced Pōhutukawa (Tree No. 392). These trees are multi-stemmed specimens, which due to their growing location, have had their natural habit of spreading and occasionally subsiding, curtailed by necessary pruning.

The residential section of Pakuranga Road (western side of Pakuranga Road) within EB2 contains limited trees of note.

Saint Kentigern College, near the northern extent of the proposed works contains a selection of mature exotic specimens and a double row of young - semi-mature Pōhutukawa.

Several groups of mature trees exist along the rear (eastern) boundary of Pakuranga Plaza carpark, which is an Auckland Council Utility Reserve (refer to Figure 7 below), including pin-oak, she-oak (*Casuarina cunninghamiana*) and eucalyptus species.

Figure 5 – Pin-oaks along the road reserve of Pakuranga Road, north of Pakuranga Plaza.

Figure 6 – Norfolk Island pines (Trees 388 – 391) at the entrance to Pakuranga Plaza (on Council utility land) and group of pōhutukawa to the right (Tree 392). (Arborlab - April 2022)

The northern end of William Roberts Road is residential in nature and contains commonly found garden trees and street trees planted within the road reserve, in grass berms between the footpath and the kerb. The most common street tree in this location is willow myrtle (*Agonis flexuosa*) which is commonly found throughout the Auckland streetscape, although not commonly planted now.

The southern end of William Roberts Road ends in a cul-de-sac with community buildings to the west and Auckland Council sports fields to the east (Ti Rakau Park). The area contains a mixture of mature exotic trees, with the most prevalent species being pin oak.

The south-western corner of Ti Rakau Park contains a group of mature exotic trees.

A separate resource consent has been applied for the William Roberts Road extension, prior to the EB2 and EB3R consents (Council reference: LUC60401706). The aspects of work associated with the William Roberts Road extension, and the trees potentially affected by those works are not referenced any further in this report.

Ti Rakau Drive has a median strip between Pakuranga Highway and Pakuranga Road, the western end of which contains a number of mature Washingtonia palms (*Washingtonia robusta*) and a single mature flowering gum tree (*Corymbia ficifolia*).

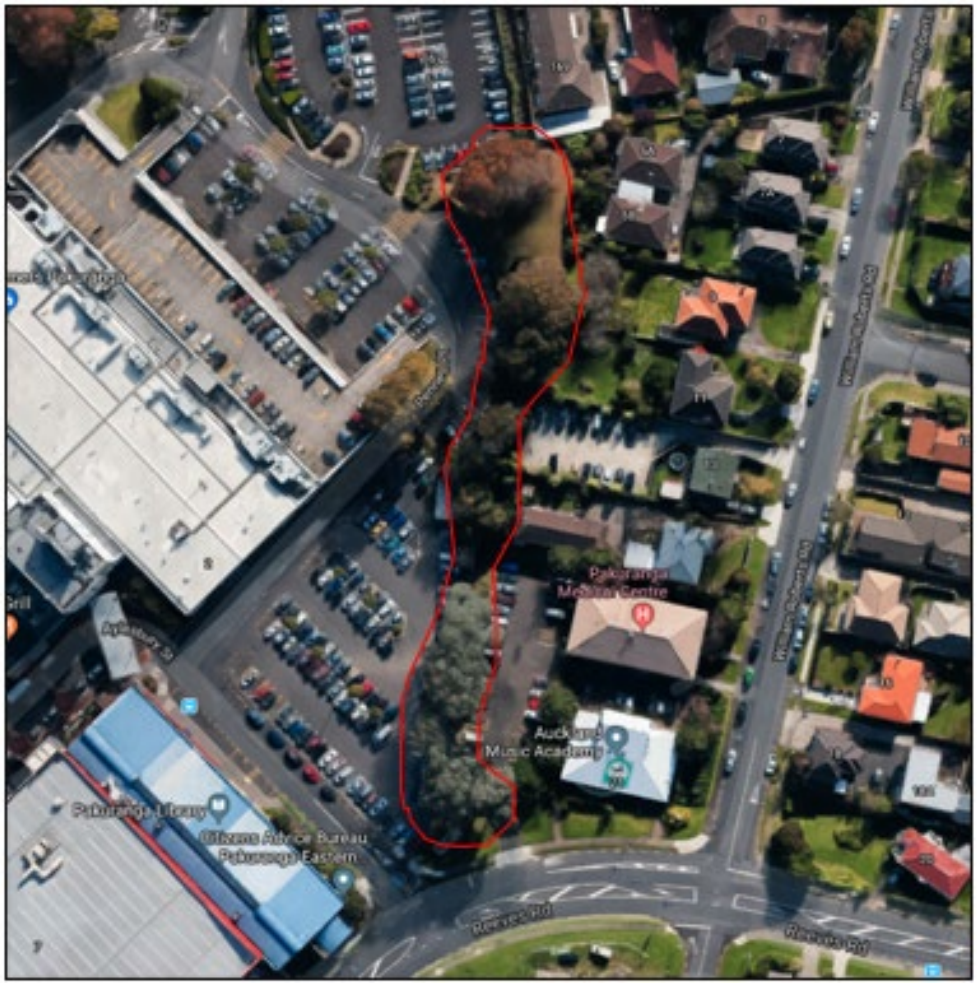

Figure 7 – Area of mature trees near the eastern boundary of Pakuranga Plaza (Council utility reserve). (Annotated Google Maps Imagery)

Figure 8 – Southern end of mature tree group circled in Figure 2 above (Arborlab – April 2022)

5.2 Section EB3 Residential Arboricultural Attributes

This section extends along Ti Rakau Drive from Ti Rakau Drive/ Reeves Road in the west to Riverhills Park to the east. The section also extends for short distances into side streets and includes small portions of Auckland Council Reserves.

Tree Plans relating to this section:

- LGS_36078_002 – EB3R Master Plan
- LGS_29855_12[A] – LGS_29855_19[A]

Seven hundred and sixteen trees or groups of trees have been identified within the wider Eastern Busway 3 Residential works area. This includes trees which are outside of, but near to the EB3R work boundary. Table 3 below provides a summary of trees located within road reserve and open space zoned land of the EB3R boundaries which measure greater than 4m in height and or 400mm in girth. These trees would require resource consent to remove or carry out certain activities within their protected root zones or more than the permitted activity levels of pruning.

Table 3: Trees within EB3R which Potentially Trigger Resource Consent

Location	Total
Road Reserve	126
Reserve	122
Joint/Unclear	22
Total	**270**

Table 4 below provides a summary of trees located within road reserve and open space zoned land which measure less than 4m in height and or 400mm in girth or are located within land zonings (under the AUP(OP) which have no tree protection requirements. These trees could be removed as a Permitted Activity.

Table 4: Trees within EB3R which do not Trigger Resource Consent (Permitted Activities)

Location	Total
Road Reserve	20
Private (Residential Zone)	418
Joint/Unclear	8
Total	**446**

The trees within this area are primarily located within the road reserve and front yards of residential sites. Sections of side roads were also surveyed which also included trees located in the road reserves and front yards of private properties.

Portions of a number of Auckland Council Reserves which adjoin Ti Rakau Drive or adjoining side streets were also surveyed.

The prominent species of trees within the Ti Rakau Drive road reserve (street trees) includes box gum and Washingtonia palm (Figure 9). Washingtonia palms have been used both in the grass berm between the kerb and the foot path and also as median strip planting.

Palm trees are generally considered to provide a lower level of ecosystem services than larger growing hard wood trees due to their smaller canopy cover. Additionally, palm trees within central median strips can be expensive to maintain, as the dead fronds need to be removed regularly, which involves extensive traffic management.

The southern end of Gossamer Drive contains a group of mature She-oak trees located within the road reserve, which are large specimens providing a reasonably dominant landscape feature.

Riverhills Park contains a collection of mature trees within the south-western corner (primarily London plane (*Platanus x acerifolia*)) and Eucalyptus (Figure 10). The southern part of Riverhills Park contains groupings of early mature trees consisting of totara (*Podocarpus totara*), mature London plane and Washingtonia palms along its Ti Rakau Drive frontage.

The south-eastern aspect of Riverhills Park is comprised of a short bank down to the foreshore. The trees present are a mixture of native and exotic, with some sections predominated by pampas grass (refer to Figure 11 below).

Figure 9 – Example of Streetscape along Ti Rakau Drive in EB3R.

Figure 10 – Mature Exotic Trees within the South-Western corner of Riverhills Park.

Figure 11 – Foreshore Vegetation at South-Eastern aspect of Riverhills Park.

6 Assessment of Arboricultural Effects

Chapter Summary
The principles of the Project will be to retain mature trees and only remove them where their retention is found to be unviable. *Removal of trees which require resource consent within the EB2 project area comprises principally of trees growing with the road reserve area (50 trees) and a smaller number in open space zoned land (11).* *Removal of trees which require resource consent within the EB3R project area comprises of a mixture of trees located within road reserve (83 trees) and open space zones (74 trees).* *These figures are based on a 'worst-case scenario', as assessed from the reference designs.* *Removal of this number of mature trees within an urban environment such as the EB2 and EB3R sections of the Project will have a moderate adverse effect which will require mitigating.*

6.1 Construction

6.1.1 Eastern Busway 2

Five hundred and ninety-three trees or groups of trees have been identified within the wider EB2 area of works. This includes trees which are outside of, but near to the site boundaries. The following summary tables Table 5 and Table 6 provide numbers of trees within the EB2 works area, by AUP(OP) zoning and whether they will be removed or retained.

Table 5: Trees within EB2 which would require resource consent to remove and associated actions

Location	Remove	Retain	Total
Road Reserve	50	130	180
Open Space	11	55	66
Joint/Unclear	NA	3	3
Total	**61**	**188**	**249**

Table 6: Trees within EB2 which do not trigger resource consent and associated actions

Location	Remove	Retain	Total
Road Reserve	12	10	22
Open Space	3	1	4
Private (Residential/Business Zones)	162	155	317
Joint/Unclear	NA	1	1
Total	**177**	**167**	**344**

The EB2 area includes the SEART ramps, the RRF and joins up to the recently completed EB1 at Pakuranga Road.

The SEART off/on ramps require the removal of a group of mature trees within road reserve, between Seven Oaks Drive and the existing off ramp (Trees 39-71). Tree 38, whilst sufficiently clear of construction activities, is assessed to pose risk to personnel and road users due to structural defects. As such, it is also proposed to be removed.

The location where the recently completed EB1 meets EB2 involves widening Ti Rakau Drive on the eastern side of the road, requiring the removal of a group of mature trees which are located within Pakuranga Plaza's carpark (Auckland Council Utility Reserve). Due to these trees being located within a Business – Town Centre zone, they are not protected by the AUP(OP). This group consists of a row of Pōhutukawa (identified as Tree group 392) and a collection of exotic trees.

A row of mature trees located to the north-western side of the RRF are also located within Business – Town Centre zone (other than tree 507 which is located within road reserve) and will require removal. Insufficient space exists for the trees to be retained during construction, and likely excavations would deem the trees to be unviable for retention.

On the opposite side of the RRF, a group of mature trees growing in front of the community building are sufficiently set back from the proposed works that they are assessed as being able to be retained (Trees 519 – 530). Two of the trees (Melia trees 527 and 529) overhang the bus stop and footpath and will likely require a degree of pruning and construction activities within their root zones.

The northern portion of William Roberts Road (between Reeves Road and Pakuranga Road) contains a limited number of trees that would require resource consent to remove, consisting primarily of Willow myrtle (*Agonis flexuosa*) nearing the end of their safe useful life expectancy (Trees 559, 567-569, & 582-584). The trees may or may not require removal, depending on the final alignment of the new kerb line in this location.

The section of Pakuranga Road between Ti Rakau Drive and William Roberts Road will have limited effects on trees requiring resource consent for removal. A new cycle lane will be formed primarily within the existing carriageway, with no work proposed between the existing kerb line and the trees' trunks. Notwithstanding this, near the intersection between Ti Rakau Drive and Pakuranga Road, the cycle lane moves south and requires the removal of Trees 371-374.

As identified above, approximately sixty-one (61) trees require removal or potentially require removal, which require resource consent as a restricted-discretionary activity. Removal of this number of mature trees within an urban environment such as the project area will have moderate adverse effects on the arboricultural and amenity values of the area which will require mitigating.

Two hundred and three trees have been identified within road reserve and open space zoned land within the EB2 area of works which are assessed as likely to be able to be retained. Some of the retained trees may require works within their protected root zones associated with various activities such as; kerb removal and replacement, footpath upgrading, surface (asphalt) replacement and infrastructure installation. Such activities have the potential to adversely affect the trees through the severance of roots, alteration to permeable surfacing or direct damage from machinery. Such adverse effects are able to be appropriately managed by following a suite of tree management protocols and tree protection methodologies.

The ecological values of terrestrial vegetation within the Project area are detailed in the ecology (Eastern Busway – Sections EB2 and EB3 Residential – Ecological Effects Assessment).

6.1.2 Eastern Busway 3 Residential

Seven hundred and fourteen trees or groups of trees have been identified within the wider EB3R works area. This includes trees which are outside of, but near to the EB3R work boundary. The following summary tables Table 7 and Table 8 provide numbers of trees within the EB3R works area, by AUP(OP) zoning and whether they will be removed or retained.

Table 7: Trees within EB3R which would require resource consent to remove and associated actions

Location	Remove	Retain	Total
Road Reserve	83	43	126
Reserve	74	48	122
Joint/Unclear	8	13	21
Total	**165**	**104**	**269**

Table 8: Trees within EB3R which would not require resource consent (permitted activity) to remove and associated actions

Location	Remove	Retain	Total
Road Reserve	7	13	20
Private (Residential Zone)	185	233	418
Joint/Unclear	6	1	7
Total	**198**	**247**	**445**

The EB3R section of works involves widening of the road corridor to the south-west, and the forming of the two-lane central busway. This will require the removal of all of the road reserve trees growing within the central median and the south-western side of the road.

The works also extend into side roads on the south-western side of Ti Rakau Drive at Tiraumea Drive, Mattson Road, Roseburn Place, Edgewater Drive (both sides), Wheatley Avenue, Fremantle Place and Gossamer Drive.

The existing street tree assets along Ti Rakau Drive within EB3R are of reasonably low value, predominantly comprised of *Washingtonia robusta* (29 trees), and *Lophostemon confertus* (26 trees). The Washingtonia palms provide limited ecosystem benefits as they are not a woody tree able to develop a broad canopy and provide the associated shading and habitat values that a more broadly spreading, woody tree can.

At the eastern end of EB3R, the works extend approximately 110 metres into Gossamer Drive, with the road being widened on both sides. This will require the removal of a group of She-oak growing within the road reserve on either side of the road (*Casuarina cumminghamiana* – Trees 887, 878, 881, 882, 896, 900, 901, 906 & 907).

On the northern side of Ti Rakau Drive between Gossamer Drive and Ti Rakau Bridge a group of semi-mature to mature trees of mixed species (indigenous and exotic) will require removal as Ti Rakau Drive will be widened in this location. The trees are growing within the footprint of the busway and bus station. The trees are growing within land that is currently zoned as Open Space – Sport and Recreation. A large eucalyptus tree requires removal for construction of the western abutment (Abutment A) of the proposed new Pakuranga Creek bridge.

As EB3R requires land take of a portion of Riverhills Park, a mitigation package for the reserve is being prepared (refer Figure 12 below). A number of improvements are proposed for the reserve, potentially including reorientation and improvements to playing fields, construction of paths, construction of toilet and playground facilities, and installation of flood lights. The reorientation of the sports fields will likely require the removal of a group of mature exotic trees within the south-western aspect of the reserve (Trees 920-933).

As identified above, approximately one hundred and sixty-five trees require removal or potentially require removal, which requires resource consent. The trees requiring removal consist of a mixture of trees located within road reserve (83), open space zoned reserve land (74) and eight trees which appear to straddle the boundary between road reserve and residential zoned land. The removal of trees within open space consists primarily of trees within Riverhills Park (refer: Arborlab Plan LGS_36078_19).

Removal of this number of mature trees within an urban environment such as the EB3R section of the Project will have a moderate adverse effect on the arboricultural and amenity values of the area which will require mitigating.

One hundred and eighteen (118) trees have been identified within road reserve and open space zoned land within the EB3R area of works which are assessed as likely to be able to be retained. Some of the retained trees may require works within their protected root zones associated with various activities such as; kerb removal and replacement, footpath upgrading, surface (asphalt) replacement and infrastructure installation. Such activities have the potential to adversely affect the trees through the severance of roots, alteration to permeable surfacing or direct damage from machinery. Such adverse effects are able to be appropriately managed by following a suite of tree management protocols and tree protection methodologies.

The ecological values of terrestrial vegetation within the Project area are detailed in the ecology (Eastern Busway – Sections EB2 and EB3 Residential – Ecological Effects Assessment).

Figure 12 – Options for mitigation at Riverhills Park.