Tree Protection Management Plan

Eastern Busway Alliance

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Eastern Busway

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Document Approval		
Action	**Name**	**Position**
Responsible	Jonathan Green	Environmental Lead
Reviewer	Saul Chambers	HSE Manager
Approver	Matt Zame	Project Director

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Acronyms

Table 1 Acronyms

Acronym	Term	Definition
AC	Auckland Council	
ALT	Alliance Leadership Team	The team that will perform the day-to-day operational leadership and management functions of the Alliance
APD	Project Director	The Alliance Project Director
AT	Auckland Transport	Auckland Transport
CCO	Controlled Organisation	
EB1	Eastern Busway Panmure to Pakuranga	

EB2	Eastern Busway Pakuranga Town Centre	
EB3C	Eastern Busway Pakuranga to Botany - Commercial	
EB3R	Eastern Busway Pakuranga to Botany - Residential	
EB4	Eastern Busway Botany Town Centre Station	
EBA	Eastern Busway Alliance	The alliance between the Alliance Participants formed for the delivery of Eastern Busway Stages 2, 3 and 4
KPI	Key Performance Indicator	The measurable value that demonstrates how effectively the Alliance is achieving key business objectives
KRA	Key Result Area	Performance targets against which the Alliance achievements are measured
PAA	Project Alliance Agreement	Formed between AT and the selected Participants for the purposes of detailed design, construction, commissioning, and defects correction of the Project
PAB	Project Alliance Board	
SLT	Senior Leadership Team	

For a full list of Eastern Busway acronyms please see document **EB-LS-0-PP-000001 Acronyms**

1 Introduction

1.1 Project Scope

The Eastern Busway is a rapid transit busway project that will create faster, more reliable and connected transport options for communities in east and south Auckland. It is being delivered by Auckland Transport, a Council Controlled Organisation (CCO) of Auckland Council.

Auckland Transport (AT) has formed an Alliance Team, the Eastern Busway Alliance (EBA), comprised of the following Alliance Participants: AT, Fletcher Construction Infrastructure Ltd., ACCIONA Construction NZ Ltd., AECOM NZ Ltd., and Jacobs NZ Ltd. The scope and terms of EBA's services are defined in the Project Alliance Agreement (PAA).

1.2 Project Description

The Eastern Busway project is a multimodal transport upgrade project between Panmure and Botany (Figure 1) in east Auckland. The project consists of four sections and Panmure Station. Panmure station is complete; Section 1, Panmure to Pakuranga is also complete. Section 2, 3 Residential are in the delivery phase, and Section 3 Commercial and 4 are in the planning and consenting phase.

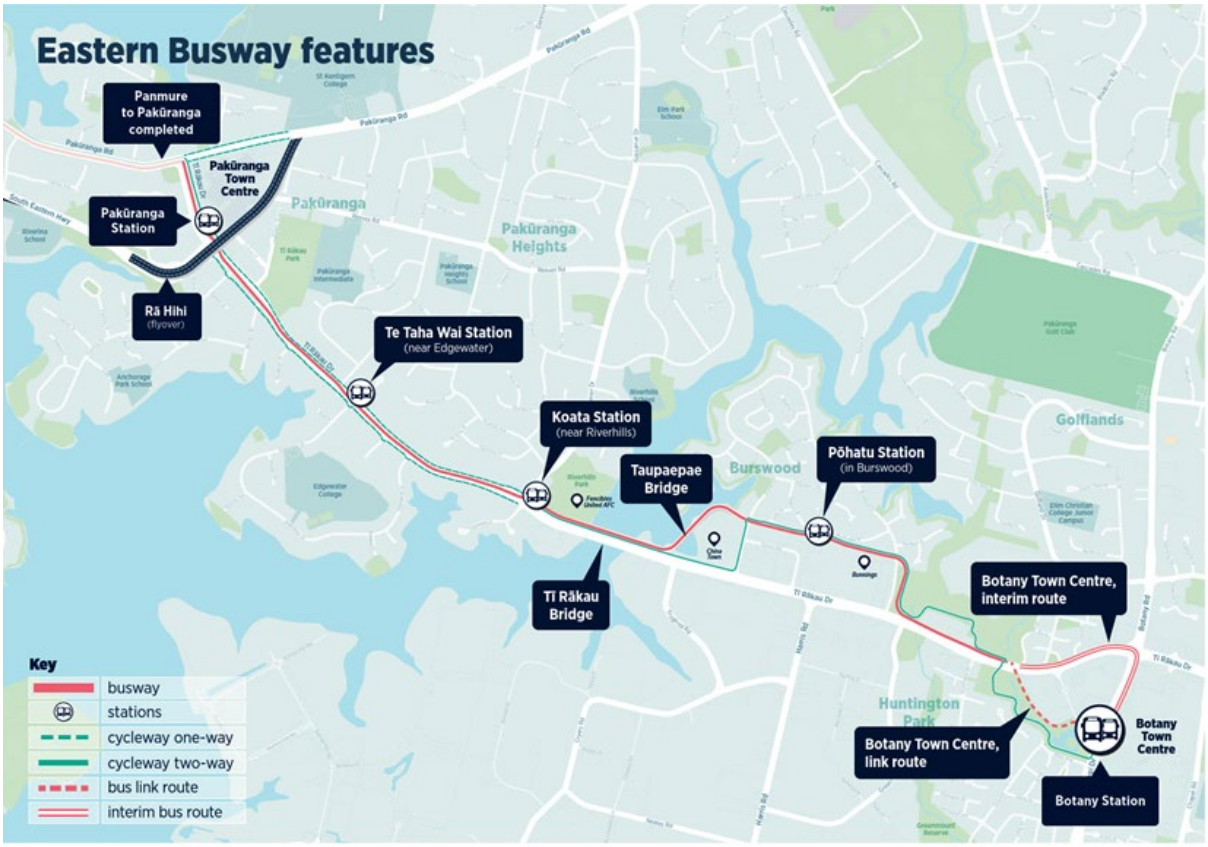


Figure 1 Eastern Busway alignment between Panmure and Botany town centres in east Auckland

1.3 Project Objectives

The client objectives for this project are as follows:

- Provide a multimodal transport corridor that connects Pakuranga and Botany to the wider network and increases choice of transport options.
- Provide transport infrastructure with existing land use and supports a quality, compact urban form.
- Contribute to accessibility and place shaping by providing better transport connections between, within, and to the town centres.
- Provide transport infrastructure that improves linkages, journey time and reliability of the public transport network.
- Provide transport infrastructure that is safe for everyone.
- “Provide or Safeguard future” transport infrastructure at (or in the vicinity of) Botany Town Centre to support the development of strategic public transport connection to Auckland Airport

2 Management Plan Scope & Objectives

2.1 Introduction

Eastern Busway Alliance (EBA) has developed this Tree Protection Management Plan (TPMP) on behalf of Auckland Transport (AT) to support the following stages of construction of the Eastern Busway Project:

- Eastern Busway 2 (EB2)
- Eastern Busway 3 (EB3R)
- Eastern Busway 3 – Commercial (EB3C)
- Eastern Busway 4 – Interim (EB4i)

2.2 Purpose and Scope

The purpose of this TPMP is to:

- As far as is reasonably practicable, avoid, remedy or mitigate any adverse construction effects on those trees to be retained as part of Eastern Busway.
- Meet the requirements of the designation conditions and resource consent conditions associated with Eastern Busway.

The principles outlined in the Construction Environmental Management Plan (CEMP) and this TPMP will be used by the Eastern Busway team to set out management procedures and methodologies for undertaking works within the vicinity of retained trees.

The Arboricultural Effects Assessment prepared for Eastern Busway by Arborlab Consultancy Services Limited forms the basis of this TPMP.

2.2.1 Tree Protection and Management Plan Objectives

The objectives of the TPMP are to:

- Minimise works and native vegetation clearance within roads, reserves and Coastal Marine Areas (CMA's), and ensure vegetation removal is clearly identified prior to avoid accidental vegetation removal
- Minimise works within the root zones of retained trees
- Ensure that any works within the root zones or pruning of trees is undertaken in accordance with arboricultural best practice methodologies

2.3 Roles and Responsibilities in Relation to the TPMP

The team responsible for achieving TPMP objectives is set out in Table 2 below. Team members will have the appropriate experience, project involvement and responsibility to ensure that all relevant aspects of Eastern Busway are considered when making decisions on TPMP implementation.

Table 2 Roles and Responsibilities

Person	Role	Responsibility
Jonathan Green	Environmental Lead	Implementation of TPMP on site and environmental compliance auditing.
Matt Zame	Project Director	Implementation of designation and resource consents
Andy Gibbard	Construction Manager	Ensuring the zone managers are aligned in their approach to ensuring environmental compliance with the TPMP
Leon Saxon (or delegate from Arborlab)	Project Arborist / Works Arborist	Provide technical Arboricultural assessments and advice. Onsite arboricultural monitoring as required. Provide advice and guidance to construction managers.
Treescape	Arborist Operations Manager	Undertake tree removals and tree pruning requirements.
Rob De Longe	Auckland Council Urban Forest Specialist Auckland Council Compliance Monitoring Arborist	Be on site as required by NoR/ resource consent conditions. Monitoring compliance of arboricultural designation and resource consent conditions

2.4 Works Arborist

The appointed Works Arborist will be experienced in tree protection systems and construction methodologies and will be responsible for implementing the TPMP on site in accordance with the condition set submitted with the application.

The Works Arborist will be responsible for confirming tree removal and retention in accordance with the Arboricultural Effects Assessment Tree Plans that accompany the resource consent and designation applications (hereon referred to as Tree Plans).And to oversee directly, all works within the dripline and rootzone of the retained trees located in the designated areas of work for the duration of the site works, until the route is considered completed, and including any reinstatement works.

The Works Arborist will make decisions on appropriate management of roots identified during excavations, carry out root pruning where required, and install materials (such as hessian/wool mulch) to maintain moisture levels within exposed rooting areas (refer to section 5.7).

The Works Arborist will work in cooperation with the Environmental Lead to ensure that sites are set up in a manner which avoids or minimizes adverse effects to retained trees, without compromising site safety.

2.5 Project Arborist

The Project Arborist shall be suitably qualified and experienced in the preparation of technical reports, will provide specialist input, and assistance to the Works Arborist in appropriate decision making on site where required. The Project Arborist will prepare memorandums to be provided to the Auckland Council Compliance Monitoring Arborist as required (Section 4.3.2).

2.6 TPMP Certification and Review

Once certified, minor amendments as a result of changes in design, construction materials, methods or management of effects can be made to the TPMP without the need to seek recertification provided that the amendments are agreed to by Council, prior to the implementation of any changes.

The TPMP may be submitted in parts or stages to address activities or to reflect the staged implementation of the Project. If submitted in part, the TPMP will clearly show the linkage with plans for adjacent stages and interrelated activities.

Any amendments to the certified TPMP that may result in a materially different outcome/effect will be submitted to Council to certify these amendments are consistent with the relevant designation and resource consent conditions prior to implementation.

If no written response is received from Council within 10 working days of the management plan being submitted for certification, the TPMP will be deemed to have certification and works can commence.

3 Legal Requirements

The TPMP has been prepared in accordance with the relevant designation and resource consent conditions contained in the condition set submitted with the application. This document is intended to provide a framework and information that will assist in the implementation of these requirements.

If there is a conflict between the TPMP and the corresponding legislative requirements, including consent conditions, then the legislative requirements shall prevail.

4 Implementation and Operation

The TPMP is to be submitted to Auckland Council for certification in accordance with Section 1.6 prior to any tree works associated with Eastern Busway being carried out.

As part of the on-site works, the EBA shall develop safe work method statements which detail the procedures to avoid, remedy or mitigate any adverse construction effects on those trees identified for retention.

4.1 Pre-Construction

Works close to retained trees will be reviewed by the Project Arborist (Section 2.6) prior to construction.

Any minor alterations to detailed designs for works planned around retained trees, that do not introduce a material change to the certified TPMP, will be further considered during pre-start meetings, which will include Auckland Council representatives.

If the design of Eastern Busway is modified so that it becomes apparent that protected trees identified as being retained within the Tree Plans are required to be removed, then the removal of the trees is appropriate if;

- The design modification results in retention of a tree that was identified to be removed (i.e. no net loss of protected trees); or
- If the design modification will result in a net loss of protected trees, a suitable replacement specimen tree is provided in Eastern Busway alignment (in addition to the proposed planting shown on the approved/certified UDLP)

4.2 Construction Methodology/Project Staging

Prior to each stage of construction commencing, the Works Arborist (identified in Table 2) will carry out the following actions as identified in Table 3. Responsibilities for each action are identified. The actions shall be completed prior to the pre-start meeting held with Auckland Council representatives.

Table 3 Project Staging – Works Arborist Process

(i) Action	(ii) How	(iii) Responsibility	(iv) Document/ confirmed by:
Identify trees for removal	Tree marked with a red X with dazzle 5 days prior to removal. Checked by Works Arborist before starting work each day. Arborist Operations Manager to contact Arborlab if any discrepancies. Record that the checks have been completed on daily 'tool-box' pre start sheet.	Project Arborist	Environmental Lead

(i) Action	(ii) How	(iii) Responsibility	(iv) Document/ confirmed by:
Identify lizard habitat areas	Identify exclusion area, invite herpetologist to site, confirm removal methodology requirements.	Environmental Lead	Ecologist and written memo
Identify trees for retention	Marked with pink ribbon, tied to tree at 3 meters above ground level.	Project Arborist	Written memo
Identify retained trees; works in root zone / biosecurity	Identify exclusion area, attach 'protected tree' signs.	Project Arborist	Written memo

Prior to any works commencing, a meeting will be held at the site to discuss all the tree protection measures proposed and the relevant designation or resource consent conditions. Present at the meeting should be:

- the Project's Environmental Lead
- the Project/Works Arborist

In the case of the areas identified in the Lizard Management Plan:

- Project herpetologist

The following Auckland Council officers must also be invited to attend this meeting:

- Team Leader Monitoring (or representative)
- In the case of trees on Roads or Parks owned land – the Senior Urban Forest Specialist (or equivalent), Operational Management and Maintenance, Auckland Council Community Facilities

Any additional trees noted during site walkover as requiring removal/pruning/works within rootzone (but not identified on the Tree Plans as requiring any works) will be discussed at the construction pre-start meeting. Any recommendations/actions arising from this meeting will be recorded on the Arborist Meeting Minutes form as evidence of agreed actions.

4.3 Tree Protection and Measures

An experienced, qualified arborist (Works Arborist), as identified in Section 24, experienced in tree protection systems, protocols, and construction methodologies around trees, is to be engaged to manage the excavation works near the tree. The Works Arborist will be engaged to manage tree removal and to avoid any potential impact on the vegetation underneath or within the root zone of retained trees on site during tree removal.

4.3.1 Pre/Post Work Administration Procedures

Prior to works commencing in the vicinity of protected trees to be retained, the Environmental Lead will arrange a pre-start meeting (as discussed in Section 4.1). At the meeting, the foreman shall agree with the Works Arborist:

- The methodology and timing of the works
- Site access and areas for maneuvering vehicles and machinery
- Areas for storing and/or stockpiling materials, spoil, and equipment
- The care needed when working around trees
- The conditions of the resource consent

An invitation shall be extended to the relevant Auckland Council Arborist responsible for the tree asset. The invitation shall be forwarded a minimum of five (5) days prior to the meeting.

Details of the meeting will be recorded on a digital arborist meeting minutes form.

Temporary access and storage areas are to be identified and delineated prior to the commencement of site works (at the pre-start meeting). All construction machinery and materials will be confined to agreed and demarcated work areas.

All vehicle movements to access the site will be excluded from the permeable Tree Protection Zone (TPZ) – refer to Section 4.3 and Appendix A for explanation of areas of retained trees.

Prior to works commencing, protective barrier fencing (refer to Section 5.4 below) shall be erected to ensure exclusion of as much of the TPZ of retained trees as practicably possible, at the direction of the Works Arborist.

No chemicals or harmful fluids are to be emptied or disposed of within the TPZ.

Damage and/compaction to existing soil structure is to be avoided by the exclusion of machinery, structures, and vehicles from the TPZ, unless protected with appropriate, fit for purpose, temporary load bearing surfaces (refer to Section 5.4 and 5.5 below).

Excavation methods within the TPZ are to be dependent on work and tree protection requirements. The primary method of excavation while within the rootzone of the retained tree will be by hand- held tools such as a spade, hydro and/or air excavation. These will be used at the edge of the required excavation footprint to expose any roots that can be retained. Once the roots are protected, the remaining area of excavation can be undertaken cautiously by a light machine excavator working on top of load bearing surfaces (refer to Sections 5.6 and 5.7 below).

Roots uncovered during the operation are to be retained and protected wherever possible. However, if this cannot be achieved, the severance of any root in excess of 35mm shall be done so at the discretion of the appointed arborist if the cumulative effects are within the tree's tolerances.

Where roots are to be severed, they are to be cut by the appointed arborist, or a contractor approved by the appointed arborist.

The backfill of excavations, around retained roots, is to utilise the original excavated material or with a superior quality soil.

Retained roots are to be protected through hessian or wool mulch wrapping (or a similar product), and where exposed to chemicals or concrete, to be covered in a layer of polythene (or a similar product). Surface roots are to be covered with geotextile fabric and a 75mm layer of sand when affected by paving.

On completion of the works, the works arborist at their discretion shall "sign off" the work. If requested, the works arborist shall provide a brief account of Eastern Busway to the council arborist (if necessary, with photos). The account of works shall include, but no be limited to:

- The effects of the works on the subject tree
- Any remedial work which may be necessary

It is the responsibility of the Environmental Lead to ensure that all persons engaged or otherwise to work on the site are made aware of the conditions of the designation and resource consents, and that those conditions are adhered to at all times.

No work shall take place within the root zone of the protected trees to be retained without prior approval from the works arborist.

4.3.2 Reporting

A written memo detailing arboricultural monitoring shall be provided to the relevant Auckland Council Compliance Monitoring Arborist with a folder of completed Supervising Arborist Records. The data will be recorded digitally and provided as a brief written document. Reporting will be carried out in accordance with Table 4 below.

Table 4 Reporting

Item	Reporting
Pre-commencement meeting	Pre-commencement minutes
Tree removal	Written memo after activity
Tree protection in place	
Excavations adjacent to trees	
Confirmation of root pruning	
Final inspection	Final report upon completion

4.4 Tree Retention

Regular forward works walkovers shall occur, with the Environmental Lead and the Works Arborist to review upcoming works. Where works are required within the root zone of retained

trees, the Works Arborist will confirm that the proposed works can be completed with no more than minor adverse effects to the tree, as anticipated by the relevant resource consent and designation conditions.

4.5 Biosecurity measures

Dutch Elm Disease (DED) Prevention Measures are to be adopted for works around any elm trees (Ulmus sp.), identified within the site.

There are strict rules, under the Biosecurities Act (1993), pertaining to the disposal of elm material in the Auckland region. The removal of the elm trees from within Eastern Busway must therefore be undertaken in full compliance with the rules listed below. It is an offence, under the Act, to not comply.

To ensure that this is the case, the Arborist Operations Manager will demonstrate (in writing) that they have the appropriate resources to fulfil the biosecurity obligations prior to carrying out the removal of any elm trees as listed for removal in the Tree Plans.

- All material must be chipped. Logs can either be cut up and chipped, or chipped and buried in landfill
- Chip to be buried in landfill or kept at storage site to compost for a minimum of three months
- Clean all equipment (chainsaw, pruning saw) after use with methylated spirits/trigene
- The tree stump must be stump ground or debarked

Kauri Dieback Disease is also prevalent in the Auckland Region. Earthworks will be avoided within three times the canopy radius of any Kauri tree. Should ground disturbance be required within three times the canopy radius of a Kauri tree, all plant will be cleaned of soil prior to entering the works area and cleaned prior to removal. Any soil requiring offsite disposal from within three time the canopy radius will be sent to landfill.

4.6 Sustainability

Vegetation removed shall generally be chipped, and the resulting mulch re-used within the open space area from which it has been removed. If any trees from road reserve are removed, the mulch may be used within the nearest available open space area. Re-using the mulch has multiple benefits, including, soil moisture retention for planted areas, improving soil condition and reducing weed infestation. Any pest species should be chipped and removed from site to either an appropriate landfill, or a local, large- scale composting operation to avoid the spread of pest seeds. When resulting mulch is to be re-used on site it should be stored in piles and left to age for several months before use.

If mulch is not able to be used within Eastern Busway, it will be donated to a local group where possible for use on appropriate environmental improvement projects.

Logs from any larger trees which require removal may also be re-used within open space areas. Uses could include; play material for children (logs securely laid on the ground to climb

upon), stumps left high for carving on site, scattered in any areas likely to have herpetofauna present as habitat/food source (food source as the wood decays and insects become present).

Re-using both mulch and logs reduces vehicle movements that would otherwise be required to remove the materials from site.

Any use of chainsaws will use eco-friendly chain-bar lube.

5 Methodology

5.1 Supervision

Any works requiring tree protection measures shall be conducted under the supervision and direction of a suitably qualified and experienced arborist (Section 2.5). The appointed works arborist will be experienced in tree protection systems and construction methodologies and will coordinate site works to ensure that the tree protection methodology is correctly implemented.

5.2 Staff Training

All staff who will be working on sites where retained trees are present shall receive a briefing from the Works Arborist, utilizing the attached flash cards.

5.3 Pre/Post work administration procedures

Auditing reports are to be compiled by the Works Arborist following the completion of each zone.

5.4 Protective barrier fencing

Prior to physical works commencing in the vicinity of protected trees, and where practicable to do so, a suitable protective fence shall be erected around the tree. The exact location and nature of the protective fence shall first be agreed and recorded by the Works Arborist. For the duration of time the protective fence is in place, the area enclosed by the fence shall be regarded as protected, and no material is to be stored, emptied or disposed of within the area enclosed by the protective fence. No person, vehicle or machinery may enter the area enclosed by the protective fence unless otherwise authorized to do so by the Works Arborist.

If for any reason it becomes necessary to move the protective fencing, then for the duration of time that the protective fence is not in place, the area which was previously enclosed by the fence shall be regarded in the same manner as if the protective fence were still in place.

Protective barrier fencing shall consist of 1.8-metre-high pole/wire mesh fencing material with ground anchor spikes (or an accepted alternative approved by the Auckland Council arborist or representative) (Figure 4). The form of the fencing shall be dependent on the type of activity to be undertaken within the vicinity of the tree and shall be suitable for the purpose. The fencing should be erected at the extremities of the permeable berm/road reserve or footpath area to totally exclude access or the storage of any materials from within the permeable TPZ area of retained trees.

Figure 2 Standard tree protection type

5.5 Storage, access, and operation

No material is to be stored, emptied, or disposed of in or around the root zone of the retained tree(s) unless otherwise authorised to do so by the works arborist. Any material which is to be stored or temporarily placed in or around the root zone shall be stored carefully on an existing or temporary hard surface such as asphalt or plywood sheets.

If, during the course of the works, machinery or vehicle access/maneuvering is required in or around the root zone, then depending on the nature of the loading of the vehicle, it may be necessary to cover those areas with a protective overlay sufficient to protect the ground from being muddied, compacted, churned up or otherwise disturbed. This may involve the deployment of 'track mats', or a layer of mulch or sand/SAP7 overlaid if necessary, with a raft of wire planks, plywood or similar.

If machinery/vehicles are to be operated or stored within the root zone area on an existing temporary load bearing surface, then the machinery/vehicle shall not cause any detrimental effect to the tree through compaction, physical damage, spillage of lubricants and fuels or discharge of waste emissions.

5.6 Excavations

Any soil excavations are to be managed appropriately by the Works Arborist when working within the TPZ (refer to Section 5.7 below) of the tree. These excavations may utilise a suite

of methodologies appropriate to the situation, ranging from hand digging, air-excavation, hydro-excavation and suitably sized machinery and overseen by the supervising arborist.

The cutting, breaking and lifting of any concrete and/or asphalt around the root zone of trees shall be done in conjunction with the works arborist through a careful combination of machine and hand operated equipment. Ideally, the concrete/asphalt will first be cracked or broken with a steel bar or sledgehammer, and the sections of concrete carefully lifted out by hand. At the discretion of the works arborist, the cutting, cracking, lifting and removal of concrete/asphalt may proceed with machinery, such as a concrete cutter, and/or small excavator. All excavators and machinery shall sit on the existing concrete/asphalt surface and work slowly backwards away from the tree.

5.7 Root protection

In accordance with New Zealand Arboricultural Association guidelines, this TPMP references the Australian Standards (AS4970:2009) - Protection of Trees on Development Sites. Prior to construction, the TPZ and Structural Root Zone area for each tree proposed to be retained will be calculated and marked out on site.

- **Tree Protection Zone (TPZ)**

The TPZ is the optimal combination of crown and root area (as defined by AS 4970-2009) that requires protection during the construction process so that the tree can remain viable. The TPZ is an area that is isolated from the work zone to ensure no disturbance or encroachment occurs into this zone. Tree-sensitive construction measures must be implemented if work is to proceed within the TPZ.

- **Structural Root Zone (SRZ):**

The SRZ is the area of the root system (as defined by AS 4970-2009) used for stability, mechanical support and anchorage of the tree.

Any roots which are encountered during any part of the process are to be retained where possible. Every effort shall be made to retain all roots 35mm in diameter or greater. The severance of any root less than 35mm shall be done so at the discretion of the works arborist. Where roots are to be severed, they shall be cut cleanly with a sharp hand saw or loppers, and the area around the root shall be backfilled with the original material.

When a root greater than 35mm in diameter is impeding the construction and all other alternatives to work around the root have been exhausted, the supervising works arborist shall only remove the root if he/she determines in writing that its removal will not be detrimental to the health and stability of the tree.

Where roots to be retained are encountered and there is need for these roots to remain exposed in order that works are not impeded, then those roots shall be covered with a suitable protective material (such as moist Hessian) in order to protect them from desiccation and/or mechanical damage, until such a time as the area around the root can be backfilled with the original material. The wrapping or covering of any roots shall be undertaken by the works arborist.

If during the works a large area of the tree's root zone is exposed, then it may be necessary to protect the exposed root zone with a protective overlay sufficient enough to protect the

ground and roots from being disturbed, for example a layer of geotextile fabric laid over a 150mm thick layer of wood mulch.

Where concrete is to be poured into excavations containing exposed roots, then all exposed roots shall first be covered in a layer of polythene to prevent the concrete from contacting the exposed root.

If during the works, it become necessary to pour concrete and/or lay asphalt directly over exposed roots (for example during reinstatement, or footpath construction), then all exposed roots shall first be covered with a layer of find sand not less than 50mm thick and a layer of geotextile fabric shall be placed over the roots prior to pouring the concrete/asphalt.

5.8 Tree Pruning Measures

Prior to construction the construction manager shall engage Council approved arboricultural contractors to carry out preliminary pruning to maintain safe working areas.

The exact extent of any pruning will be discussed prior to commencement at a meeting held between the works arborist and the arboricultural contractor engaged to carry out the pruning.

Any arboricultural work shall be undertaken by suitably trained and experienced individuals in accordance with NZARB pruning standards (MIS308).

All the pruning works on the retained trees to be implemented within the permitted standards under AUP and under arboricultural supervision in accordance with the currently accepted arboricultural practice. If the proposed pruning has exceeded the permitted standard of AUP, the proposal to be reviewed and approved by Council prior to implementation on site, which may trigger separate resource consent applications.

Appendix A: Tree Protection Zone (TPZ) & Structural Root Zone (SRZ).

The Australian Standard AS 4970-2009 - Protection of trees on development sites is used for the allocation of tree protection zones. This method provides a TPZ that addresses both tree stability and growth requirements. TPZ distances are measured as a radius from the center of the trunk at ground level.

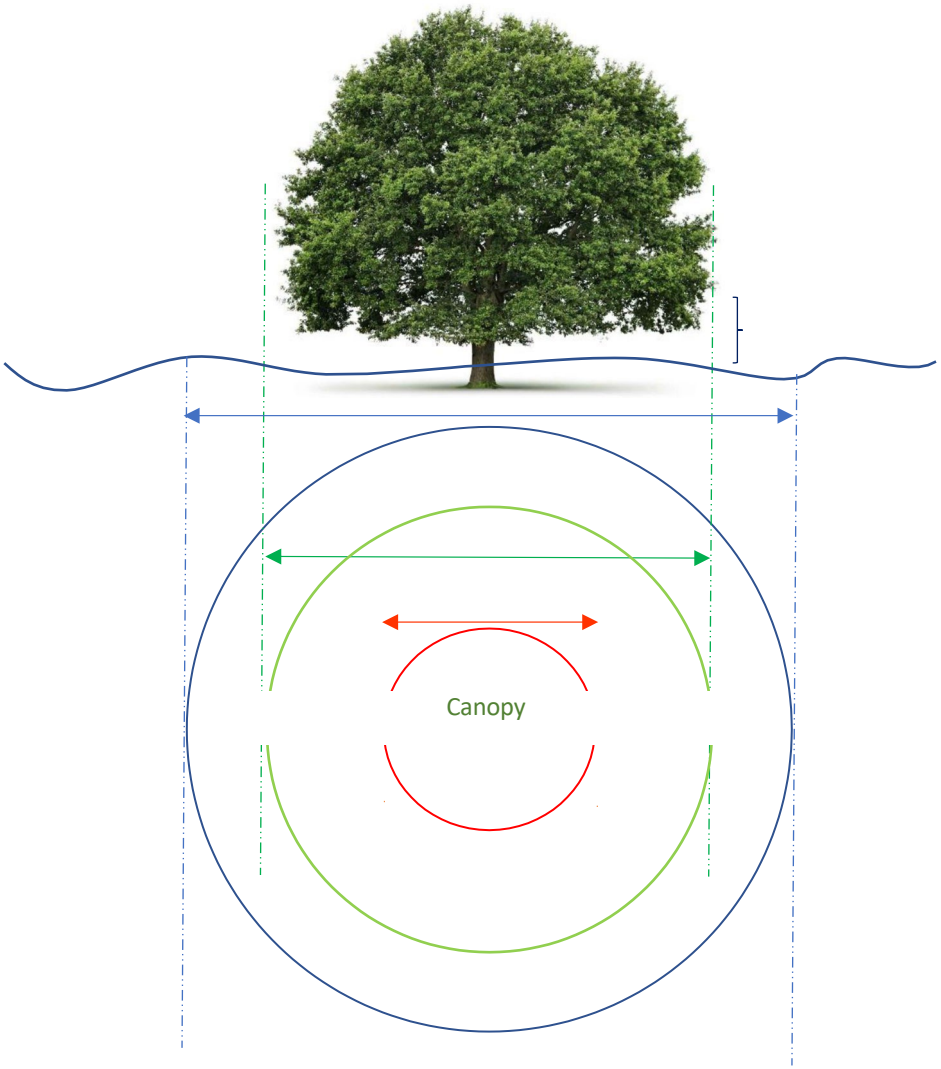


Figure 3Tree protection zones

AS4970-2009, s3: The radius of the TPZ is calculated for each tree by multiplying its Diameter @ Breast Height measured @ 1.4m from ground level (DBH × 12 = TPZ). (DBH = Trunk Girth @ 1.4m ÷ π).

To calculate the SRZ: Radius SRZ = **D**iameter **A**bove **R**oot **C**rown (**DRC** x 50) ^ 0.42 x 0.64. If the DRC is less than 0.15m the SRZ will be 1.5m.

Appendix B: Auckland Unitary Plan Operative in part, J1 Definitions

Protected root zone: “The circular area of ground around the trunk of a protected tree, the radius of which is the greatest distance between the trunk and the outer edge of the canopy. For columnar crown species the protected root zone is half the height of the tree”.

Figure 4 Protected root zone A

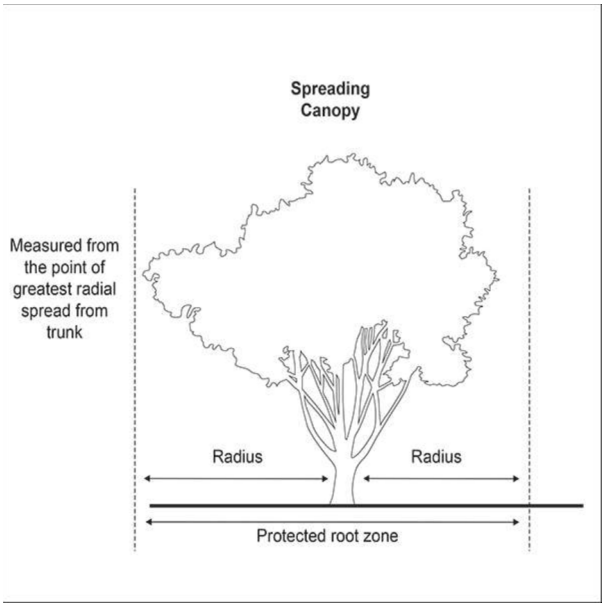
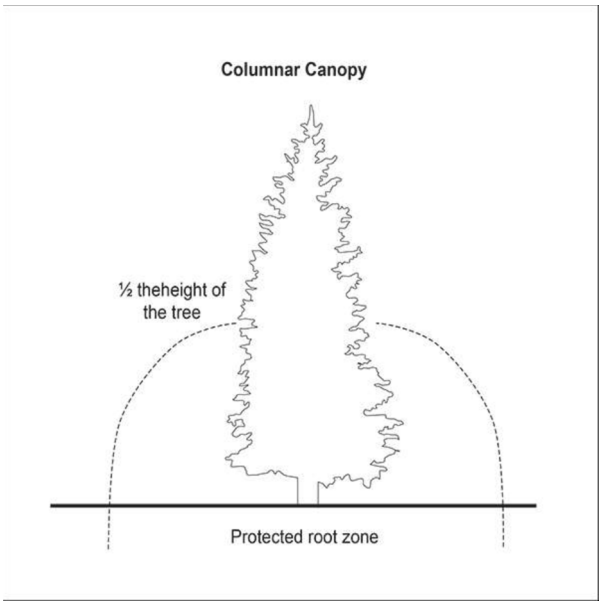


Figure 5 Protected root zone B



Appendix C: Arborlab Tree Protection Card

- The Works Arborist must be approved by the governing Council authority and MUST be familiar with all relevant rules, standards & conditions
- All personnel must have attended an Arborlab induction on working within the root zone of trees
- All personnel involved in the project must be aware of the tree issues on the site and have the tree reports and conditions of consent on site
- Arborist MUST pre-inspect site to assess risks and develop a work plan with the contractor
- Arborist MUST supervise excavations within the root zone of trees

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Arborist MUST supervise excavations within the root zone of trees

- No materials stored within root zone
- No machinery stored within root zone
- No unsupervised machinery digging within root zone
- No damaging overhanging vegetation (look up)
- No pruning or damaging roots - Arborist must approve all pruning
- Arborist must be on site to supervise the removal of any hard surface within the rootzone of a tree

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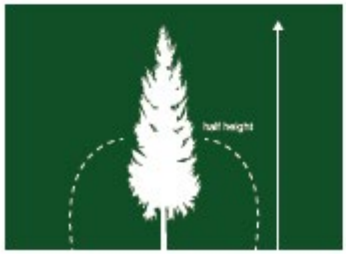
Arborlab
Creating Green Space Sustainability

March 2021

How to determine a Root Zone

Ensure the correct determination procedure

The rootzone is measured as per the illustrations below.



Columnar Canopy
(Tall, Narrow, Upright trees)
Measure half the height of the tree and apply it in a radius around the trunk.

Spreading Canopy
Measured from the point of greatest radial spread (generally the northern side of the tree) and applied in a radius around the trunk.

Kauri Tree
Measure the outermost canopy dripline and multiply three times in a radius around the trunk.

- A pre-commencement meeting is to be held between the contractor and Arborlab to ensure all personnel are aware of the tree work plan
- All excavations within the root zone of all trees shall be supervised by the Works Arborist
- Main stems shall be protected from potential damage
- All activities shall be recorded by Arborlab and reported on
- Any noncompliance issues are documented and reported to site managers
- All active sites are regularly audited throughout the duration of the projects`

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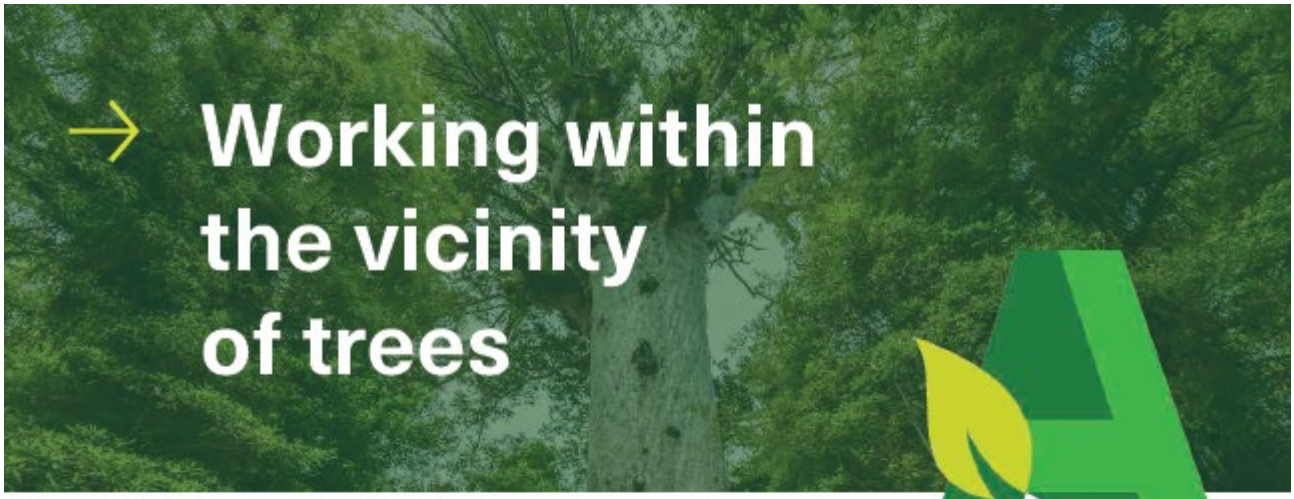
Appendix D: Working within the Vicinity of Trees



Trees provide immense benefits to the environment, community and society.

Auckland Council have recognised that trees hold value, and have given specific groups of trees protection within the Auckland Unitary Plan (AUP). The AUP has set out specific rules and standards that must be adhered to if work is proposed within the vicinity of these trees.

FIVE MAIN GROUPS OF TREE PROTECTION

Street Trees - Trees located in the road corridor
Park Trees - All trees in open spaces
Notable Trees - Specified list of historic or significant trees
Ecological & Environmental Vegetation -In overlay areas or "sensitive environments" as identified in the AUP.
Kauri Trees -To prevent Kauri dieback disease *see handout for more details.

Talk to one of our solutions experts

With over 20 years experience our consulting team specialise in Arboriculture, Ecology and Green space asset management and sustainability

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Key Points when working within the vicinity of the five main groups:

	TREES ON PRIVATE LAND	STREET TREES	PARKS AND RESERVE TREES	NOTABLE TREES	ECOLOGICAL & ENVIRONMENTAL VEGETATION	KAURI TREES
REVIEW REQUIRED	NO	✓	✓	✓	✓	✓
ARBORIST REQUIRED ON SITE WHEN EXCAVATIONS UNDERTAKEN	NO	✓	✓	✓	✓	NOT IF KAURI DIEBACK PROTOCOL IS ADHERED TO
ARBORIST INPUT NOTABLE TREES	✓	✓	✓	✓	✓	✓
ARBORIST INPUT OVERLAY AREAS	✓	✓	✓	✓	✓	✓

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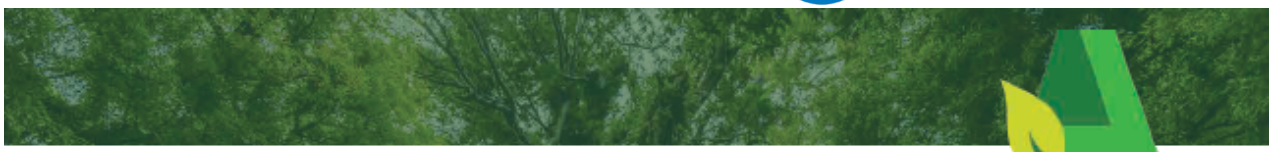
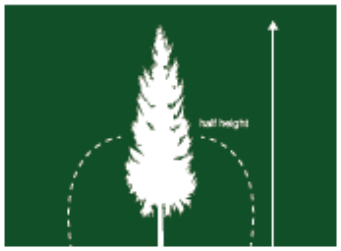


Identifying the protected root zone

A specialist arborist will be able to identify and record the tree species and dimensions, in order to calculate the protection zone, structural root zone and the extent of incursion.

All trees that are OVER 4m in height or 400mm in diameter are protected. You also need Tree Owner Approval for all activities within the rootzone of ALL COUNCIL TREES. The rootzone is measured as per illustrations below.

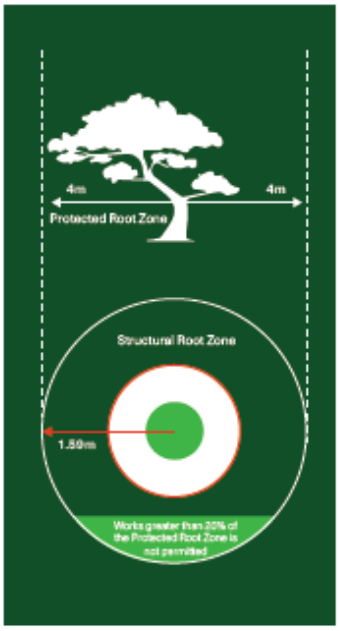


Columnar Canopy
(Tall, Narrow, Upright trees)
Measure half the height of the tree and apply it in a radius around the trunk.

Spreading Canopy
Measured from the point of greatest radial spread (generally the northern side of the tree) and applied in a radius around the trunk.

Kauri Tree
Measure the outermost canopy dripline and multiply three times in a radius around the trunk.

Measuring the structual root zone



Structural Root Zone Radius

Calculation: (Diameter above root crown x 50) $^{0.42}$ x 0.64 (0.175 x 50) $^{0.42}$ x 0.64 = 1.59m

Step by step process :

1. Clarify potential rules by location, tree type, asset owner and overlays

2. Identify trees

3. Calculate root zone

4. Assess incursion and if it is within permitted standards or requires Tree Consent

5. Get approvals, monitor works and send final memos as per requirement

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