NZ TRANSPORT AGENCY
WAKA KOTAHI

TE ARA HAUĀURU
NORTHWEST RAPID TRANSIT

ARBORICULTURAL MANAGEMENT OF PŌHUTUKAWA AND NOTABLE TREES

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New Zealand Government

Qualifications and experience of the author

My full name is Leon Saxon. I am a Senior Consultant Arborist employed by Arborlab Ltd, 76D Paul Matthews Road, Albany, Auckland 0632.

Arborlab is one of New Zealand's leading green space asset management specialists. One of its services to provide arboriculture services relating to all aspects of tree management from practical arboriculture and legal government processes to complex risk analysis and assessment and providing expert witness services.

I have been employed by Arborlab since March 2016. I assess and provide specialist input into resource consent applications and prepare arboricultural reports to support resource consent applications for large infrastructure projects.

I hold a Diploma in Arboriculture from Wintec, the Waikato Institute of Technology. I am also a registered user of the Quantified Tree Risk Assessment System and a qualified International Society of Arboriculture Tree Risk Assessor.

I have over 25 years' experience specialising in arboriculture.

I spent six years working for Auckland Council as an arborist in the Resource Consents and Compliance Department (North).

Since 2016, I have provided specialist input to resource consent applications on a consultancy basis to the Auckland Council Consents and Compliance Department as an employee of Arborlab.

I also I have experience in providing expert evidence in relation to major roading projects (Auckland's Eastern Busway) and cycle paths/shared paths (Glen Innes to Tāmaki Drive Shared Path and Te Whau Shared Path).

Although this matter is not before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses as contained in section 9 of the Environment Court Practice Note 2023. I agree to comply with that Code. My qualifications as experts are set out above. I am satisfied that the matters which I address in this report are within my area of expertise, except where I state that I am relying on information provided by another person or expert. I have not omitted to consider material facts known to me.

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Acronyms, definitions and abbreviations

Term	Definition
AUP	Auckland Unitary Plan
GIS	Geographic Information System
GPS	Global Positioning System
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
Indicative Design	The Indicative Design of the Project within the Project Area as shown on the Indicative Design drawings in Part 6 that will be confirmed during detailed design
LINZ	Land Information New Zealand
NoR	Notice of Requirement
Project	Te Ara Hauāuru Northwest Rapid Transit
Project Area	The Proposed Designation and the extent of the coastal occupation permits sought
Proposed Designation	The area defined by the Proposed Designation boundary as shown on the Proposed Designation Plans in Part 6
SH16	State Highway 16
SRZ	Structural Root Zone
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment
WWRZ	Works Within Root Zone

1. Introduction

1.1 Purpose and scope of this report

The purpose of this report is to provide an assessment of construction impacts on specified trees to confirm whether it is practical to retain them during the construction and operation of the Northwest Rapid Transit Project (the Project).

This report addresses construction impacts on specific trees and notable trees. The areas involve the following:

- pōhutukawa trees (and other species) located between Great North Road and the Northwestern Motorway/State Highway 16 (SH16) opposite Western Springs Park;
- two notable pōhutukawa trees located at 30 Potatau Street and 2 Kirk Street, Grey Lynn; and
- a group of pōhutukawa trees at St Francis School, Point Chevalier.

This report evaluates the health of the identified trees within the specified areas, assesses and considers the likely impact of the works and recommends measures to manage and/or mitigate any potential or actual effects caused by the Project. My assessment is based on the Indicative Design (the Indicative Design of the Project within the Project Area as shown on the Indicative Design drawings in Part 6 that will be confirmed during detailed design), and Proposed Designation (The area defined by the Proposed Designation boundary as shown on the Proposed Designation Plans in Part 6), for the Project. Based on my understanding of the indicative construction methodology (summarised in Part 2 of this Application) and Indicative Design, this report provides an assessment of the ability for identified trees to be retained.

The findings and recommendations of this report are based on a visual ground-based assessment undertaken in late August and early September 2025, and review of the Indicative Design.

Two aspects of the Project that require consideration are temporary construction effects and permanent works effects. The identified trees have been categorised by what is likely to occur to them based on the Indicative Design. There are five categories that the impacted trees can be placed into as a result of the Project, including:

- Works Within Root Zone (WWRZ).
- Pruning and WWRZ.
- Pruning.
- Remove.
- Unaffected/isolate.

The specific information on trees and actions identified are outlined in Section 3 and a tree inventory is provided in Appendix A.

2. Tree assessment methodology and limitations

Tree health assessments are undertaken through a Visual Tree Assessment (VTA) consistent with modern arboricultural practices (Mattheck and Breloer, 1994). Unless stated, all assessments are undertaken from ground level.

Tree health assessments are generally based upon industry best practice, the assessor's experience and in accordance with (but not limited to):

- MIS306 Tree Inspection for Access and Work;
- MIS501 Tree Risk Assessment;
- BS 5837 2012 Trees in Relation to Design, Demolition and Construction to Construction; and
- AS 4970-2009 Protection of Trees on Development Sites.

Unless detailed in this report, no tissue sampling was carried out and all data was collected without the use of any invasive and/or diagnostic tools. The tools used onsite to gather the necessary tree data will generally be a measuring tape and hand-held devices.

The tree girth and canopy width are measured using a standard nylon tape measure. Unless specified the tree height is estimated.

Given the dynamic nature of trees, arboricultural assessments are generally valid for up to 12 months from the date of inspection and ongoing frequency based inspections are recommended.

Tree locations are generally plotted using a combination of Global Positioning System (GPS) and overhead mapping (GPS survey) through online software. GPS surveys can be variable, for example, discrepancies with aerial angles and GPS coordination variances. To assist with GPS surveys, the plot locations are manually adjusted on site using overhead photographs (Land Information New Zealand (LINZ) imagery). This method, although generally accurate and suitable for tree assessments, is not as accurate as a topographical survey or 'ground truthing'.

AS 4970-2009 Protection of Trees on Development Sites provide a Tree Protection Zone (TPZ) and Structural Root Zone (SRZ), expressed as a radius measurement from the trunk centre. The TPZ incorporates the SRZ. These measurements are calculated from trunk/stem size. When determining potential encroachment impacts, the following factors are considered:

- potential loss of root mass;
- species and tolerance of root disturbance;
- tree size and age, vigour;
- stability;
- soil characteristics and volume, topography and drainage;
- the presence of existing or past structures or obstacles affecting root growth; and
- design.

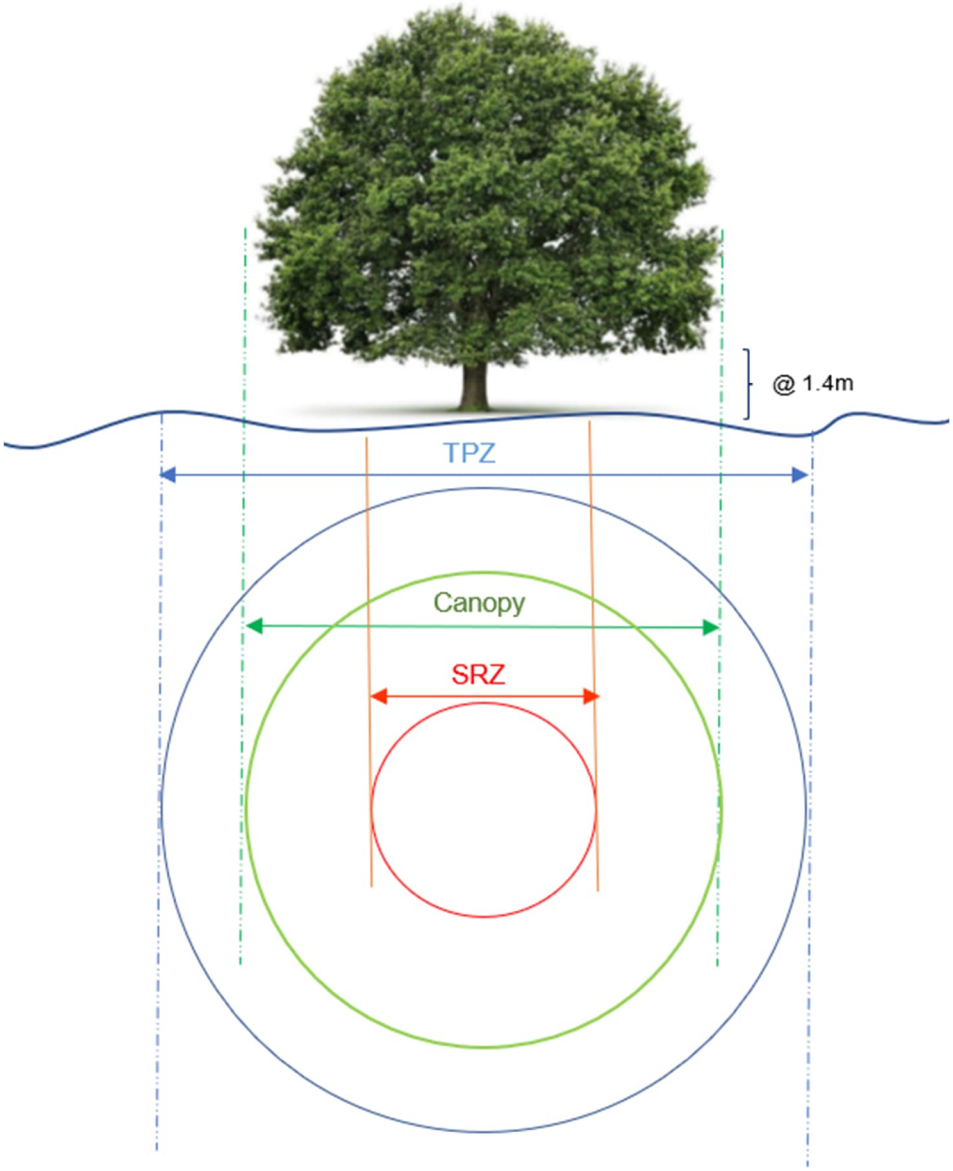
The standards describe the TPZ as the optimal combination of crown and root area that requires protection during the construction process so that the tree can remain viable. The TPZ is an area that is isolated to ensure that tree sensitive construction measures are implemented so that any disturbance or encroachment is mitigated. The Standards describes the SRZ as 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. The standards specify the TPZ at a maximum of 15m.

SRZ[1] and TPZ[2] measurements have been recorded in accordance with Auckland Council's Tree Owner Approval Guide and are considered to be from the trunk centre. This method provides a TPZ that addresses

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

[2] TPZ calculation: $TPZ_{(m)} = DBH_{(m)} \times 12$

both tree stability and growth requirements. TPZ distances are measured as a radius from the centre of the trunk at ground level.



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.

3. Regulatory considerations and findings

3.1 Western Springs

At Western Springs, approximately twenty-six trees located within Open Space zoned land which measure greater than 4m in height or greater than 400mm in girth are likely to require removal (Trees 27-33, Tree 35, Tree 37, Tree 39, Trees 41-53 and Trees 62-64 (refer to Figure 3-1)). This is based on the assumption that mature pōhutukawa trees growing alongside Great North Road will be retained, with the majority of other vegetation within the area being removed. For further details, refer to the Tree Plans in Appendix B.

Based on the Indicative Design, thirty-eight trees at Western Springs have been identified as requiring either works within their protected root zone only or works within their protected root zone and trimming. Pruning of branches measuring greater than 100mm in diameter will likely be required and pruning of roots measuring greater than 80mm in diameter may be required.

Table 3-1 below provides the likely action for each of the trees identified within the Western Springs specified area and is provided to support the Notice of Requirement (NoR).

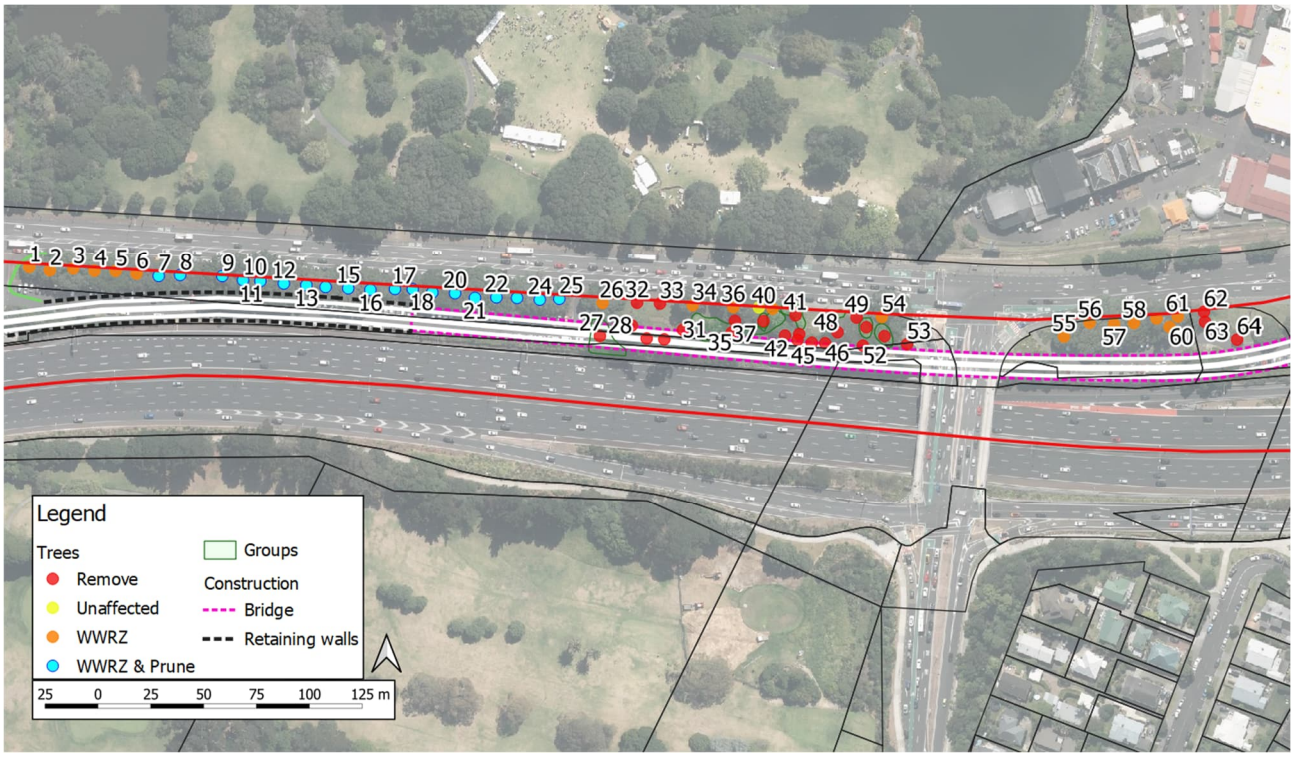


Figure 3-1: Overview of location of trees at Western Springs

Table 3-1: Tree inventory and likely associated action for Western Springs pōhutukawa and notable trees

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	Proposed Action
1	1	*Metrosideros excelsa*	9	1886	WWRZ
2	1	*Metrosideros excelsa*	12	5099	WWRZ
3	1	*Metrosideros excelsa*	14	4638	WWRZ
4	1	*Metrosideros excelsa*	12	4095	WWRZ
5	1	*Metrosideros excelsa*	12	4490	WWRZ
6	1	*Metrosideros excelsa*	11	2650	WWRZ
7	1	*Metrosideros kermadecensis*	12	2772	WWRZ & Prune
8	1	*Metrosideros excelsa*	11	4400	WWRZ & Prune
9	1	*Metrosideros kermadecensis*	14	6126	WWRZ & Prune

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	Proposed Action
10	1	*Metrosideros kermadecensis*	13	3154	WWRZ & Prune
11	1	*Metrosideros excelsa*	13	4626	WWRZ & Prune
12	1	*Metrosideros excelsa*	13	3297	WWRZ & Prune
13	1	*Metrosideros excelsa*	13	2907	WWRZ & Prune
14	1	*Metrosideros excelsa*	11	3241	WWRZ & Prune
15	1	*Metrosideros excelsa*	13.5	7971	WWRZ & Prune
16	1	*Metrosideros excelsa*	13	4260	WWRZ & Prune
17	1	*Metrosideros excelsa*	9	2112	WWRZ & Prune
18	1	*Metrosideros excelsa*	10	2322	WWRZ & Prune
19	1	*Metrosideros excelsa*	11	4655	WWRZ & Prune
20	1	*Metrosideros excelsa*	11.5	4042	WWRZ & Prune
21	1	*Metrosideros excelsa*	11.5	4066	WWRZ & Prune
22	1	*Metrosideros excelsa*	10	4642	WWRZ & Prune
23	1	*Metrosideros excelsa*	10.5	4365	WWRZ & Prune
24	1	*Metrosideros excelsa*	11	5330	WWRZ & Prune
25	1	*Metrosideros excelsa*	8	3183	WWRZ & Prune
26	1	*Metrosideros excelsa*	10	6250	WWRZ
27	25	*Mixed native revegetation*	4*	300	Remove
28	1	*Pinus pinaster*	24	3290	Remove
29	1	*Pinus pinaster*	20	2190	Remove
30	1	*Pinus pinaster*	25	3170	Remove
31	1	*Pinus pinaster*	19	2650	Remove
32	1	*Metrosideros excelsa*	4.5	410	Remove
33	1	*Metrosideros excelsa*	4.5	390	Remove
34	1	*Metrosideros excelsa*	11	3826	WWRZ
35	17	*Phoenix canariensis*	8*	2000	Remove
36	1	*Metrosideros excelsa*	10	3275	WWRZ
37	1	*Pinus radiata*	19	3410	Remove
38	1	*Pittosporum eugenioides*	8	1262	Unaffected
39	2	*Pittosporum eugenioides*	7*	760	Remove
40	1	*Metrosideros excelsa*	8	2445	WWRZ
41	4	*Pittosporum eugenioides*	7*	1042	Remove
42	1	*Vitex lucens*	12	1785	Remove
43	1	*Metrosideros sp.*	4	300	Remove
44	1	*Corynocarpus laevigatus*	8	690	Remove
45	1	*Vitex lucens*	7	993	Remove
46	1	*Vitex lucens*	7	882	Remove
47	19	*Mixed native revegetation*	6*	400	Remove
48	1	*Pinus radiata*	22	3740	Remove
49	1	*Pinus radiata*	19	3250	Remove
50	4	*Podocarpus totara*	9	680	Remove
51	6	*Pseudopanax arboreus*	6*	500	Remove
52	1	*Vitex lucens*	10	1516	Remove
53	1	*Vitex lucens*	8	1240	Remove

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	Proposed Action
54	1	*Metrosideros excelsa*	10	5482	WWRZ
55	1	*Metrosideros excelsa*	8	2665	WWRZ
56	1	*Metrosideros excelsa*	10	5616	WWRZ
57	1	*Metrosideros excelsa*	10	4632	WWRZ
58	1	*Metrosideros excelsa*	10	3868	WWRZ
59	1	*Metrosideros excelsa*	8.5	2505	WWRZ
60	1	*Pinus radiata*	18.5	3730	WWRZ
61	1	*Metrosideros excelsa*	10	3408	WWRZ
62	1	*Populus alba*	12	2240	Remove
63	1	*Populus alba*	6	1180	Remove
64	3	*Cordyline australis*	8*	840	Remove
65	1	*Metrosideros excelsa*	10	3060	Not Affected
66	1	*Metrosideros excelsa* Notable*	16	2668	Not Affected
67	1	*Metrosideros excelsa* Notable*	18	3331	Prune

3.2 St Francis School trees

Table 3-2 below provides the likely action for each of the trees identified within the St Francis School specified area and are provided to support the NoR.

The trees within St Francis School are located within land zoned Special Purpose – School, and there are no relevant overlays. As such, their removal is a permitted activity.

Table 3-2: Tree inventory and likely associated action for St Francis School trees

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	Proposed Action
68	5	*Metrosideros excelsa*	5	1350	Unaffected
69	1	*Metrosideros excelsa*	8	3800	Remove
70	20	*Pittosporum crassifolium*	4	400	Remove
71	1	*Metrosideros excelsa*	8	3800	Remove
72	1	*Metrosideros excelsa*	8	3800	Remove
73	1	*Metrosideros excelsa*	8	3800	Remove
74	1	*Metrosideros excelsa*	8	1500	Remove
75	1	*Metrosideros excelsa*	8	1500	Remove
76	1	*Metrosideros excelsa*	8	1500	Remove
77	1	*Metrosideros excelsa*	8	2400	Remove
78	1	*Metrosideros excelsa*	8	2400	Remove
79	1	*Metrosideros excelsa*	8	2400	Remove
80	1	*Metrosideros excelsa*	8	2400	WWRZ
81	1	*Metrosideros excelsa*	8	2400	WWRZ
82	1	*Metrosideros excelsa*	8	3400	Unaffected
83	1	*Metrosideros excelsa*	8	2400	Unaffected
84	1	*Metrosideros excelsa*	8	1400	Unaffected

4. Advice and analysis

4.1 Works within root zones of retained trees

The Indicative Design, where it intersects Trees 1–18 (refer to Figure 4-1), will be set slightly lower than the trees. Its footprint will involve removing existing surfaces and stripping soil down to clay. A retaining wall along the outer edge of the busway will retain the land supporting the trees. For this assessment, the retaining wall is considered the closest edge of excavation.

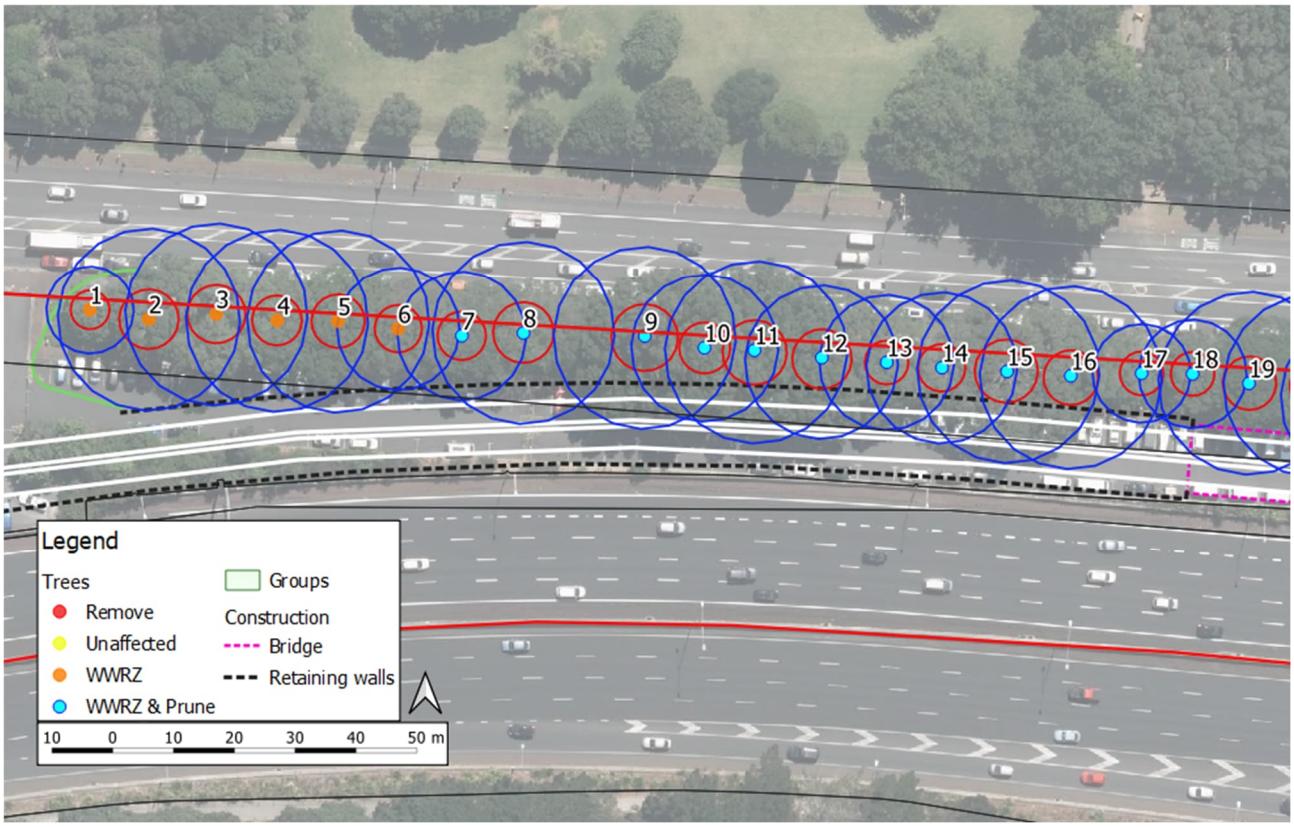


Figure 4-1: Where the busway passes Trees 1 – 18, the Indicative Design has it set at a lower level, with associated retaining wall shown above as a black dashed line

My further analysis of Trees 1-18 includes:

- Trees 1-8 are slightly smaller specimens and excavations are not as close to the trees; and
- Trees 8-16 are expected to experience similar root zone impacts from the bulk earthworks associated with the proposed busway and the associated retaining wall.

The Tree Plans in Appendix B show the TPZ as an indicative circle around each of the trees, with the largest trees having a TPZ measuring 15m radius. However, due to root limiting factors, such as the existing kerb line and hard surfacing, the root systems are unlikely to extend fully north or south and will be more concentrated within the permeable garden bed where they grow (refer to Figure 4-2 below).

The root architecture of the subject pōhutukawa trees growing between Great North Road and the carpark (Trees 1–26) is likely to develop laterally within the upper soil horizons, with roots dividing to smaller diameter as they extend further from the trunks. Roots typically spread beyond the canopy where the soil is more porous, supporting gaseous exchange and higher nutrient availability. By the time roots reach the car park kerb line, they are unlikely to exceed 100mm in diameter, though this cannot be ruled out. Smaller roots encountering obstruction, such as the kerb line (a root limiting factor), will follow the path of least resistance, often extending laterally along the kerb and occasionally beneath the asphalt. However, root density and presence are expected to be significantly lower on the far side of the kerb compared to the tree side (refer to Figure 4-2).

Figure 4-2: Likely root architecture of pōhutukawa adjacent to carpark

Severing roots can have a negative effect on tree function, including stability and water and nutrient uptake, with the cumulative extent of root removal determining the overall impact. For example, the TPZ encroachment for Tree 15, without accounting for root limiting factors indicates that approximately 29% of its notional TPZ would be affected by the busway excavations. However, considering the root-limiting influences, actual root loss is estimated at 10–20%. A similar situation applies to Trees 9-14 and Tree 16. Trees 17 and 18 are smaller, so the proportion of their TPZ affected are correspondingly less.

Provided appropriate aftercare measures are followed, a 10-20% TPZ encroachment for these trees is not likely to affect the long-term viability of these trees.

Example of TPZ encroachment scenario without accounting for root limiting factors for Tree 15 is shown in Figure 4-3.

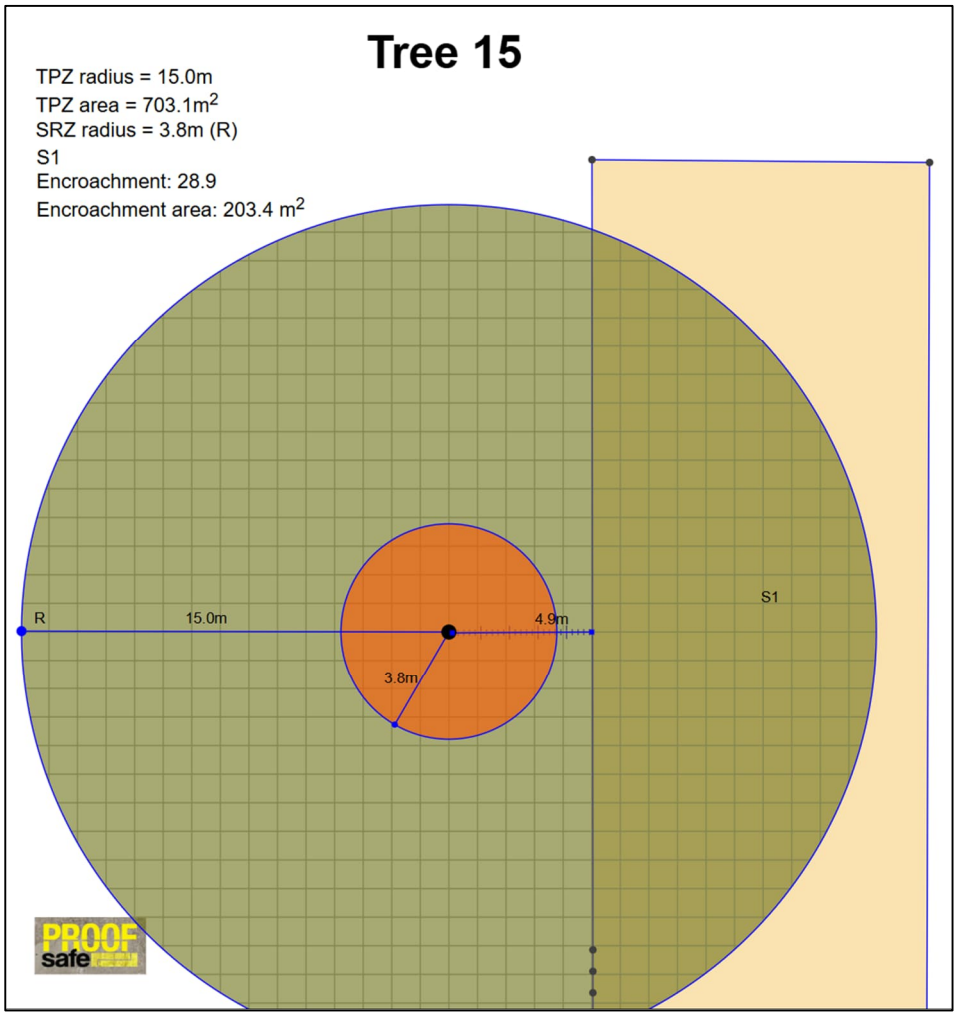


Figure 4-3: Tree 15, theoretical TPZ calculation without root limiting factors considered

4.2 Pruning

The proposed busway passes south of the row of pōhutukawa trees (Trees 1–26) (refer to plans in Appendix B for tree locations). The trees vary in size and shape but generally have multiple stems and spreading canopies, typical for the species.

Potential pruning requirements of the Project arise in two phases: during construction, and post construction during busway operation, with the construction phase likely being the more significant.

Where the busway initially intersects trees from the west, it is set at approximately 1.5m below existing levels, which has been considered in the assessment of effects. If the vertical alignment were lower than currently shown in the design, the impacts on pruning would be less. If the vertical alignment were higher, more of the trees' canopies would require removal, increasing the impacts on the trees.

Adjacent to Tree 18, the busway transitions to an above ground bridge structure. Trees 9-16 have the largest canopy overhang over the proposed busway.

It is my understanding that the Project does not aim to create 'clear-sky' above the busway; only pruning required to complete construction and to provide standard double-decker bus clearance is planned. I consider low stems near the retaining wall alignment adjacent to Trees 7–16 may need removal, while higher branches outside the operational clearance envelope will be retained.

In my opinion, while some large diameter branches may require removal, the proportion of foliar coverage affected is considered manageable without any long-term adverse effects. Several specimens have splayed lateral stems showing signs of settling, which describes the process of the stems slowly lowering towards the ground. Following initial pruning, structural supports such as props may be required on a case-by-case

basis. Any propping would require engineering input and would be located within the Proposed Designation, but outside the busway corridor.

Examples of likely pruning requirements are shown in Figure 4-4, Figure 4-5 and Figure 4-6.

Figure 4-4: Example of likely pruning requirements – Tree 9 viewed from west with likely branch removal highlighted

Figure 4-5: Tree 12 and likely pruning requirements

Figure 4-6: Tree 15, largest stem severance – approximately 1000mm girth

To the east of Tree 18, the busway transitions from an at-grade road to an above ground bridge to gain elevation over St Lukes Road. The bridge structure reduces bulk excavations adjacent to pōhutukawa Trees 19-26. The bridge will be founded on piers located centrally along its length, at the edge of the trees' TPZs in the middle of the carpark, where few roots are expected. If the detailed design results in an extension of the retaining wall design, similar effects to Trees 19–26 as to Trees 1–18 will ensue and require similar mitigating actions.

4.3 Tree removal

The area between the carpark entrance and St Lukes Road overpass contains a mix of trees, including five mature pōhutukawa near Great North Road, which will be retained with minimal adverse effects (see Figure 4-7 and Figure 4-8 below). Some or all of the remaining vegetation may require removal to facilitate the construction of the busway in this location as shown in Figure 4-9.

Trees requiring removal for permanent structures are a group of native revegetation (Tree 27), a group of maritime pine trees (Trees 28-31, with Trees 28 and 29 shown in Figure 4-10), one mature karaka (Tree 44), and three semi-mature pūriri (Tree 45, Tree 46 and Tree 52).

Temporary construction access may require removal of additional vegetation such as smaller pittosporums (Tree 39 and Tree 41), larger Monterey pines (Trees 37-48 and Tree 49) and semi-mature pūriri (Tree 45 and Tree 46). The group of Phoenix palms (*Phoenix caneriensis*) shown in Figure 4-11, a pest species, may also be removed, which is considered an environmental benefit.

The removal of any trees within public land will require tree asset owner approval. Any replacement specimen trees will be subject to agreement with the tree asset owner at the time approval is needed and will be appropriately based on the tree removal needed.

Figure 4-7: Mature pōhutukawa between carpark entrance and St Lukes Road proposed to be retained

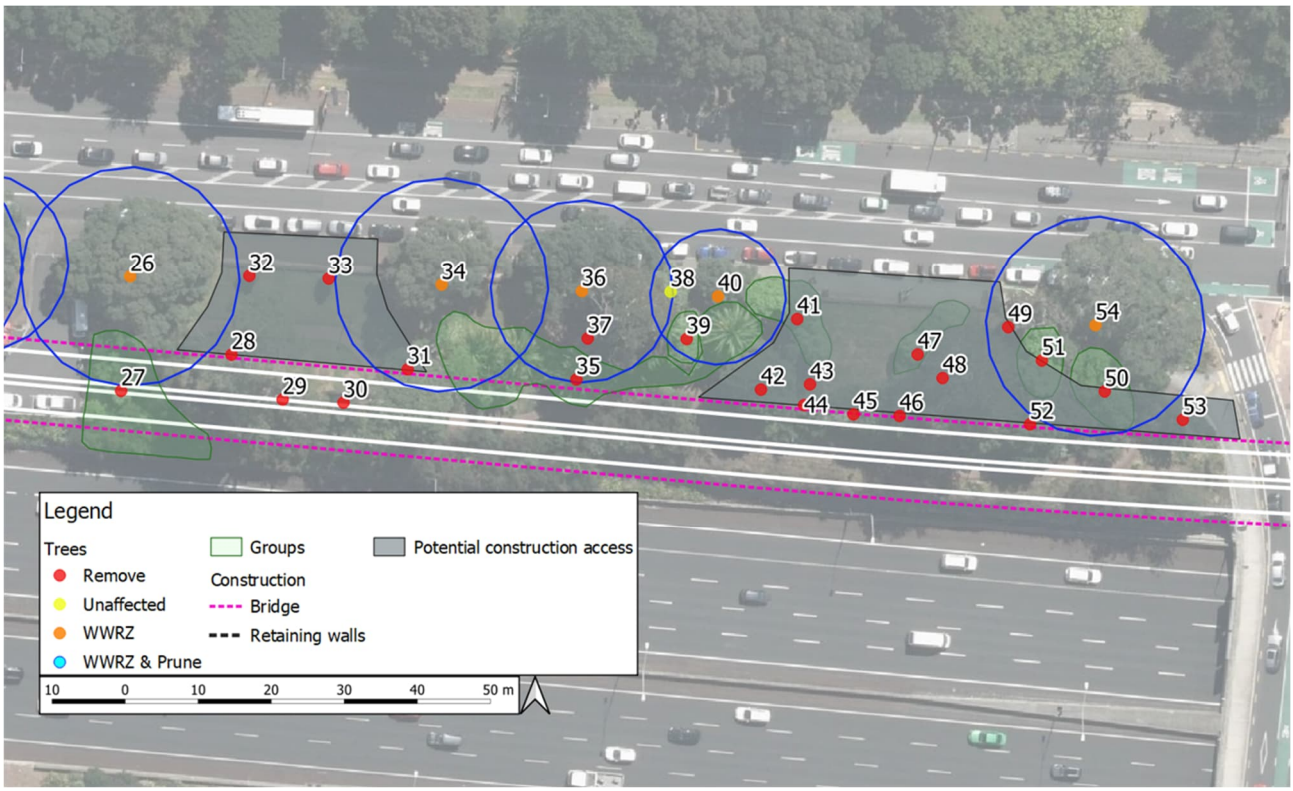


Figure 4-8: Tree removal / retention plan showing TPZs of retained trees

Figure 4-9: Approximate area of vegetation removal from Open Space zoned area

Figure 4-10: Trees 28 and 29, visible from the west

Figure 4-11: Tree 35 Group of Phoenix palms

4.4 Notable trees

I have identified two notable pōhutukawa trees located within private properties in Arch Hill adjacent to the Proposed Designation (refer to Figure 4-12):

- 30 Potatau Street (Reference: Auckland Unitary Plan (AUP) Notable Trees Overlay – 129 [Project reference Tree 66]); and
- 21 Kirk Street (Reference: Notable Trees Overlay – 837 [Project reference Tree 67]).

The tree at Potatau Street is located outside the Proposed Designation boundary and appears to be unaffected by the Project.

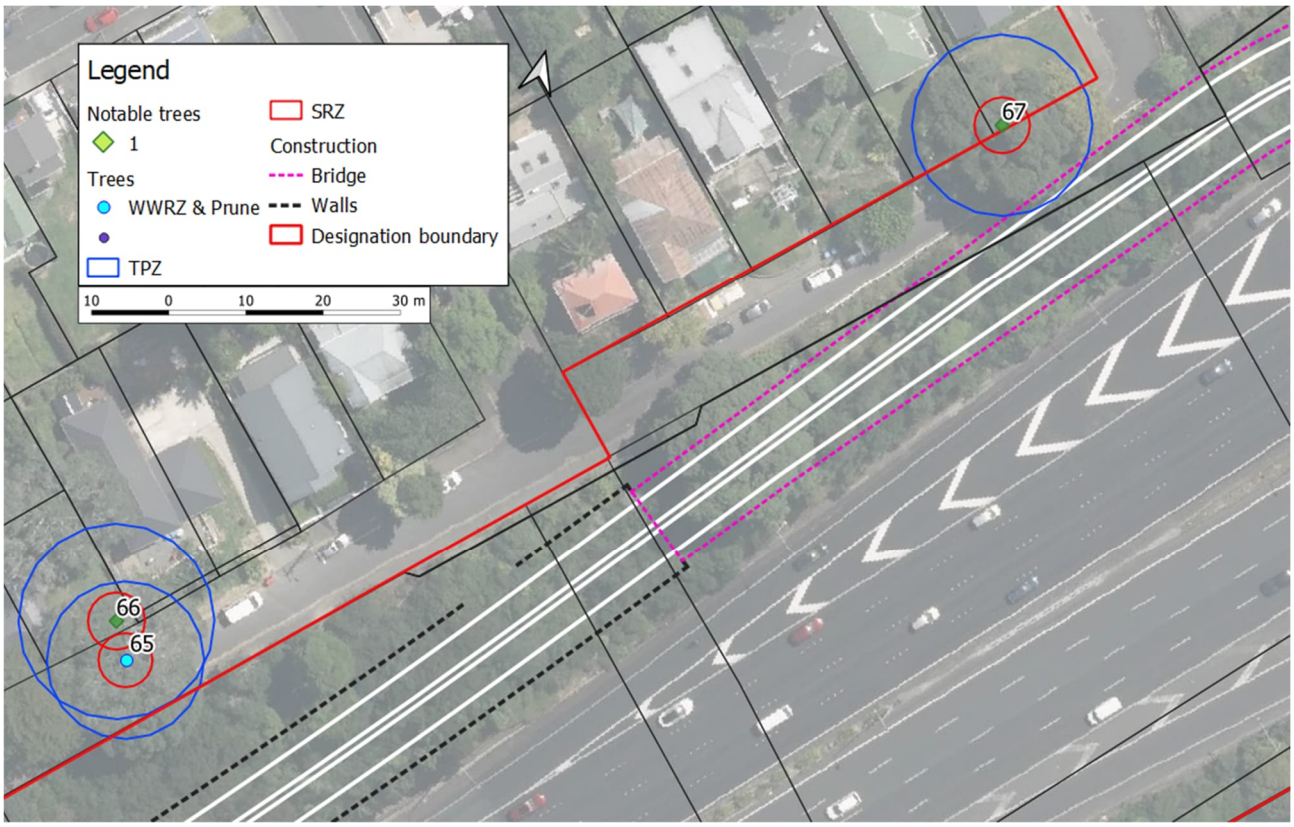


Figure 4-12: Notable trees within the Arch Hill area

The tree at Kirk Street originates from the southwestern corner of the property at 21 Kirk Street. This is just outside the Proposed Designation. Based on the Indicative Design, I consider a small of amount of pruning may be required on Notable Tree 837 to provide lateral clearance for the above ground bridge structure. This pruning is expected to be minor in nature and is not anticipated to affect the tree's long-term health and stability, or amenity values. Refer to Figure 4-13, Figure 4-14 and Figure 4-15.

Figure 4-13: Notable Tree 837 (referenced as Tree 67 for the Project) – viewed from south. Eastern aspect of canopy may require a small amount of pruning for construction clearance, based on Indicative Design

Figure 4-14: The Project bridge overpass where it is adjacent to Notable Tree 837. Note the Indicative Design does not extend any closer to the tree than the existing retaining wall on the lower side of Keppell Street

Figure 4-15: 3D imagery of the Project bridge overpass where it is adjacent to Notable Tree 837. Note the bridge does not extend any closer to the tree than the existing retaining wall on the lower side of Keppell Street

Notable Tree 129 (Project reference Tree 67) is located near the eastern boundary of 30 Potatau Street. The tree is set back from the Proposed Designation and will not be impacted by the Project.

Figure 4-16: Notable Tree 129 viewed from north circled. The pōhutukawa to the left is a street tree

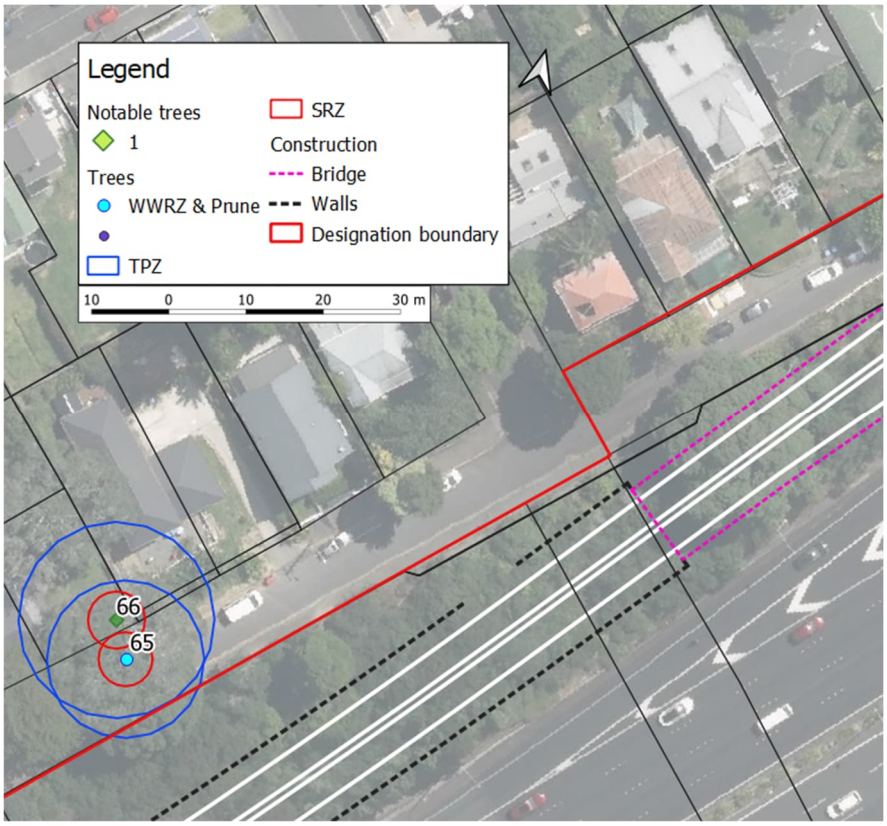


Figure 4-17: Aerial imagery of Notable Tree 129 (Arborlab Reference Tree 66)

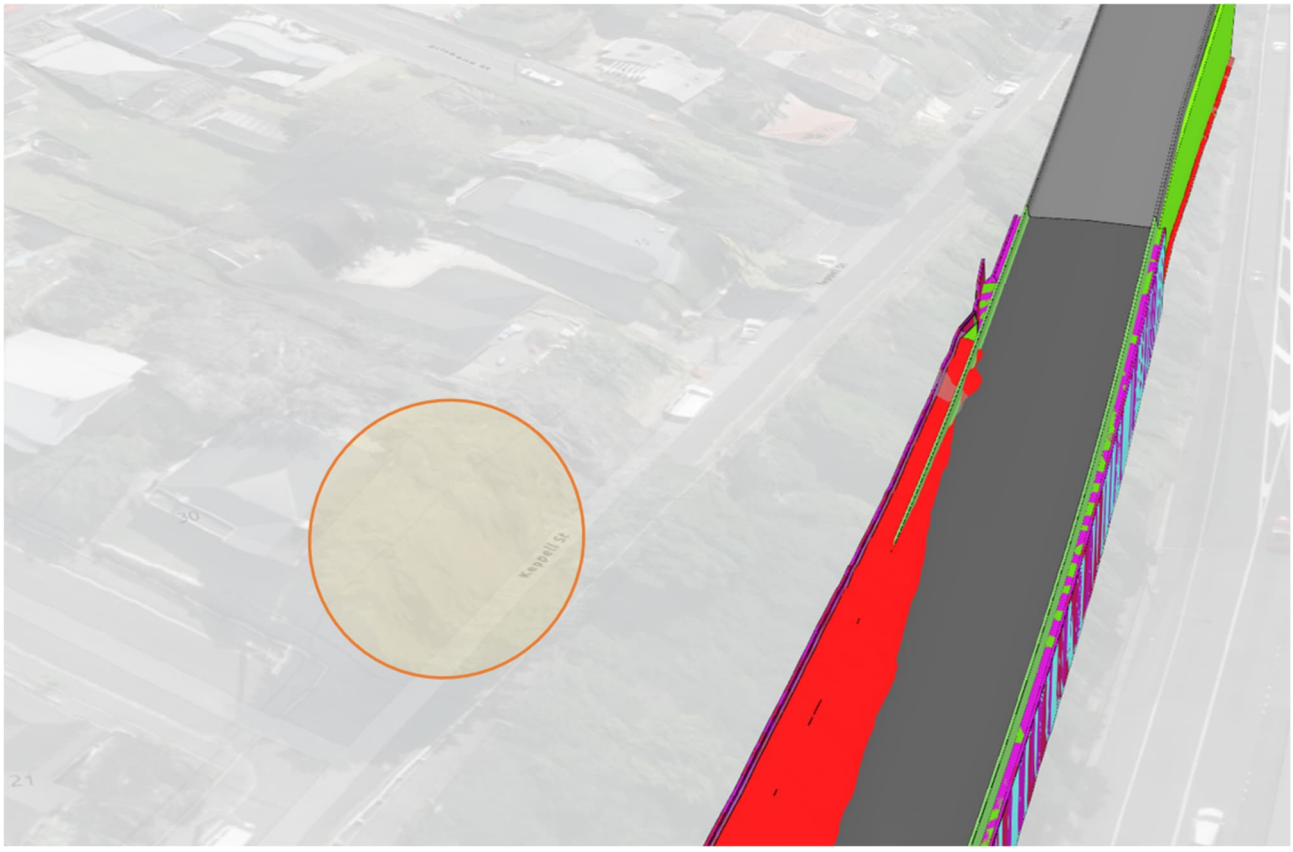


Figure 4-18: 3D imagery of Indicative Design adjacent to Notable Tree 129 (circled)

4.5 Trees at St Francis School

The row of pōhutukawa alongside the playing fields at St Francis School will largely require removal due to conflicts with the Indicative Design (refer to Figure 4-19). Trees 69–79 would have extensive works within their root zones, associated with the placement of fill for a batter slope.

Trees 80 and 81 are located outside the Proposed Designation and are likely able to be retained in good health, albeit with some construction activities within their TPZs.

Trees 82, 83 and 84 are located outside the Proposed Designation and are unaffected by the Project.

Figure 4-19: Trees at St Francis School and likely associated actions

4.6 Tree protection protocols

The following tree protection protocols have been prepared to indicate the measures that would be implemented to appropriately care for retained trees within the specified areas. These protocols may require refinement following completion of detailed design.

4.6.1 Prior to any works starting

- An experienced, qualified arborist (appointed arborist) experienced in tree protection systems, protocols and construction methodologies around trees, is engaged to manage trees within the construction area of the Project.
- A pre-start meeting held with the principal, contractor and the appointed arborist to identify areas for onsite monitoring, work timings, work methodologies required near trees, etc.
- Pruning, construction areas and excavation footprints to be clearly identified.
- Install protective fencing to agreed locations at the edges of the work zones.
- Aged tree mulch is to be installed contiguously on all available permeable areas within the root zone of Trees 1-26 (essentially between the construction footprint and the Great North Road footpath).
- Prior to aged tree mulch, a layer of compost with a high fungal content should be laid up to three metres around the base of the trees, at a depth of 80mm. Aged mulch can be layered over top of this compost. High fungal compost provides beneficial nutrients and microorganisms to the soil.

4.6.2 During construction works

- The Appointed Arborist be required to supervise all works within a tree's root zone (TPZ) where the tree is to be retained.
- All retained trees to be managed so that any potential adverse effects are minimised or mitigated, including (among other things) maintaining the protective fencing, prohibiting chemicals and most vehicles in the TPZ, and managing any roots uncovered during construction.
- Tree pruning to be undertaken by an experienced arboricultural contractor.
- Mana whenua are given first right of refusal of any stem wood from pruned or removed trees.
- Where excavations within the TPZ of an identified retained tree are required, initial excavations shall be undertaken through a combination of suitable tools such as hand-held tools (spade/shovel) and/or hydro-vac to expose the roots and undertake clean root pruning at the edges of the excavations.
- Exposed root zone areas shall be covered with a suitable layer of material such as hessian.

4.6.3 Following construction works

- Maintain mulch at 80-150mm deep for up to three (3) years following the works.
- If determined necessary by the Appointed Arborist following construction, install a monitored irrigation system for trees retained that have been subject to works within their respective root zones. The system is to be a 'dripper' type installed beneath the mulch. This will be used during the summer months for up to three years during and/or after the works. This will be determined on a case-by-case basis, based on the extent of root zone disturbance of each tree.
- Monitor irrigation and soil moisture levels for at least three years following the works.
- Post works monitoring of the trees' health and condition will be undertaken. The first monitoring event will be six months following the completion of the works, with the second monitoring eight months after the initial monitoring event, this will allow for any potential seasonal variations. Further mitigation measures and monitoring requirements shall be outlined at each monitoring event. Other mitigation measures that may be implemented and will be outlined by the Works Arborist, such as soil additives, pruning etc.

5. Conclusions and recommendations

5.1 Conclusions

Major infrastructure construction is proposed to the south of pōhutukawa Trees 1–25. This will involve works within the root zones of most of these trees and may require significant pruning.

The assessment has considered site-specific factors, including soil conditions, and root-limiting influences and the modified environment. In my opinion, while excavation and construction may be considered a major encroachment based on notional TPZ measurements, actual root loss is expected to be lower—generally 10–20%—and the impact on tree stability and health is anticipated to be minor.

I note that two notable pōhutukawa trees are located adjacent to the proposed works in the Keppell Street area. From my assessment, Notable Tree 129 at 30 Potatau Street will not be affected, while Notable Tree 837 at 21 Kirk Street may require minor lateral canopy pruning to provide clearance during construction.

Provided the tree protection methodologies proposed in this report are followed, it is my opinion that the retained trees will be appropriately managed.

Where pruning is required, it is expected to be limited to providing operational clearance for the Project. The majority of foliage will be retained, and no long-term adverse effects on tree health, stability, or amenity values are anticipated.

Overall, with adherence to the proposed tree protection protocols, it is my opinion that the trees that are retained can be managed to ensure survival during and after construction of the Project.

5.2 Recommendations

Based on my analysis above, I recommend that:

- The retaining wall adjacent to pōhutukawa Trees 1-25 along Great South Road should be designed with the minimum footprint possible and avoid overhead clearance requirements during construction.
- Replacement planting for vegetation removed from the Western Springs Open Space zoned area should occur. The quantum, placement and species should be agreed at the time of detailed design in consultation with the tree asset manager.
- Tree protection protocols, as outlined in this report, should be implemented on retained trees. Tree removals must be undertaken by qualified and experienced contractors.
- Works within the TPZ of retained trees should be supervised by an appointed, experienced arborist, familiar with tree protection systems, protocols and construction methodologies near trees. All pruning is to be undertaken by a suitably qualified and experienced arborist and be in accordance with NZARB pruning standards (MIS308).

Appendix A. Tree inventory

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	DBH (cm)	Diameter at root crown (cm)	Number of stems	CSR (m)	Form	Structure	Health	Age class	Ownership	SRZ (m)	PRZ (m)	TPZ (m)
1	1	*Metrosideros excelsa*	9	1886	60.0	91.8	14	5	Poor	Fair	Fair	Mature	Reserve	3.2	5	7.2
2	1	*Metrosideros excelsa*	12	5099	162.3	248.6	5	10	Fair	Fair	Good	Mature	Reserve	4.9	10	15.0
3	1	*Metrosideros excelsa*	14	4638	147.6	243.8	8	10	Poor	Fair	Fair	Mature	Reserve	4.8	10	15.0
4	1	*Metrosideros excelsa*	12	4095	130.4	171.3	7	8	Fair	Fair	Good	Mature	Reserve	4.1	8	15.0
5	1	*Metrosideros excelsa*	12	4490	142.9	198.0	10	10.5	Good	Fair	Good	Mature	Reserve	4.4	10.5	15.0
6	1	*Metrosideros excelsa*	11	2650	84.3	148.0	8	9	Fair	Fair	Fair	Mature	Reserve	3.9	9	10.1
7	1	*Metrosideros kermadecensis*	12	2772	88.2	153.1	9	10	Fair	Fair	Good	Mature	Reserve	4.0	10	10.6
8	1	*Metrosideros excelsa*	11	4400	140.0	271.2	10	12	Poor	Poor	Poor	Mature	Reserve	5.0	12	15.0
9	1	*Metrosideros kermadecensis*	14	6126	195.0	328.8	14	14	Fair	Fair	Good	Mature	Reserve	5.5	14	15.0
10	1	*Metrosideros kermadecensis*	13	3154	100.4	175.7	9	11	Fair	Fair	Fair	Mature	Reserve	4.2	11	12.1
11	1	*Metrosideros excelsa*	13	4626	147.2	305.6	8	15	Poor	Poor	Fair	Mature	Reserve	5.3	15	15.0
12	1	*Metrosideros excelsa*	13	3297	104.9	255.6	9	15	Fair	Fair	Good	Mature	Reserve	4.9	15	12.6
13	1	*Metrosideros excelsa*	13	2907	92.5	122.9	9	8.5	Fair	Fair	Fair	Mature	Reserve	3.6	8.5	11.1
14	1	*Metrosideros excelsa*	11	3241	103.2	151.5	9	9	Fair	Fair	Poor	Mature	Reserve	3.9	9	12.4
15	1	*Metrosideros excelsa*	13.5	7971	253.7	296.7	6	15	Fair	Fair	Fair	Mature	Reserve	5.2	15	15.0
16	1	*Metrosideros excelsa*	13	4260	135.6	212.0	7	10	Fair	Fair	Good	Mature	Reserve	4.5	10	15.0

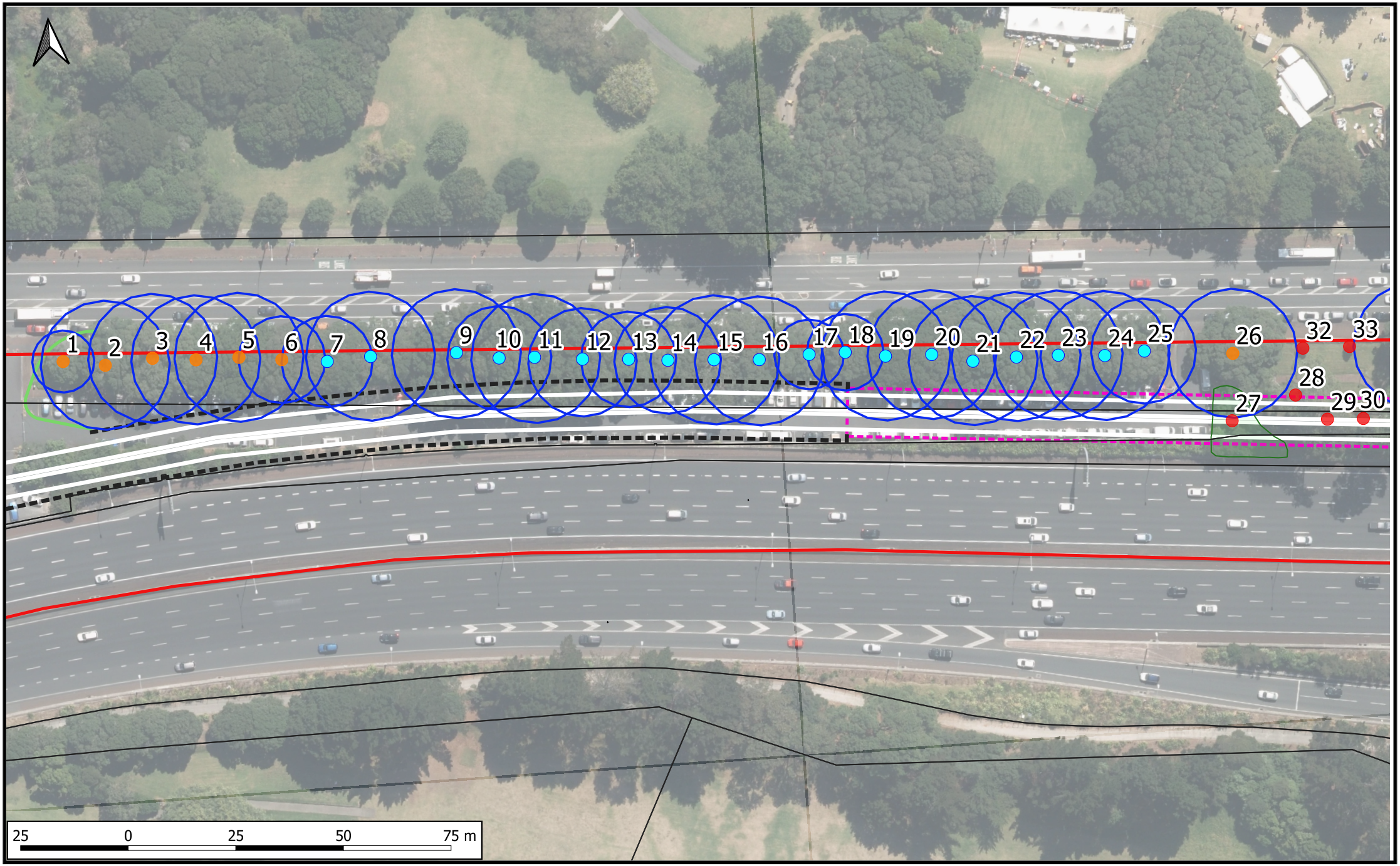
Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	DBH (cm)	Diameter at root crown (cm)	Number of stems	CSR (m)	Form	Structure	Health	Age class	Ownership	SRZ (m)	PRZ (m)	TPZ (m)
17	1	*Metrosideros excelsa*	9	2112	67.2	122.2	9	7	Fair	Fair	Fair	Mature	Reserve	3.6	7	8.1
18	1	*Metrosideros excelsa*	10	2322	73.9	123.8	8	8	Fair	Fair	Good	Mature	Reserve	3.6	8	8.9
19	1	*Metrosideros excelsa*	11	4655	148.2	199.3	6	10	Good	Good	Good	Mature	Reserve	4.4	10	15.0
20	1	*Metrosideros excelsa*	11.5	4042	128.7	162.7	11	11	Good	Good	Good	Mature	Reserve	4.1	11	15.0
21	1	*Metrosideros excelsa*	11.5	4066	129.4	229.8	10	11	Good	Good	Good	Mature	Reserve	4.7	11	15.0
22	1	*Metrosideros excelsa*	10	4642	147.8	199.9	8	11	Good	Good	Fair	Mature	Reserve	4.4	11	15.0
23	1	*Metrosideros excelsa*	10.5	4365	139.0	189.7	7	10	Good	Good	Fair	Mature	Reserve	4.3	10	15.0
24	1	*Metrosideros excelsa*	11	5330	169.7	288.4	5	15	Fair	Fair	Good	Mature	Reserve	5.2	15	15.0
25	1	*Metrosideros excelsa*	8	3183	101.3	185.6	7	9.5	Fair	Fair	Fair	Mature	Reserve	4.3	9.5	12.2
26	1	*Metrosideros excelsa*	10	6250	198.9	183.3	1	11.5	Excellent	Good	Excellent	Mature	Reserve	4.3	11.5	15.0
27	25	*Pittosporum crassifolium*	4	300	9.5	11.1	1	2	Fair	Fair	Fair	Semi-Mature	Reserve	1.5	2	2.0
28	1	*Pinus pinaster*	24	3290	104.7	137.8	1	15	Fair	Fair	Fair	Mature	Reserve	3.8	15	12.6
29	1	*Pinus pinaster*	20	2190	69.7	86.6	1	8	Fair	Fair	Fair	Mature	Reserve	3.1	8	8.4
30	1	*Pinus pinaster*	25	3170	100.9	112.7	1	9	Fair	Good	Fair	Mature	Reserve	3.5	9	12.1
31	1	*Pinus pinaster*	19	2650	84.4	99.0	1	8	Poor	Poor	Fair	Mature	Reserve	3.3	8	10.1
32	1	*Metrosideros excelsa*	4.5	410	13.1	15.6	1	1.5	Good	Fair	Good	Young	Reserve	1.5	1.5	2.0
33	1	*Metrosideros excelsa*	4.5	390	12.4	14.0	1	1.5	Good	Fair	Good	Young	Reserve	1.5	1.5	2.0
34	1	*Metrosideros excelsa*	11	3826	121.8	157.2	3	9.5	Fair	Fair	Good	Mature	Reserve	4.0	9.5	14.6
35	17	*Phoenix canariensis*	8	2000	63.7	79.6	1	2.5	Fair	Fair	Good	Mature	Reserve	3.0	2.5	7.6

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	DBH (cm)	Diameter at root crown (cm)	Number of stems	CSR (m)	Form	Structure	Health	Age class	Ownership	SRZ (m)	PRZ (m)	TPZ (m)
36	1	*Metrosideros excelsa*	10	3275	104.3	160.1	4	10	Fair	Fair	Good	Mature	Reserve	4.0	10	12.5
37	1	*Pinus radiata*	19	3410	108.5	128.0	1	15	Dead	Dead	Dead	Dead	Reserve	3.7	15	13.0
38	1	*Pittosporum eugenioides*	8	1262	40.2	46.8	2	6.5	Fair	Fair	Good	Mature	Reserve	2.4	6.5	4.8
39	2	*Pittosporum eugenioides*	7	760	24.2	25.1	1	5	Fair	Fair	Good	Mature	Reserve	1.9	5	2.9
40	1	*Metrosideros excelsa*	8	2445	77.8	81.2	2	5	Fair	Fair	Good	Mature	Reserve	3.0	5	9.3
41	4	*Pittosporum eugenioides*	7	1042	33.2	43.6	2	5	Fair	Fair	Good	Mature	Reserve	2.3	5	4.0
42	1	*Vitex lucens*	12	1785	56.8	72.3	2	7	Good	Fair	Good	Mature	Reserve	2.9	7	6.8
43	1	*Other*	4	300	9.5	11.1	1	2.5	Fair	Fair	Fair	Mature	Reserve	1.5	2.5	2.0
44	1	*Corynocarpus laevigatus*	8	690	22.0	30.9	1	4.5	Good	Fair	Good	Semi-Mature	Reserve	2.0	4.5	2.6
45	1	*Vitex lucens*	7	993	31.6	30.9	3	4	Good	Fair	Good	Semi-Mature	Reserve	2.0	4	3.8
46	1	*Vitex lucens*	7	882	28.1	29.0	2	3	Fair	Fair	Good	Semi-Mature	Reserve	2.0	3	3.4
47	19	*Pittosporum eugenioides*	6	400	12.7	14.3	1	2.5	Fair	Fair	Fair	Mature	Reserve	1.5	2.5	2.0
48	1	*Pinus radiata*	22	3740	119.0	130.2	1	16	Good	Fair	Fair	Mature	Reserve	3.7	16	14.3
49	1	*Pinus radiata*	19	3250	103.5	92.9	1	8	Fair	Fair	Fair	Mature	Reserve	3.2	8	12.4
50	4	*Podocarpus totara*	9	680	21.6	22.6	1	2.5	Good	Good	Good	Mature	Reserve	1.8	2.5	2.6
51	6	*Pseudopanax arboreus*	6	500	15.9	19.1	1	2.5	Fair	Fair	Fair	Mature	Reserve	1.7	2.5	2.0
52	1	*Vitex lucens*	10	1516	48.3	61.4	6	6.5	Good	Fair	Good	Mature	Reserve	2.7	6.5	5.8
53	1	*Vitex lucens*	8	1240	39.5	41.7	7	5	Good	Fair	Good	Mature	Reserve	2.3	5	4.7
54	1	*Metrosideros excelsa*	10	5482	174.5	181.1	2	8	Fair	Fair	Good	Mature	Reserve	4.2	8	15.0
55	1	*Metrosideros excelsa*	8	2665	84.8	100.3	3	6.5	Good	Fair	Good	Mature	Reserve	3.3	6.5	10.2

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	DBH (cm)	Diameter at root crown (cm)	Number of stems	CSR (m)	Form	Structure	Health	Age class	Ownership	SRZ (m)	PRZ (m)	TPZ (m)
56	1	*Metrosideros excelsa*	10	5616	178.8	353.6	10	14	Good	Fair	Good	Mature	Reserve	5.6	14	15.0
57	1	*Metrosideros excelsa*	10	4632	147.4	202.4	10	12	Good	Fair	Good	Mature	Reserve	4.5	12	15.0
58	1	*Metrosideros excelsa*	10	3868	123.1	214.5	13	12	Good	Fair	Good	Mature	Reserve	4.6	12	14.8
59	1	*Metrosideros excelsa*	8.5	2505	79.7	169.0	12	8	Fair	Fair	Fair	Mature	Reserve	4.1	8	9.6
60	1	*Pinus radiata*	18.5	3730	118.7	125.7	1	15	Fair	Fair	Fair	Mature	Reserve	3.6	15	14.3
61	1	*Metrosideros excelsa*	10	3408	108.5	138.1	6	8	Good	Fair	Good	Mature	Reserve	3.8	8	13.0
62	1	*Populus alba*	12	2240	71.3	84.4	1	10	Fair	Fair	Poor	Mature	Reserve	3.1	10	8.6
63	1	*Populus alba*	6	1180	37.6	41.1	1	3	Fair	Fair	Fair	Mature	Reserve	2.3	3	4.5
64	3	*Cordyline australis*	8	840	26.7	28.0	1	2	Good	Good	Good	Mature	Reserve	1.9	4	3.2
68	5	*Metrosideros excelsa*	5	1350	32.0	57.3	4	5	Good	Fair	Good	Mature	Private	3.8	NA	68
69	1	*Metrosideros excelsa*	8	3800	62.5	95.5	4	7	Good	Good	Excellent	Mature	Private	7.5	NA	69
70	1	*Pittosporum crassifolium*	4	400	12.7	15.9	1	1	Good	Fair	Excellent	Young	Private	2	NA	70
71	1	*Metrosideros excelsa*	8	3800	62.5	95.5	4	7	Good	Good	Excellent	Mature	Private	7.5	NA	71
72	1	*Metrosideros excelsa*	8	3800	62.5	95.5	4	7	Good	Good	Excellent	Mature	Private	7.5	NA	72
73	1	*Metrosideros excelsa*	8	3800	62.5	95.5	4	7	Good	Good	Excellent	Mature	Private	7.5	NA	73
74	1	*Metrosideros excelsa*	8	1500	27.6	63.7	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	74
75	1	*Metrosideros excelsa*	8	1500	27.6	63.7	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	75
76	1	*Metrosideros excelsa*	8	1500	27.6	63.7	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	76

Tree ID #	Tree quantity	Species	Height (m)	Girth (mm)	DBH (cm)	Diameter at root crown (cm)	Number of stems	CSR (m)	Form	Structure	Health	Age class	Ownership	SRZ (m)	PRZ (m)	TPZ (m)
77	1	*Metrosideros excelsa*	8	2400	27.6	95.5	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	77
78	1	*Metrosideros excelsa*	8	2400	27.6	95.5	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	78
79	1	*Metrosideros excelsa*	8	2400	27.6	95.5	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	79
80	1	*Metrosideros excelsa*	8	2400	27.6	95.5	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	80
81	1	*Metrosideros excelsa*	8	2400	27.6	95.5	4	7	Good	Good	Excellent	Mature	Private	3.3	NA	81
82	1	*Metrosideros excelsa*	8	3400	42.8	95.5	4	7	Good	Good	Excellent	Mature	Private	5.1	NA	82
83	1	*Metrosideros excelsa*	8	2400	37.5	95.5	4	7	Good	Good	Excellent	Mature	Private	4.5	NA	83
84	1	*Metrosideros excelsa*	8	1400	44.6	95.5	4	7	Good	Good	Excellent	Mature	Private	5.4	NA	84

Appendix B. Arborlab plans



Aerial images may not accurately reflect the actual vegetation cover. Vegetation is plotted as accurately as possible. Unless otherwise stated, project specific vegetation only has been plotted and captured.

Vegetation alteration/removal may be subject to resource consent requirements/conditions. It shall be the client's responsibility to determine whether or not this is the case.

Works within the root zone of trees should be supervised by an appointed works arborist.

Trees

- Remove
- Unaffected
- WWRZ
- WWRZ & Prune
- TPZ
- Groups

Construction

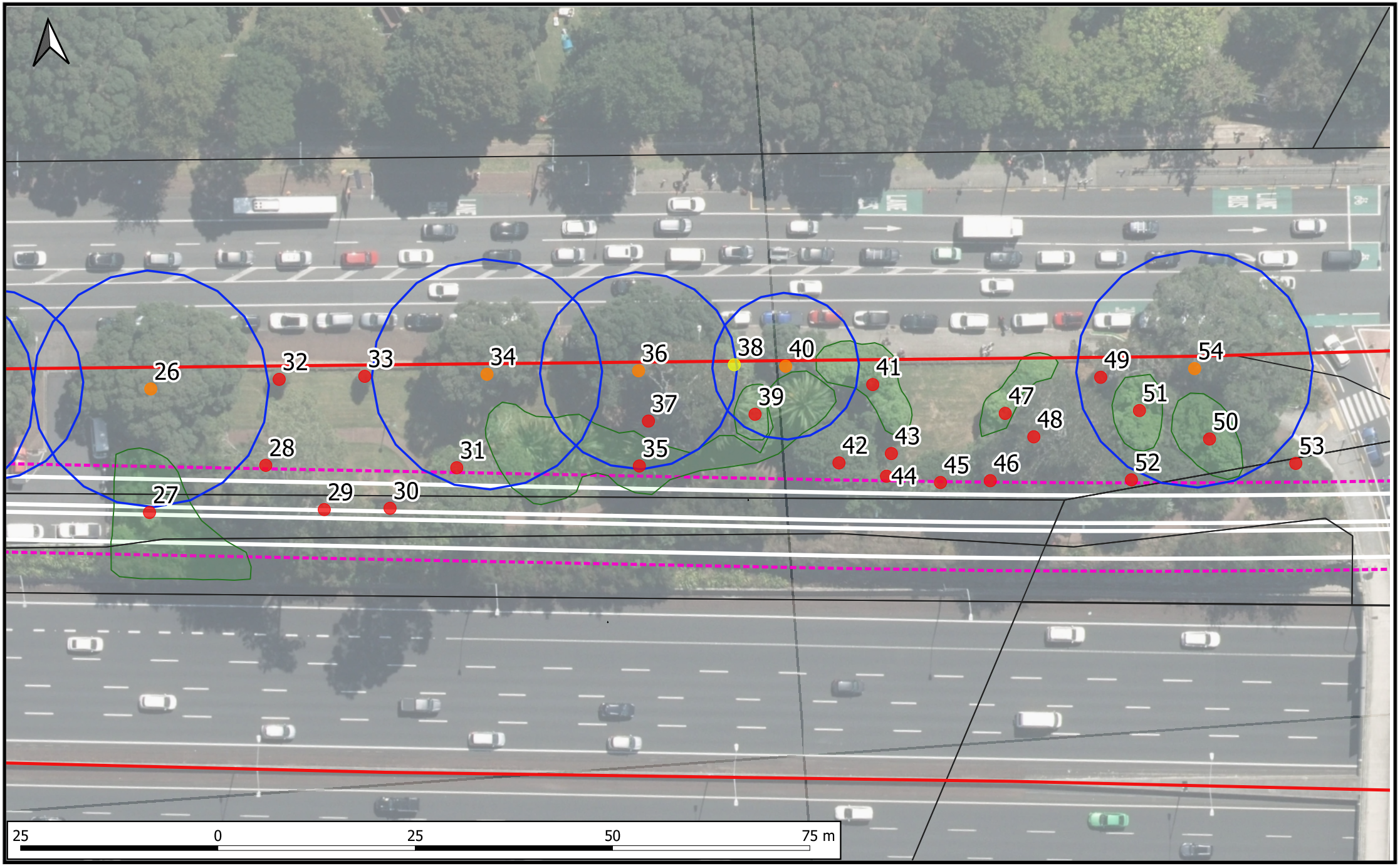
- Bridge
- Walls
- Designation boundary

Arborlab
Creating Green Space Sustainability

North-West-Rapid-Transit

TREE LOCATION PLAN

		Date
Requested by		
Surveyed by	DS	28/08/25
Plotted by	LGS	12/09/25
Checked by	JR	30/09/25
Drawing number	LGS-38893-01	Rev B



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Works within the root zone of trees should be supervised by an appointed works arborist.

Trees
- Remove
- Unaffected
- WWRZ
- WWRZ & Prune
- TPZ
- Groups

Construction
- Bridge
- Walls
- Designation boundary

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TREE LOCATION PLAN

		Date
Requested by		
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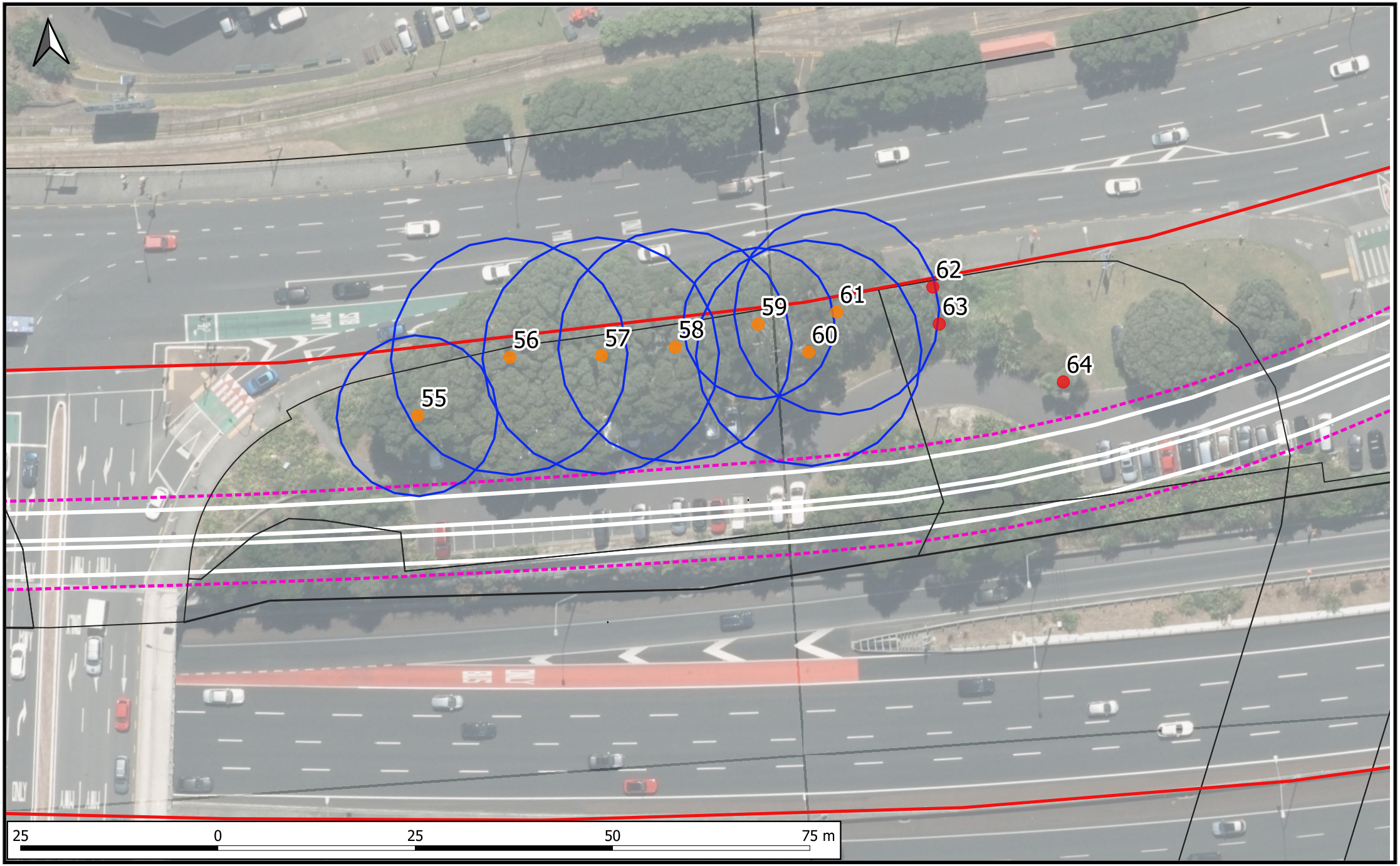
Plotted by	LGS	12/09/25
Checked by	JR	30/09/25
Drawing number	LGS-38893-02	Rev B



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Vegetation alteration/removal may be subject to resource consent requirements/conditions. It shall be the client's responsibility to determine whether or not this is the case.

Works within the root zone of trees should be supervised by an appointed works arborist.

Trees
- Remove
- Unaffected
- WWRZ
- WWRZ & Prune
- TPZ
- Groups

Construction
- Bridge
- Walls
- Designation boundary

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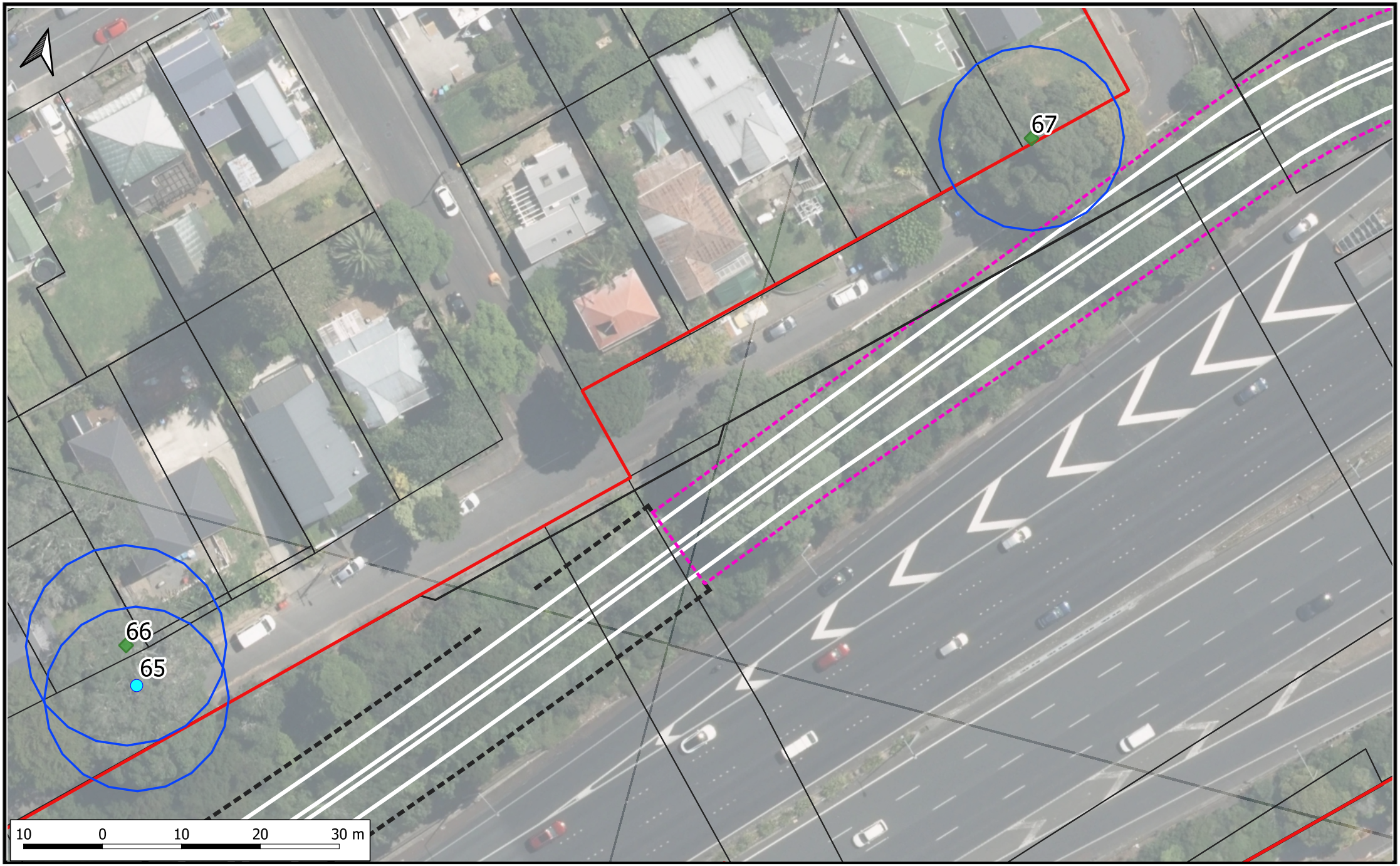
North-West-Rapid-Transit

TREE LOCATION PLAN

		Date
Requested by		
Surveyed by	DS	28/08/25
Plotted by	LGS	12/09/25
Checked by	JR	30/09/25
Drawing number	LGS-38893-03	Rev B



Aerial images may not accurately reflect the actual vegetation cover. Vegetation is plotted as accurately as possible. Unless otherwise stated, project specific vegetation only has been plotted and captured.

Vegetation alteration/removal may be subject to resource consent requirements/conditions. It shall be the client's responsibility to determine whether or not this is the case.

Works within the root zone of trees should be supervised by an appointed works arborist.

Trees
- Prune
- SRZ
- TPZ

Notable trees
- 1

Construction
- Bridge
- Walls
- Designation Boundary

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North-West-Rapid-Transit

TREE LOCATION PLAN

		Date
Requested by		
Surveyed by	DS	28/08/25
Plotted by	LGS	12/09/25
Checked by	JR	30/09/25
Drawing number	LGS-38893-04	Rev B

Aerial images may not accurately reflect the actual vegetation cover. Vegetation is plotted as accurately as possible. Unless otherwise stated, project specific vegetation only has been plotted and captured.

Vegetation alteration/removal may be subject to resource consent requirements/conditions. It shall be the client's responsibility to determine whether or not this is the case.

Works within the root zone of trees should be supervised by an appointed works arborist.

Trees
- Remove
- Unaffected
- WWRZ

TPZ
Groups

Construction
- Fill
- Kerb
- Designation Boundary

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North-West-Rapid-Transit

TREE LOCATION PLAN

		Date
Requested by		
Surveyed by	DS	28/08/25
Plotted by	LGS	12/09/25
Checked by	JR	30/09/25
Drawing number	LGS-38893-05	Rev B