
**Arboricultural Report:
Tree protection around development site,
Protection Plan/Tree Health Assessment**

Relating to site location:
758-760 High St, Lower Hutt

Specific Mention to:
AS 4097 - 2009 Protection of Trees on Development Sites

- Attention:
- Kerry Wyne, Urban Edge Planning
 - Harrison Hitchens, Ropata Village

Date Prepared: 9th August, 2020

Site Visit Date: 9th August, 2020

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- 1. **Brief**.....
- 1.1 **Proposal**.....
- 1.2 **Limitations**.....
- 2. **Methodology**.....
- 3. **Tree Information/documentation**.....
- 4. **Tree observations/findings**.....
- 5. **Recommendations for tree protection**.....
- 5.1 **Brief**.....
- 5.2 **TPZ/SRZ**
 Definition.....
- 5.3 **Permitted activities**.....
- 5.4 **Access to TPZ**
- 5.5 **Recommendations**.....
- a. **Driveway Construction/Excavation Recommendations**.....
- b. **Pavers/Tiles Area Construction/Excavation Recommendations**.....
- c. **Closest Unit Construction Construction Recommendations**.....
- d. **Fence Line Demolition Recommendations**.....
- e. **Waste bin Storage area**.....
- 6. **Maintaining the TPZ/Monitoring and Certification**.....
- 7. **Specifications**.....
- 7.1 **Signage**.....
- 7.2 **Fencing**.....
- 7.3 **Mulching**.....
- 7.4 **Education/Inductions**.....
- 8. **Remedial**
 Works.....
- 9. **Conclusion**.....



1. Brief

This report/assessment has been commissioned by Kerry Wynne from Urban Edge Planning on behalf of a proposed retirement demolition and development for Ropata Village Ltd. JSW Contracting Group have been contracted to provide a health assessment on the specified mature Pōhutukawa (*Metrosideros excelsa*) at the entrance way of 758-760 High St (Ropata Retirement village) and provide recommendations to ensure the health of the Pōhutukawa can remain in good health throughout the development/construction process. The report must provide specific mention to unit standard **AS4970-2009 (Australian Standard, protection of trees on development sites)**.

Scope of Works as per email brief forwarded on from Council Consent parties.

- Provide an arborist report prepared by a suitably qualified arborist that demonstrates that the Pōhutukawa tree is in good health and can be maintained throughout construction. It is recommended that the arborist report specifically addresses AS 4970-2009 Protection of trees on development sites. If the report comes back that damage may occur to the tree or the dripline, please provide an amended assessment of environmental effects, including any mitigation for the loss of any part of the tree, and any associated plans.
Reason: The Pōhutukawa tree provides significant amenity to the wider environment and softens the bulk of the proposed development.

1.1 Proposal

The plan attached (appendix 1) provides an overview of the proposed consented arrangement of nearby buildings, driveways, landscapes and pathways of the proposed retirement village. The close up in appendix 2 offers a more detailed inspection of the Pōhutukawa tree in question.

The plan proposes (for the purposes that affect the specimen Pōhutukawa tree) maintaining the existing route of the driveway (as inspected on 9th August 2020) but widening it to a width of 6.0m (currently 3.8m). There may also need to be some utility/water works underneath the existing driveway prior to the new driveway being installed. Construction for the driveway/proposed services will have a impact on 'Structural', 'Lower Order' and 'Non-woody roots' (see Appendix B2.4 of AS4970-2009 standard) on the south side of the Pōhutukawa tree.

The plan also proposes that the existing building approximately (measured from trunk centre) 12 metres north east of the Pōhutukawa will be demolished and replaced with another that is approximately 8 metres from the centre of specimen Pōhutukawa, with the south wall encroaching on the canopy line of the tree (as it stood on inspection day of 9th August, 2020).

There is also paving/tiling work to be laid south of the above building finishing approximately 3.8metres off the centre of the Pōhutukawa tree with a currently, unspecified finish height.

The final affecting proposed works that would impact the Pōhutukawa tree is the demolition of the existing brick and steel fence beside the footpath, with no attached detail of another fence to replace it. Note will be made about demolition recommendations but no fence construction recommendations as no fence has been specified within given plans.

Note: In section 6.0, 7.0 and 8.0 will give greater detail as to the expected construction methodology/details for the above stated affected areas around the Pōhutukawa tree.



Appendix 1



Appendix 2

1.2 Limitations

- All observations on the existing buildings/environment and health of the tree will be limited to the time of the inspection. No assumptions nor guarantees are given to any future changed/alterations to the condition of the tree either prior to the site visit nor afterwards (for example, a toxic herbicide being sprayed near the tree a day before inspection)
- Assumptions on tree health/root systems are based upon *AS4970-2009 (Australian Standard, protection of trees on development sites)*
- This report is intended to be a measure of the trees health and condition prior to works commencing on the development, and recommendations on how to mitigate any risk of damage from the proposed development work.
- Any alterations, variations or changes to the plans/information originally handed over to JSW Contracting may affect the recommendations made in this report, and should be considered with this report alongside
- All development information is based upon documents given to JSW Contracting by Urban Edge Design on 5th August, 2020



2. Inspection Methodology

- During the site visit on 9th August, a VTA was carried out (visual tree inspection), as well as the tree being climbed to inspect some potentially rotten unions (where branch unions are)
- All observations about the conditions of the tree were noted and limited only to the time of the inspection
- All assessments were carried out visually, and where possible under loose sections of bark, built up areas of rot/leaf and debris waste build up in the unions and forks of the tree and prodded with a metal spanner to figure out how deep any potential rot went.
- No drilling/invasive methods of inspection were used to assess the trees health
- All findings are documented below with relevant photos attached.

3. Tree Information/Documentation

Note: All measurements taken on a phenomenally windy day making exact measurements somewhat difficult to obtain precisely.

In order of Section 2.3.2 (*preliminary tree assessment*) of AS4970-2009 (Australian Standard, protection of trees on development sites)

- Botanic Name:** *Metrosideros excelsa* **Common Name:** Pōhutukawa
- Vigour:** Extremely healthy, all construction works around tree, have been around for well over a decade, no reason to expect a short life expectancy with these factors considered
- Structure:** Idyllic Pōhutukawa form, multiple spreading trunks from the ground, all twisted and bent, very symmetrical. Almost as tall as wide.
- Dimensions:** Canopy Spread, apx 16m East to West
 Canopy Spread, apx 18m North to South
 Height, apx 19m
 DBH, not available (7 trunks at DBH height)
- Age Class:** Very mature, one of the elder ones around Wellington, apx 100-150 years old
- Estimated Life Expectancy:** 150+ years, outside factors determining life expectancy
- Heritage and/or cultural matters:** *'The Pōhutukawa tree provides significant amenity to the wider environment and softens the bulk of proposed developments.'*
- Ecological and habitat matters:** NA, ecologist may be required (no visible birds nests seen upon visual or climbing inspection)
- The location relative to existing site features, e.g. its function as a screen or as a landmark feature:** Directly to the left upon entrance gate to the village, overhanging the sidewalk and bus stop waiting area by several metres, centrepiece upon current parking area.
- Retention Value:** The Pōhutukawa has been a staple of the environment for a considerable number of decades despite multiple new developments over the previous years. It offers a significant amount of real estate in the sky upon driving or walking around the area due to its close proximity to the road/sidewalk. Also being a mature native species that is slow going and temperamental, the tree is rare and impossible to replace. Making it incredibly valuable to retain.

Notes: Tree is almost completely symmetrical with a slight north south orientation probably due to prevailing wind. Exceptional new growth coming through all parts of tree.



Appendix 3 (left), Symmetrical specimen Pōhutukawa, photo taken from north



Appendix 4 (right), slightly longer pattern in a north south orientation, taken from the west, looking east.



4. Tree Observation/Findings:

Fairly symmetrical looking tree with a somewhat thicker trunk and orientation pointing north south/east west. New buds and growth coming through on every part of the tree with strong vigour and minimal deadwood throughout the tree. No discolouration notice, nor major damages/breakages throughout the tree. Multiple previous prunings have been carried out throughout the tree with previous prune marks around branch collar almost entirely healed with some twisting/skewing of the bark. Minimal bug/insect life throughout the tree, occasional worm living in the organic matter collected in between fork/unions in branches. Minimal rot throughout whole trunk sections of tree with occasional few inches of rotten leaf litter in the tree, with solid trunk underneath. No significant cracks/stress points noted in the tree. One minor crack in the centre truck, not rotten nor expanding.

Overall the tree was in exceptionally good health with no significant signs or stress, damage or decay amongst it.



Appendix 5 (left), new leaf and bud growth at the tips of all branches around the tree, minimal dead wood/branches observed

Appendix 6 (right), new leaf and bud growth at the tips of all branches around the tree, minimal dead wood/branches observed



Appendix 7 (left): Flaked off bark showing hard, solid trunk beneath, minimal rot, cracks, insects or signs of poor health

Appendix 8 (right): Previous prune marks almost entirely healed, repeated throughout the tree



Appendix 9 (left): Previous prune marks healing well, repeated throughout tree.

Appendix 10 (right), All major unions/forks in tree tested for rot, 10mm-50mm of rotten material on top (all old leaves/dirt) with hard trunk of the Pōhutukawa below, prime health



Appendix 11 (left): All major unions/forks in tree tested for rot, 10mm-50mm of rotten material on top (all old leaves/dirt) with hard trunk of the Pōhutukawa below, prime health

Appendix 12 (right): All major unions/forks in tree tested for rot, 10mm-50mm of rotten material on top (all old leaves/dirt) with hard trunk of the Pōhutukawa below, prime health



Appendix 13 (left): Previous prune marks almost entirely healed upon inspection

Appendix 14 (right): Minor crack found in main trunk, very old, starting to heal over, not to be concerned about. No others found

5. Recommendations For Tree Protection

5.1 Brief: To ensure protection of the Pōhutukawa tree throughout the demolition/development process, JSW Contracting Group recommends a strict Tree Protection Zone (TPZ), careful construction methodology around the Structural Root Zone (SRZ) and some pruning work prior to development commencement.

5.2 Definition: TPZ Definition;

Due to the complicated trunk system of the Pōhutukawa tree, as well as factoring in the other nearby infrastructure which has been built nearby the tree. The TPZ will be calculated as the exterior dripline of the Pōhutukawa tree.

Pruning Definition: A few select branches specifically chosen to be pruned off the tree in accordance with industry standards that are deemed to not impact the health of the tree to remove them. But essential to remove at risk of being damaged ripped off the tree during development.

SRZ Definition;

The Structural Root Zone of the specimen Pōhutukawa tree is calculated with the following workings in accordance with *AS4970-2009 3.3.5 (Structural Root Zone [SRZ] calculation formula)*. The diameter at 1.4m above ground level was taken of all 5 trunks found at that height, then calculated together to find the Median trunk circumference of the tree.

The following numbers used within the calculations can be used below, photos will be provided upon request.

Trunk 1:	57.0cm	Diameter at Breast height
Trunk 2:	51.0cm	Diameter at Breast height
Trunk 3:	65.0cm	Diameter at Breast height
Trunk 4:	87.5cm	Diameter at Breast height
Trunk 5:	47.7cm	Diameter at Breast height
Trunk 6:	62.0cm	Diameter at Breast height

Median trunk circumference:	59.5cm
Structural Root Zone (SRZ) Radium:	150.0cm
Structural Root Zone Diameter:	300.0cm

SRZ Calculations:

Data Set for Median Calculations (in m); 0.477, 0.51, 0.57, 0.62, 0.65, 0.875

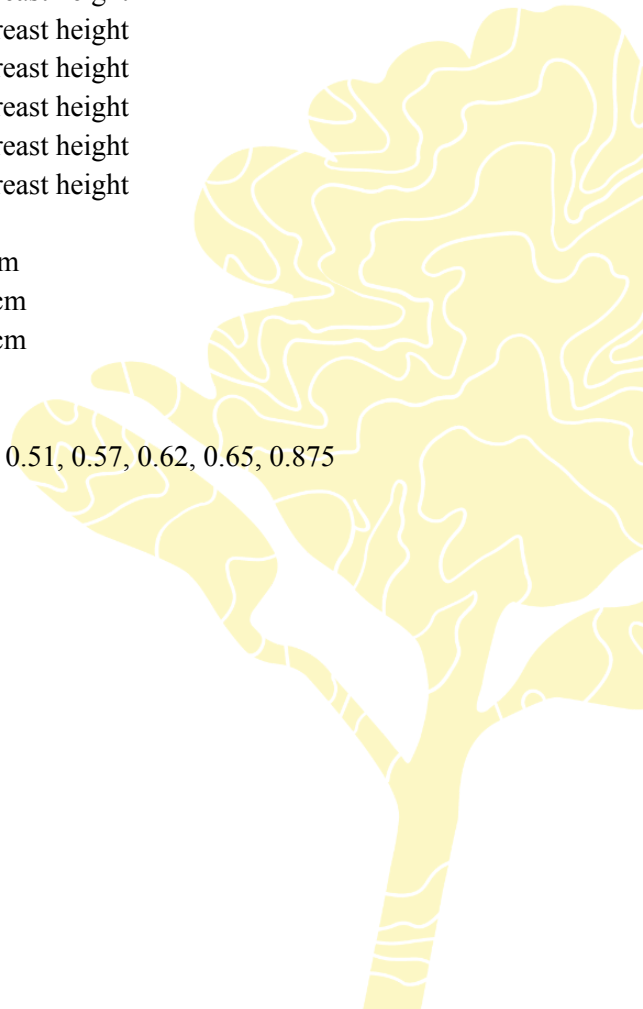
Mean: 0.617m

Median: 0.595m

SRZ radius = $(D \times 50)^{0.42}$

Official AS4970-2009 Calculator also used.

<https://as4970calculator.web.app/>



5.3 Access to TPZ: The TPZ shall be restricted of all access (excluding driveway) to a difficult-to-move fencing structure (Waratah and safety mesh, signwritten (*in accordance with AS4970-2009 Appendix C 'Tree Protection Zone, NO ACCESS'*)). There shall be no gate, nor any easy, simple way of breaking into the TPZ. If any works are to commence within the TPZ the site Arborist (who is appointed in charge of TPZ and Pōhutukawa monitoring throughout the development) must be given prior to changes/alterations to the TPZ.

It is advised a thick layer of mulch is spread around the TPZ prior to works beginning to help keep the tree moist and healthy.

5.4 Permitted Activities The TPZ will be considered a zone of banned entry/free of any works at all. This can include but is not restricted too as specified in *AS4970-2009 (Australian Standard, protection of trees on development sites)*.

- a. 'Machine excavation including trenching;
- b. Excavation for silt fencing;
- c. Cultivation;
- d. Storage;
- e. Preparation of chemicals, including preparation of cement products;
- f. Parking of vehicles and plant equipment;
- g. Refuelling;
- h. Dumping of waste;
- i. Wash down and cleaning of equipment;
- j. Placement of dirt fill;
- k. Lighting of fires;
- l. Soil level Changes;
- m. Temporary or permanent installation of utilities and signs
- n. Physical damage to the tree;'

However due to the location of the driveway specified in the development plan, there will be a breach of well over the allowed for 10% encroachment into the TPZ as specified in *AS4970-2009 (Australian Standard, protection of trees on development sites)*. There is also an encroachment into the TPZ with some proposed landscape work. The following recommendations are split into five sections below.

- Driveway
- Pavers/Tiles
- Closest Unit/heavy machinery
- Fence Demolition
- Services/Water installation

5.5 Recommendations

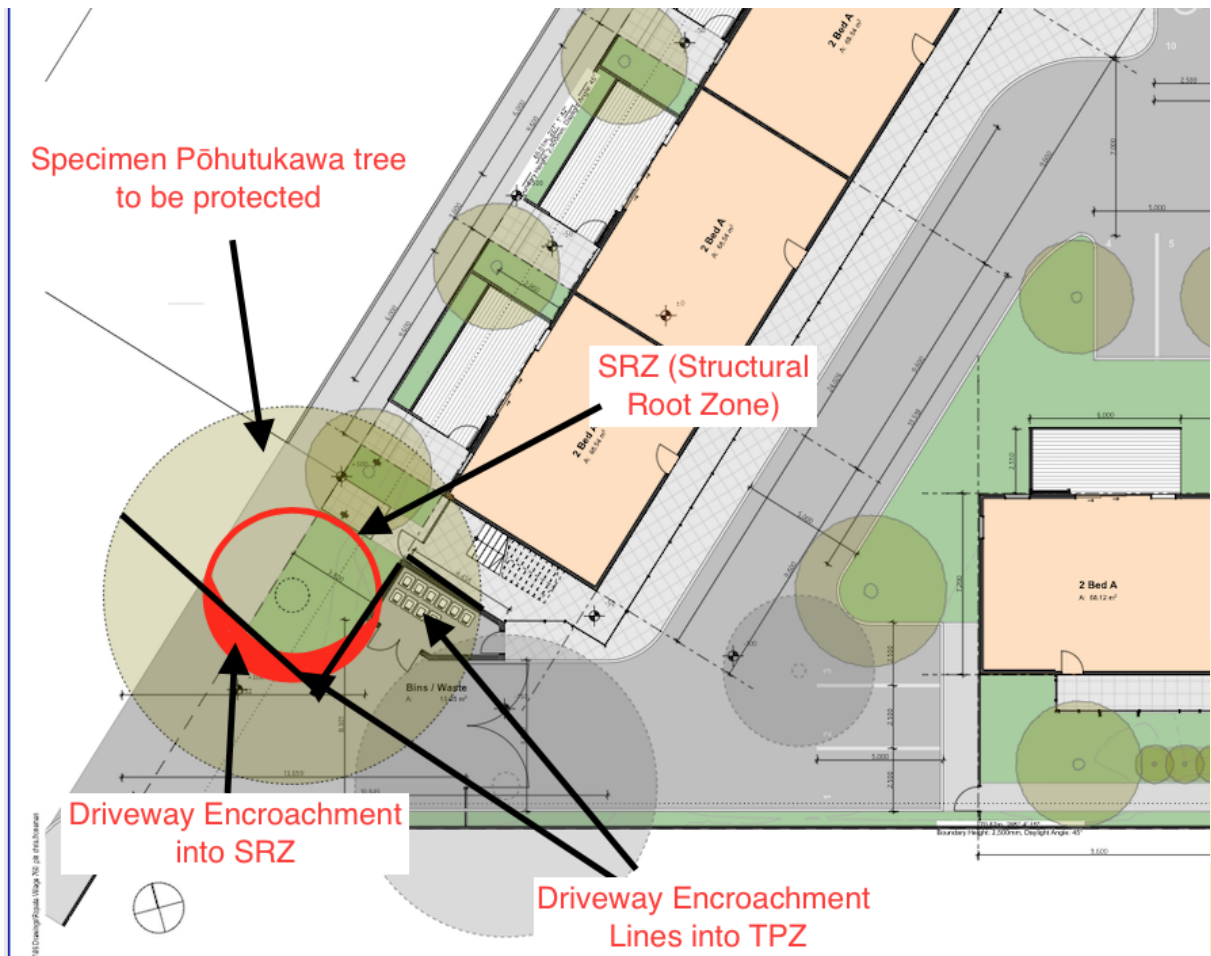
a. Driveway:

Prior Meeting: A meeting was done on site to address the issues of planned excavations and a new driveway encroaching on the TPZ area. During the meeting the existing ground heights were taken in relation to the

construction methodology of the proposed new driveway.

Excavation:

The TPZ would ordinarily be fenced off/made difficult to easily encroach with person or machine, there'd also possibly be given additional moisture/protection measures around the tree (ie bracing or mulching). However, Ordinarily you can have a maximum of a 10% encroachment into the TPZ, preferably temporarily. Due to the proposed location of the driveway, there would be a roughly 40% encroachment on the TPZ and a breach of the SRZ (Structural Root Zone) as a full time structure throughout construction and permanently. See Appendix 13 for diagram.

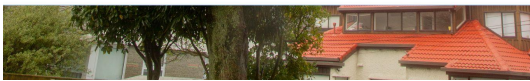


Appendix 15: See specific area where driveway is proposed (grey tone), where it is encroaching into the SRZ (Structural Root Zone), and into the TPZ (Tree Protection Zone)

Pruning: There is one branch above the existing/proposed driveway which is low hanging (just over 3.3 metres off the ground) which is advised to be pruned off prior to development as the risk of it being clipped by trucks/machines is too high. It is the lower of a double union branch, meaning little aesthetic change will come from the pruning. See Appendix 14 for details.



Branch to prune
To low, will clip trucks/machines
as driven into site



Appendix 16 (left): Lower branch of the two where the trunk forks, to be pruned off. Hanging significantly over the driveway, too low for heavy trucks/machinery to pass through without risking clipping and damaging the branch.

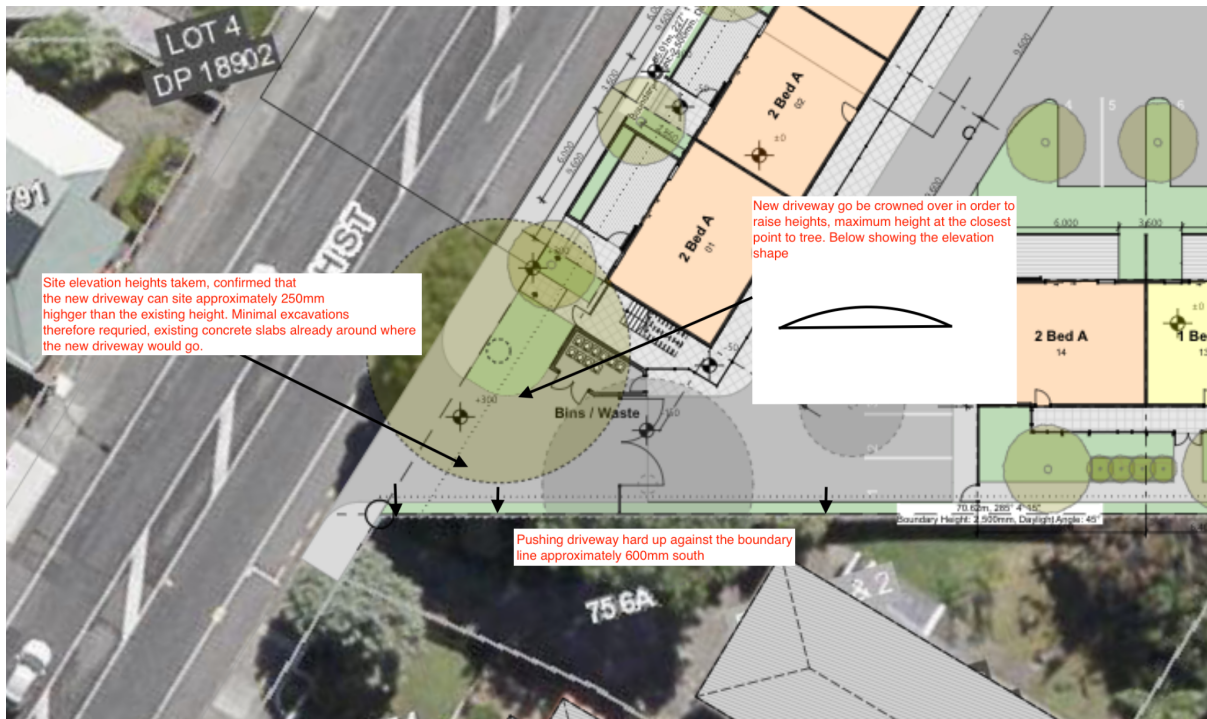
Appendix 17: (right): Lower branch on the left to be removed, wider shot to show scale.

Recommendations: Following recommendations are listed below as options to be considered for the protection of the Pōhutukawa. Consultation with onsite engineers and concurrence of a workable plan has been made and are listed below.

- **Move/narrow driveway as close to .** If it is possible to move the driveway further south, right up against the boundary line would free up approximately 600mm of otherwise intrusive driveway over the Structural Root Zone. **UPDATE: Since original recommendations were made, the driveway has been shifted and narrowed freeing up a additional metre of space from the centre of the Pōhutukawa tree**
- **Build over the top of the existing ground height/driveway height.** On site heights of the existing driveway and Root Buttress were taken with a rotational laser to determine how much excavatio would need to be done. Minimal excavatio would be required as the new driveway could be **crowned** over the SRZ and be sitting at a finished height of approximately 250mm above the existing driveway. With the additional 30mm of asphalt the the current driveway has over it, there is strong confidence that minimal impacts to the trees root system will occur with the proposed raised driveway height.
- **Air excavation.** In the event that there has to be excavation around the structural root systems, excavating as carefully as possible around the roots (possibly with compressed air) and redirecting them away from the driveway instead of cutting them, and backfilling back around the roots as quickly as possible to avoid long term damage to the Pohutukawa would be recommended.

- **Excavated backfills very quickly.** Any excavations that expose either Structural Roots, Lower Order Roots or Woody roots. Must be kept as moist and away from sunlight as much as possible. This can be achieved by laying Biocoir mats or Hessian mats over exposed areas, then kept moist, backfilling dirt over exposed roots, or mulching. All in order to keep the roots as healthy as possible until backfilled to finish grade to minimise root damage.
- **Prune Low Branches.** In accordance with industry standards, prune lower hanging branches away from risk of being clipped by machinery above the driveway.

Conclusions: Upon initial inspections, there was strong concern over excavation methods causing damage to the SRZ. After meetings on site and dimensions, heights and methodology were taken/discussed. There is strong confidence that the SRZ will be unaffected by the now raised/crowned driveway and shifted position. In the event any further excavation needs to happen, the use of an 'air spade' is recommended. *See Appendix 18 for details*



Appendix 18: Showing where to shift driveway south/elevation view of how driveway crown would look with peak of crown as close to the trunk as possible.

b. Pavers/Tiles:

Outside the nearest unit there is a proposed paved area that encroaches the Tree Protection Zone by approximately 40%. However, the Pōhutukawa tree in question already has (upon initial site visit date) a paved area around where cars park. Given the tree is in extremely good health, and the paved parking area has been around some time, if this area were to be paved again or **lifted** in height, there would be no encroachment on the non-woody root system of the tree.

Therefore, so long as the excavation work was kept moist and given cover when left unattended (to shelter any exposed roots) and the new paved area is either at the **same** or a **lifted** finished height to the current carpark. There would be minimal protection work required. Keeping the roots moist and only opening the

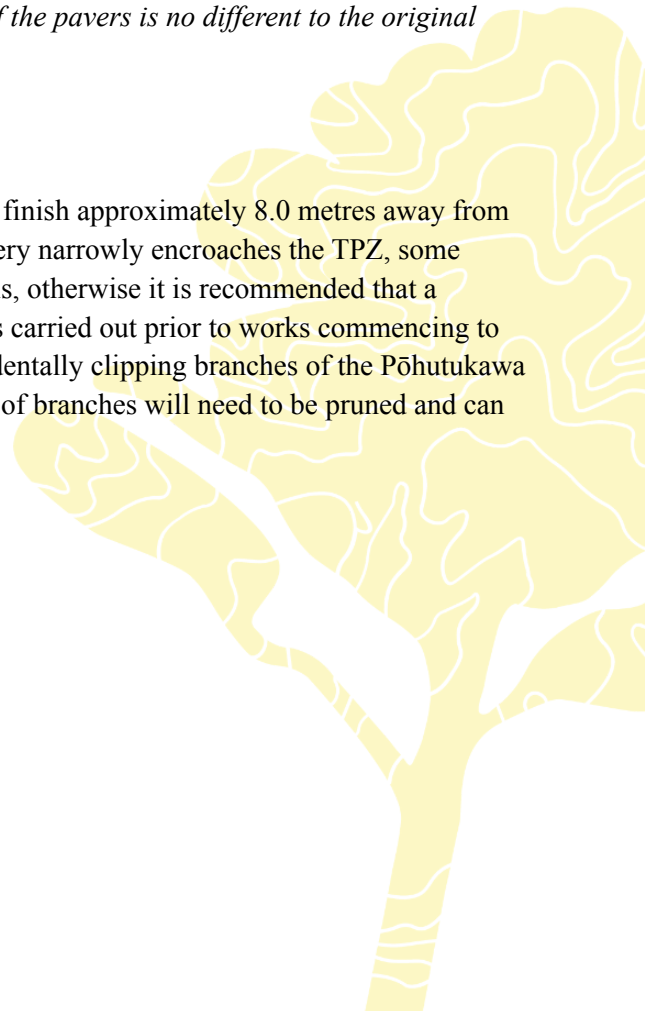
TPZ for the specific paving work, with no fill/material left on the roots is JSW's recommendation. A diagram can be seen in Appendix 16.

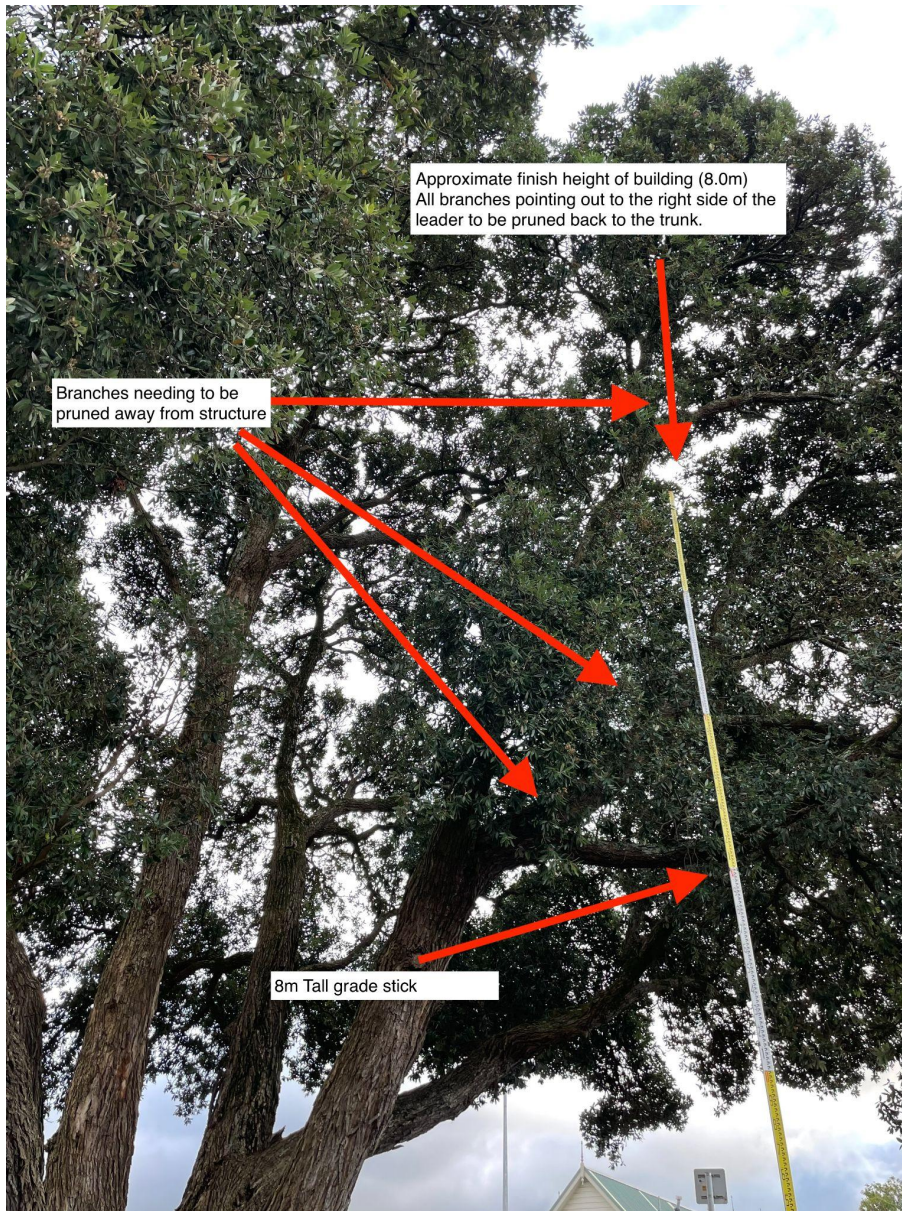


Appendix 19: The line of encroachment for the paved area breaches the TPZ but not the SRZ, so long as the non-woody roots are kept moist and cool and the finish height of the pavers is no different to the original heights, minimal recommendations are suggested

c. Closest Unit Construction:

There is a proposed unit (last unit on the building) which would finish approximately 8.0 metres away from the centre of the Pōhutukawa tree to the north east. The house very narrowly encroaches the TPZ, some minor pruning may be required at the tips of the branches for this, otherwise it is recommended that a meeting with the earthworks contractor or any crane operators is carried out prior to works commencing to ensure the process of movements is kept out of range from accidentally clipping branches of the Pōhutukawa tree. Following a site visit with finished heights taken a number of branches will need to be pruned and can be seen in Appendix 20 below.





Appendix 20: All branches to be pruned away from the building line as it will currently hit it.

d. Fence Line Demolition

There is an existing steel and brick fence that runs between the sidewalk and the Pōhutukawa tree which has not been specified for removal, but in the event that it does need to be demolished to make way for a new fence the recommendations for minimising impact to the Pōhutukawa are as follows.

Mulching the TPZ, mulching the TPZ area so that any foot steps, heavy tools or falling bricks will have a softened landing onto any potential roots of the tree.

Working in an orientation that keeps both workers and hand tools away from dropping material onto the tree/roots of the tree. Even a small wound from a falling brick can cause an infection within the tree.



Hand tools only, If the TPZ is breached on anything other than a hard surface (existing paved areas, driveway/sidewalk) hand tools must be used instead of tracking any heavy machinery over the root systems.

Ground mats, in the event machinery must be used to demolish the wall, ground mats must be laid at the start of the day and packed away at the end of the days over all soft areas where non-woody roots or structural roots will be under.

e. Waste Bin Area

Amongst the proposed plans there is an area nearby for waste bin/recycling collection for the residents. The area features a wall made of either timber/concrete blocks and is roughly 12 square metres. In the plans it features it being a few metres from the centre of the Pōhutukawa tree and just outside of the SRZ. The specified heights of the waste bin area will be well above the existing height of the driveway that currently sits at the property. For this reason, minimal excavation is required below the existing ground height, and is also outside of the SRZ.

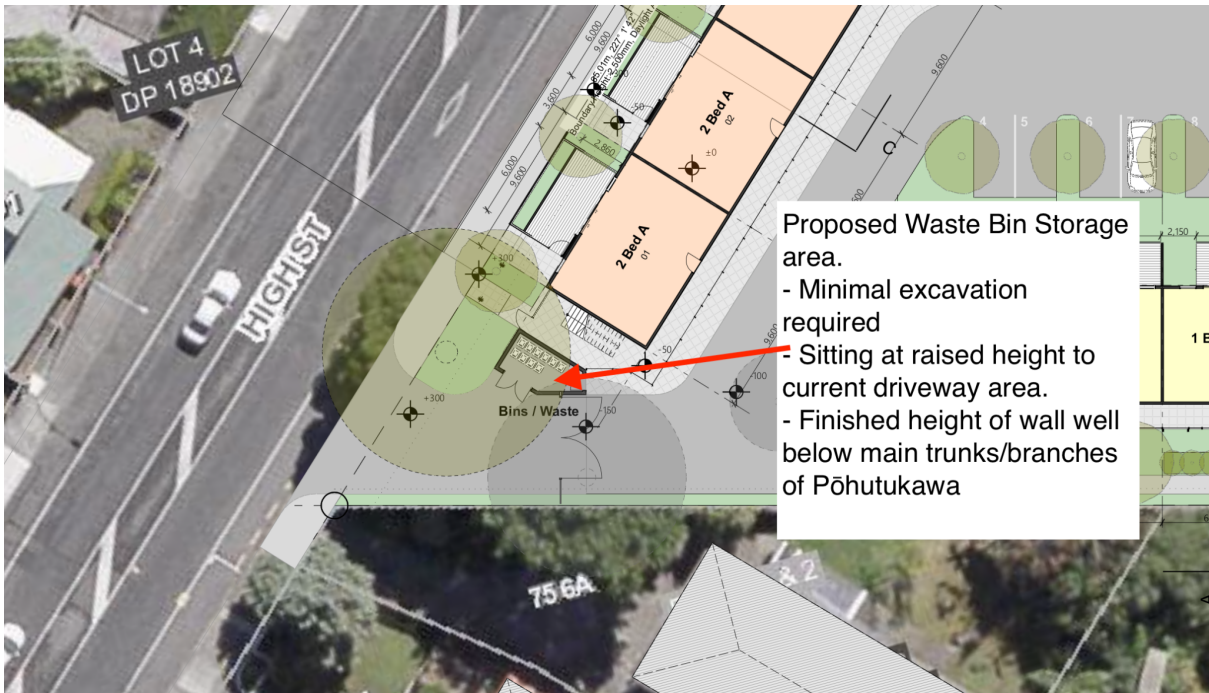
The finished height of the walls around the bin area is also well away from the steep angle of the main trunks of the tree, meaning no intrusion to the top of wall height and tree trunks/branches will happen.

While the area does not encroach on the SRZ it does encroach into the TPZ. It is recommended for construction not to start until all other heavy demolition and earthmoving work has been completed, and the bulk of the construction work. This is to ensure that when the TPZ is decommissioned or altered, there will be minimal heavy machines causing damage to the tree root structure.

Below is two attached diagrams showing where the waste bin collection area is, and the current existing height of the ground level.



Appendix 21: Attached approximate edges and finished height of waste bin collection area



Appendix 22: See plan view of proposed waste bin storage area.

6. Maintaining the TPZ/Monitoring and Certification

Throughout the demolition, construction and remedial works of the proposed development. It will be necessary to have a dedicated Site Arborist meet with major parties at different intervals (ie excavator operator during demolition phase, landscapers during paving phase...etc) to ensure all relevant parties know about the Tree Protection Zone, why it is there, why it's important and how a collaborative plan can be arranged to ensure the work gets done without damaging the Pōhutukawa tree.

It is recommended that a Site Arborist is assigned to the project and read in on this, and any other relevant reports and plans. Once appointed a plan of checkups/meetings on the tree's health throughout the project can be arranged, with regular documentation taken and any changes addressed and altered if possible as quickly as possible.

7. Specifications

7.1 Signage:

Signage of the TPZ must be clearly labelled on all sides applicable, as well as notified as hazards on site boards and daily safety briefs.

Signage must ensure a degree of education about why the TPZ is there and the Pōhutukawa is being protected.

7.2 Fencing:

It is recommended that all temporary fencing around the TPZ is difficult to easily move/shift. This can include but is not limited to:

- Waratah and mesh fencing
- 2.0m high security fence
- Timber and plywood fence (resting on TOP of the ground not drilled into)

7.3 Mulching:

A thick layer of mulch (100mm minimum) spread around the TPZ is recommended to help improve the soil health, retain moisture in the soil, offer a cushion between any foot steps over the Non-woody/Lower Order roots.

Mulch is not to be piles around the Root flare of the tree with a healthy gap between the edge of the mulch and root flare left.

Mulch must be replaced every 12 months or when sunken into the soil around.

7.4 Education/Inductions:

Subcontractors that are brought on site to carry out works must be read into/educated on the Pōhutukawa tree and the requirements around the TPZ by either a foreperson, project manager or site arborist. An explanation on how to plan working methodology around the TPZ must be given.

An explanation on why the tree is being protected and how long it has been there must be given too, in an effort to ensure peoples understanding/appreciation of the TPZ. Records of this should be kept on all hazard ID sheets used on site and mentioned frequently at safety/operation meetings.



8. Remedial Works

Upon completion of the development/project some remedial works around the TPZ/Pōhutukawa tree are required. They must be noted and reported by the Site Arborist and carried out in a prudent manner. These can include, pruning off damage/snapped branches, aerating compacted soils nearby, bracing any potential cracks/damages to the tree of major concern.

Once completed the TPZ can be dismantled in its entirety and removed off site.

9. Conclusion

In conclusion the above document can be split into three categories, assessment, concerns, actions. The tree is in exceptionally good health, has been well taken care of/looked after over its life, and has no reason to be concerned about an imminent decline in health/shorter life span.

There are major concerns about the driveway excavation that would be required as it intrudes upon the Structural Root System (SRZ) of the tree. JSW Contracting Group is satisfied with the plan of building up instead of excavating down for the driveway, as well as moving it farther south if at all possible. If this cannot be done, it is recommended that excavation works are carried out in the most delicate way possible (with air potentially), with roots rewrapped or redirected where possible, and cut at a last resort. Any roots exposed during the paving or the driveway construction must be kept moist and covered as much as possible. Works around demolition and unit construction should be coordinated in a way that requires as little risk of damage to the tree as possible.

There is a small amount of pruning work to be done prior to any development starting, all in accordance with industry standard/worksafe requirements. Upon completion of pruning work there is a Tree Protection Zone to be setup prior to development starting with a mulch bed laid down. All in order of keeping the delicate root systems of the Pōhutukawa unaffected as possible.

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