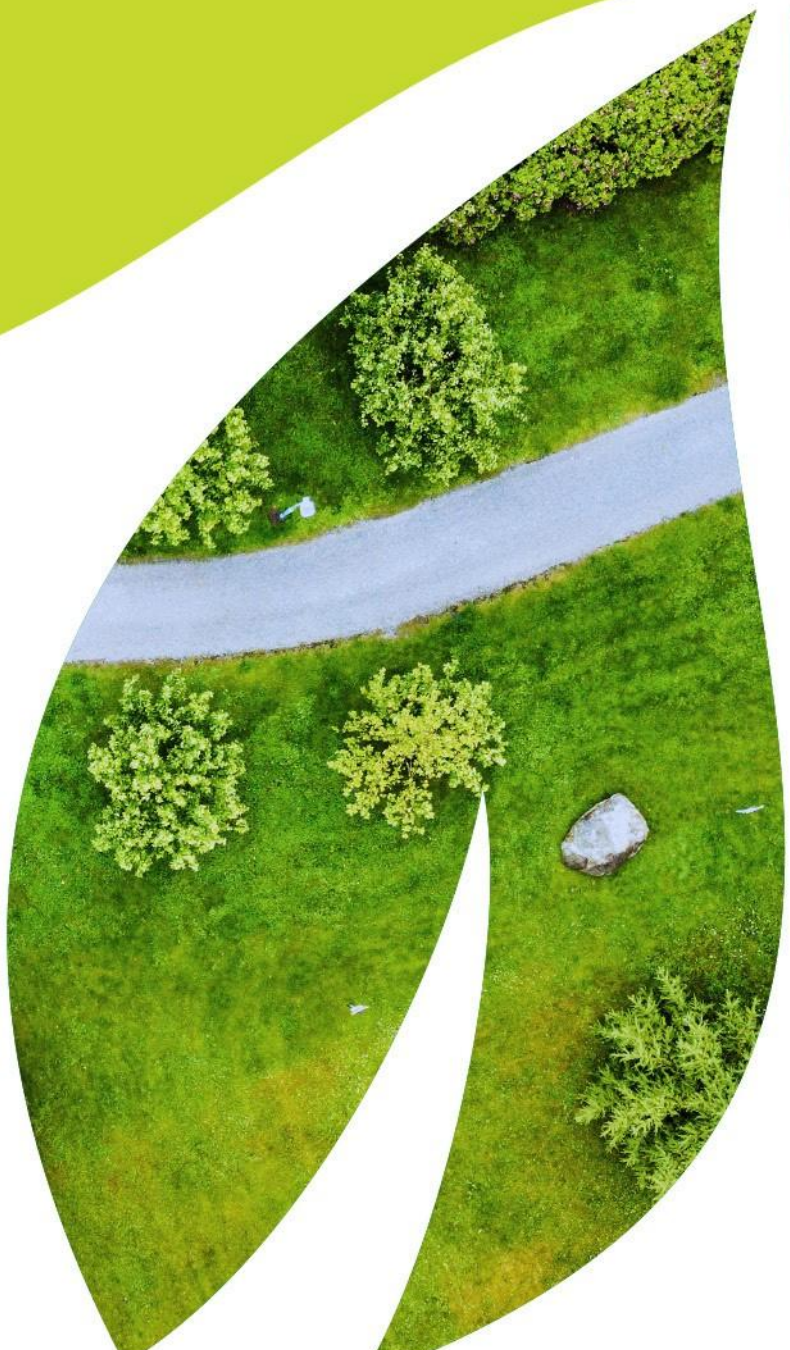
Arborlab

Creating Green Space
Sustainability

Arboricultural Impact Assessment

Karekare Stockpile Removal



Arboricultural Impact Assessment

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Context and summary

1. Stellar Projects Limited has engaged Arborlab Consultancy Services Limited to assess arboricultural impacts associated with the removal of stockpiled soil within the reserve area at 1 Lone Kauri Road, near Pōhutukawa Glade, Karekare.

2. The trees have been assessed August 2023 and February 2025. This assessment references plans by Stella, dated 11/04/2025.

3. Following the rain events and Cyclone Gabrielle, January / February 2023 and subsequent land slips throughout the coastal settlement, the reserve area was used as an interim storage site for approximately 2,400m^3 of spoil. The reserve was a relatively level grassed area used for passive recreation and the main entrance and thoroughfare to the Pōhutukawa Glade Track and onto Karekare Beach. The area is bordered by mature pōhutukawa, coprosma and Pseudopanax. Pōhutukawa Glade extends from the western edge of the reserve through to Karekare beach.

4. It is proposed to ameliorate the effects of the stockpile through spoil removal and spreading an amount across the reserve.

5. Notwithstanding the emergency requirement at the time, there was potential that the placement of spoil over the root zones of trees could result in adverse effects via soil compaction, restriction of air/water exchange, drainage modifications and damage to non-woody feeder roots. An option to remove the stockpile to a secondary site in 2024, west through pōhutukawa glade was assessed as unfeasible.

6. The most recent assessment of the trees' health and vitality has revealed that the placement of the stockpile has had little effect to date, apart from one mature pōhutukawa which has died. If a tree protection methodology, which is included in this report, is implemented during the proposed works, it unlikely that any adverse effects from the spoil removal/reduction will occur.

Figure 1: Drone aerial photograph of area and stockpile

Regulatory Limitations

7. The site has covers two AUP[OP] zonings: 'Open space – conservation zone' and 'Trees in roads', with the following overlays also in place.
    - Natural Resources: Significant Ecological Areas Overlay – SEA_T_5539, Terrestrial
    - Natural Resources: Natural Stream Management Areas Overlay [rp]
    - Natural Heritage: Outstanding Natural Landscapes Overlay [rcp/dp] – Area 73, Waitakere Ranges and coastline
    - Natural Heritage: Waitakere Ranges Heritage Area Overlay – Extent of Overlay

Figure 2: site zoning (Open space-conservation zone and Trees in roads)

Figure 3: SEA

8. As part of the assessment, the Auckland Unitary Plan (AUP(OP)) has been considered. The site is located within the Open Space – conservation zone and Road reserve, with a SEA overlay. Given the proposed activities associated with the works, it is our understanding that the relevant rules and standards are associated with E26 Infrastructure. As the works do not intend to alter the vegetation, we believe that Rule E26.3.3.1 (A77) *vegetation alteration or removal that does not comply with Standards E26.3.5.1 to E26.3.5.4*, regarding works within a SEA do not apply. It is our understanding that the governing standards and rules for the works are contained within E26.4.3.1. The standards within E26.4.3.1 are the same standards that are outlined within chapters E17 and E16, which relate to trees growing within the road reserve and open space zoning. The relevant standards for works within the root zone of trees, outlined in E26, E17 and E16 are below.

Works within protected root zone

(2) For roots greater than 60mm but less than 80mm in diameter:

a) excavation undertaken by hand digging, or air spade, or hydro vac or machine excavator within the protected root zone with direction and/or supervision of a qualified arborist:

(i) works must not disturb more than 20 per cent of the protected root zone;

(ii) works involving root pruning must not be on roots greater than 80mm in diameter at severance;

(iii) any machine excavator must operate on top of paved surfaces and/or ground protection measures;

(iv) any machine excavator must be fitted with a straight blade bucket; and

9. It has been assessed that the works can be preformed within the above permitted standards.

Proposed works

10. The proposed works activities include the removal of most of the stockpile and spreading the remainder as fill. On top of the fill there will be a 100mm dressing of topsoil. The following diagram generally outlines the proposed works. More plans are outlined in Appendix A.

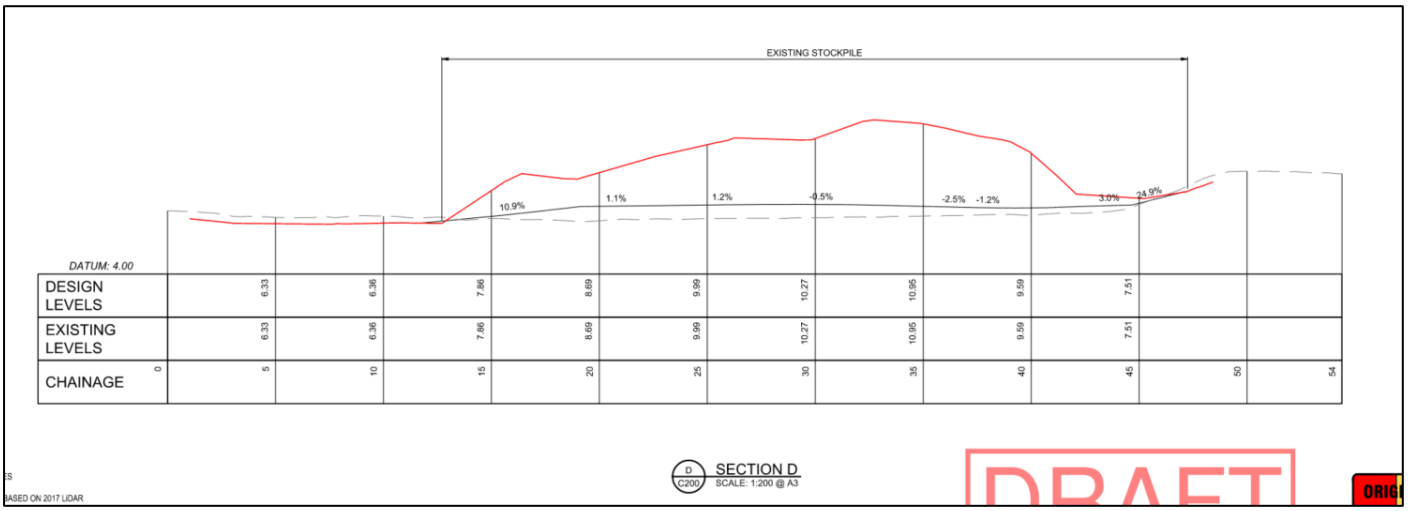


Figure 4: the proposed stockpile works diagram

11. The removal will be achieved through machine excavator and trucks. The trucks will enter the site through an existing gate, which is in the northeastern corner of the site. This accessway was used to transport the spoil into the site.

Figure 5: Access to the site

Figure 6: Access to the site

12. The access way into the site has been used as part of the stockpile, raised above the previous level. This is relevant as there will be no roots within the spoil, which also by default, acts as a load bearing bridge.

13. A perforated pipe and scoria trench will be installed within the site to allow for drainage. The trench is being installed outside the root zone of trees.

14. A tree protection protocol will be adhered to during the works. The protocols are generally outlined below.

    - An onsite arborist will be engaged to monitor and direct tree protection protocols.
    - A pre-commencement meeting with the onsite arborist will take place prior to the works.
    - Entry and exit to the site are to be through the existing accessway only.
    - All movement of trucks and excavators will be maintained on top of the existing spoil's footprint, which is to be demarcated with pegs.
    - Any movement or manoeuvring of machinery outside of the stockpile footprint and within the root zone of trees will be on top of load bearing boards.
    - The excavations will not be preformed outside the 'toe' of the stockpile.
    - The final level will not be lower than the existing level outside the toe of the stockpile.
    - No pruning of trees will occur without the agreement of the onsite arborist.

Findings

Table 1: Inventory and details of trees

Tree No.	Botanical name	Height (m)	Girth @ 1.4m (mm)	Girth @ ground level (mm)	PRZ (m)	SRZ (m)	TPZ (m)	Health	Comments
1	Metrosideros excelsa	7	2500	2500	6	3.0	9.5	Good	• Adjacent to the entrance. • Canopy overhangs entrance and edge of stockpile.
2	Metrosideros excelsa	4	575	1200	4	2.2	2.1	Good	• Canopy overhangs pile. • Edge of root zone slightly buried.
3	Metrosideros excelsa	4	1100	1100	3	2.1	4.2	Good	• Canopy overhangs pile. • Edge of root zone slightly buried
4	Metrosideros excelsa	6	2000	2000	6	2.7	7.6	Dead	• Dead tree
5	Metrosideros excelsa	6	2700	2700	6	3.1	10.3	Good	• Canopy overhangs pile. • Edge of root zone slightly buried
6	Metrosideros excelsa	6	1750	2000	6	2.7	6.6	Fair	• Canopy overhangs pile. • Edge of root zone slightly buried
7	Metrosideros excelsa	4	600	600	2.5	1.65	2.2	Good	• Canopy near pile toe.
8	Metrosideros excelsa	15	2660	3730	13	3.5	10.1	Good	• Adjacent existing stockpile. • Surface roots evident.
9	Metrosideros excelsa	15	5550	6360	13	4.4	15	Good	• Adjacent existing stockpile. • Surface roots evident.
10	Pseudopanax arboreus	4	600	600	2.5	1.6	2.2	Good	• Canopy adjacent logs.
11	Pseudopanax arboreus	4	600	600	2.5	1.6	2.2	Good	• Canopy adjacent logs.
12	Pseudopanax arboreus	4	600	600	2.5	1.6	2.2	Good	• Canopy adjacent logs.
13	Metrosideros excelsa	6	1800	1800	4	2.6	6.8	Good	• Canopy near pile toe.
14	Metrosideros excelsa	6	1800	1800	4	2.6	6.81	Good	• Canopy near pile toe.
15	Metrosideros excelsa	6	1800	1800	4	2.6	6.8	Good	• Canopy near pile toe.
16	Pseudopanax arboreus	4	600	600	2.5	1.6	2.2	Good	• Canopy at toe of pile.
17	Pseudopanax arboreus	4	600	600	2.5	1.6	2.2	Good	• Canopy adjacent toe of pile.
18	Pittosporum crassifolium	4	200	200	2	1.5	2	Good	• Canopy adjacent toe of pile.
19	Coprosma arborea	2	200	200	2	1.5	2	Poor	• Canopy adjacent toe of pile.
20	Coprosma arborea	2	200	200	2	1.5	2	Good	• Canopy adjacent toe of pile.

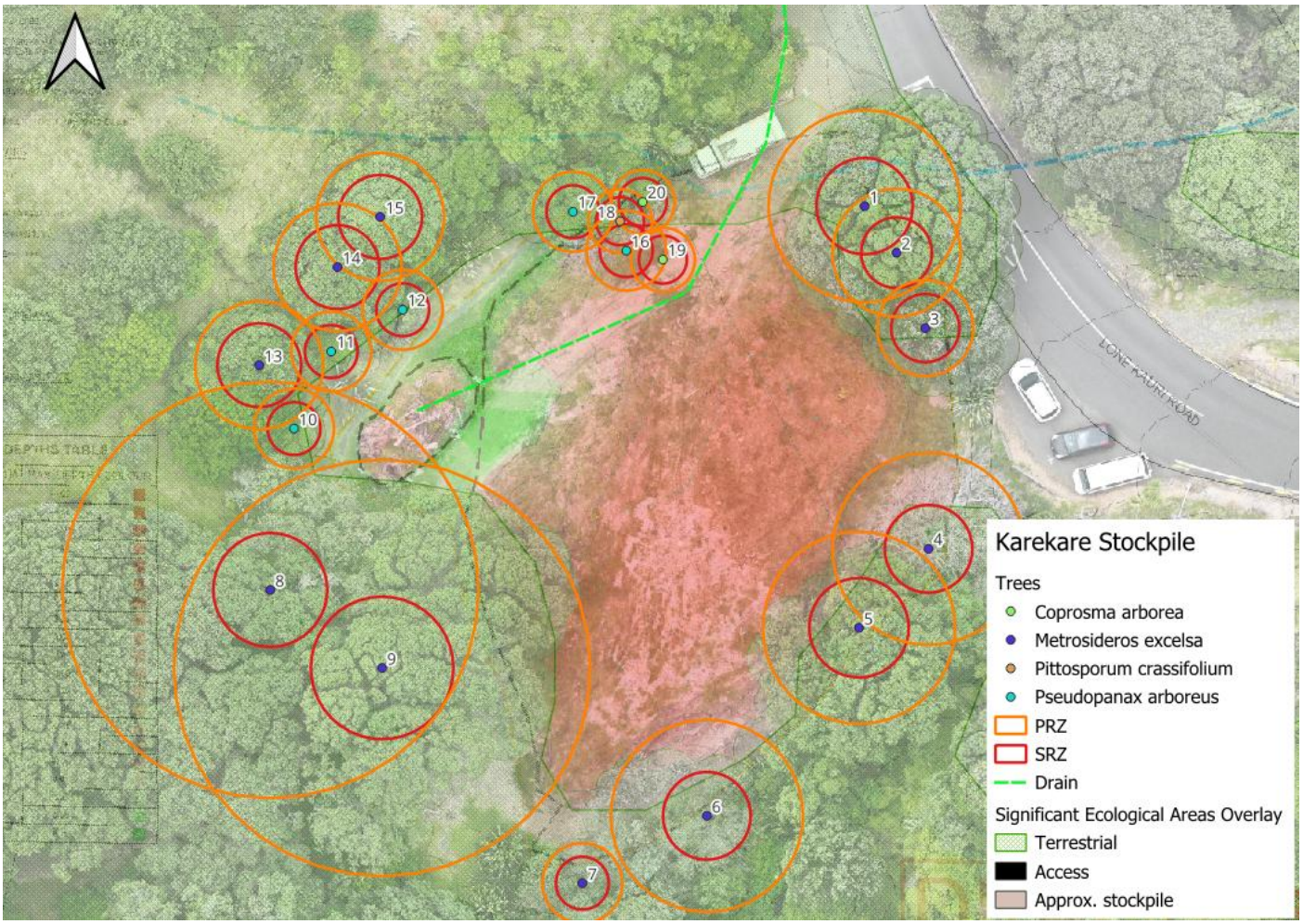


Figure 7: Approximate stockpile extent, tree locations and relevant root zones.

Advice and Analysis

15. Tree No.4 has died. Its demise is likely to be a combination of factors that may include the stockpile.

16. Previous works have removed a large portion of the stockpile from the rootzone of Tree 9 and the peripheries of the edge trees. Tree 9 is the first of the 'Glade' trees, which are the foremost trees of the area and contribute the wide amenity and benefits of the reserve. The early removal of the stockpile within the tree's root zone was to minimise any adverse effects that the stockpile may have.

17. We cannot provide an assessment of effects in respect to comparing with the trees prior the stockpile, as the health and vitality of the trees was not known. However, apart from Tree 4, at the time of this assessment the general health and vitality of the trees is fair to good. It is my opinion, symptoms of root and/or biotic damage from the stockpiling will have been present within the trees' canopies by now. It is therefore unlikely that the trees have been adversely affected by the works.

18. Given the time involved, it is unlikely that root growth into the pile will have occurred and as long as the ground level is not lowered past the original ground level, no roots should be affected.

19. Although the stockpile has had little bearing on the trees' health and vitality, its removal can only further benefit the trees.

20. To ensure that the trees are not affected by the works, the tree protection methodology is to be

followed. If adhered to, the potential adverse effects will be negligible.

21. As the soil/earth was bought from areas where kauri dieback may reside, biosecurity protocols will need to be followed.

Recommendations

22. To avoid and minimise impacts on trees because of the works, we recommend tree protection measures and protocols are implemented.

23. Auditing reports should be compiled by an Appointed Arborist and made available to Auckland Council upon request.

Appendix A: Tree Assessment Methodology and Limitations

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.

Unless specified GPS plotting and measurements will be indicative only and subject to the resilience and accuracy of GPS data on the day of data collection. All attempts are made to ensure that GPS plotting and subsequent desk top analysis will be as accurate as possible.

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

i) MIS306 Tree Inspection for Access and Work

ii) MIS501 Tree Risk Assessment

iii) BS 5837 2012 Trees in Relation to Design, Demolition and Construction to Construction

iv) AS 4970-2009 Protection of Trees on Development Sites

Unless detailed in the 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 will be measured using a standard nylon tape measure. Unless specified the tree height will be 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 GPS and overhead mapping (GPS survey) through online software. GPS surveys can be variable, for example, discrepancies with aerial angles, GPS coordination variances. To assist with GPS surveys, the plot locations are manually adjusted on site using overhead photographs (LINZ imagery). This method, although generally accurate and suitable for tree assessments, is not as accurate as a topographical survey or 'ground truthing'.

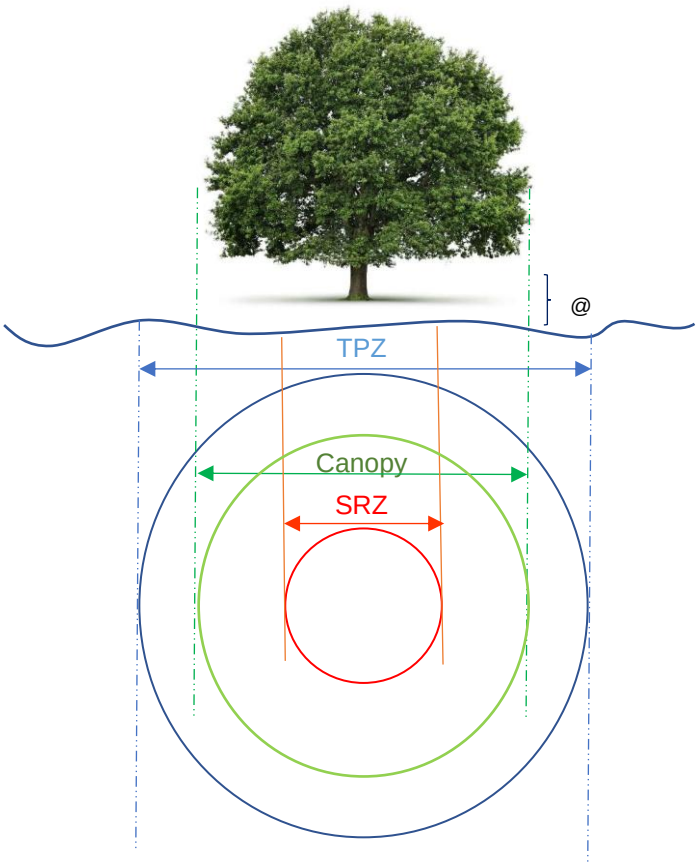
AS 4970-2009 Protection of Trees on Development Sites provide a tree protection zone (TPZ) and structural root zone (SRZ), expressed as a radius measurement from the trunk centre. The TPZ incorporates the SRZ. These measurements are calculated from trunk/stem size. When determining potential encroachment 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.

Structural Root Zone (SRZ)[1] and Tree Protection Zone (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 both tree stability and growth requirements. TPZ distances are measured as a radius from the centre of the trunk at ground level.



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

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: Tree Protection Methodology

Pre-works

1. An arborist (appointed arborist) experienced in tree protection methods, protocols and construction methodologies around trees, is to be engaged for the project.

2. Prior to works commencing, the consent holder is to arrange a pre-start meeting with the works principal, contractor, representatives of Council and the appointed arborist. The pre-start meeting is to identify:

    - Areas where the appointed arborist will need to be on site monitoring works. The expected work timings near the tree.
    - Work methodologies required.
    - Access to the site for vehicles and equipment and potential for storage of the equipment in relation to the tree.
    - Onsite audit recording method and final report requirements.

3. The stockpile area is to be identified and visually marked out prior to construction.

During works

4. Tree protection methodology amendments shall require approval from the appointed arborist.

5. Although not a requirement, the root zone of the tree should be fenced off to identify machine restricted areas.

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

7. Entry and exit to the site are to be through the existing accessway only.

8. All movement of trucks and excavators will be maintained on top of the existing spoil's footprint, which is to be demarcated with pegs.

9. Any movement or manoeuvring of machinery outside of the stockpile footprint and within the root zone of trees will be on top of load bearing boards.

10. The excavations will not be performed outside the 'toe' of the stockpile.

11. The final level will not be lower than the existing level outside the toe of the stockpile.

12. No pruning of trees will occur without the agreement of the onsite arborist.

Post works

13. Auditing reports are to be compiled by the appointed arborist and made available to Council if requested.

Appendix C: 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 J1.4.5 Protected root zone A

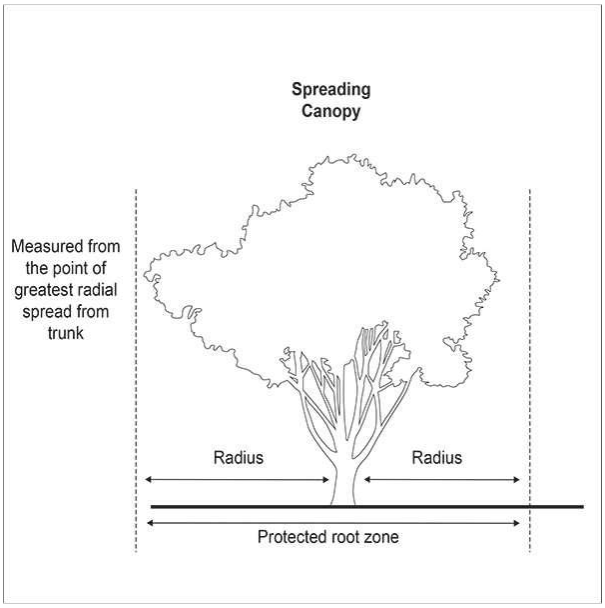
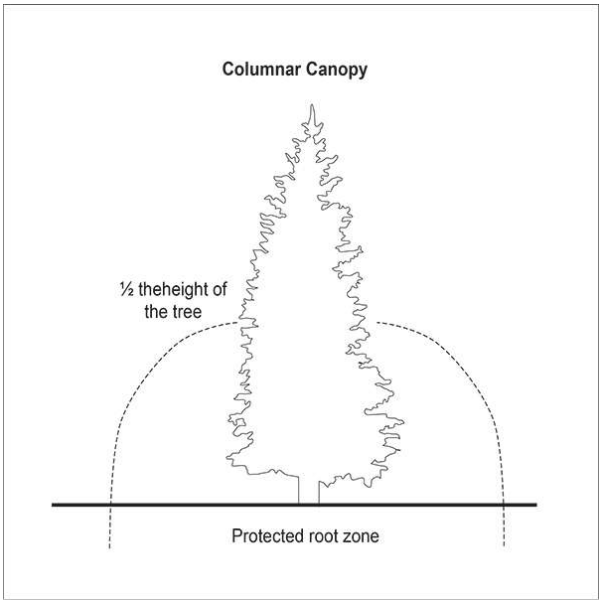
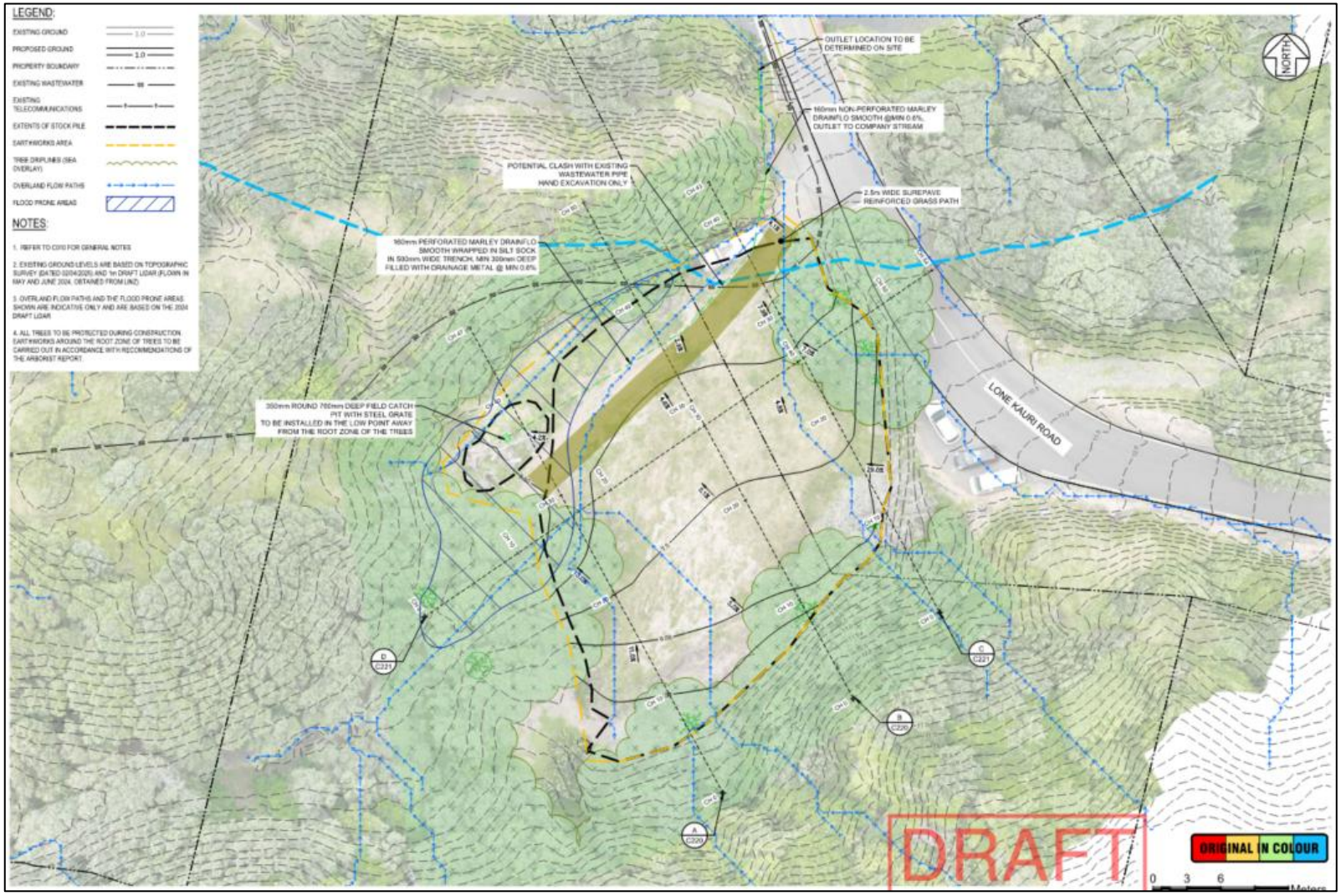
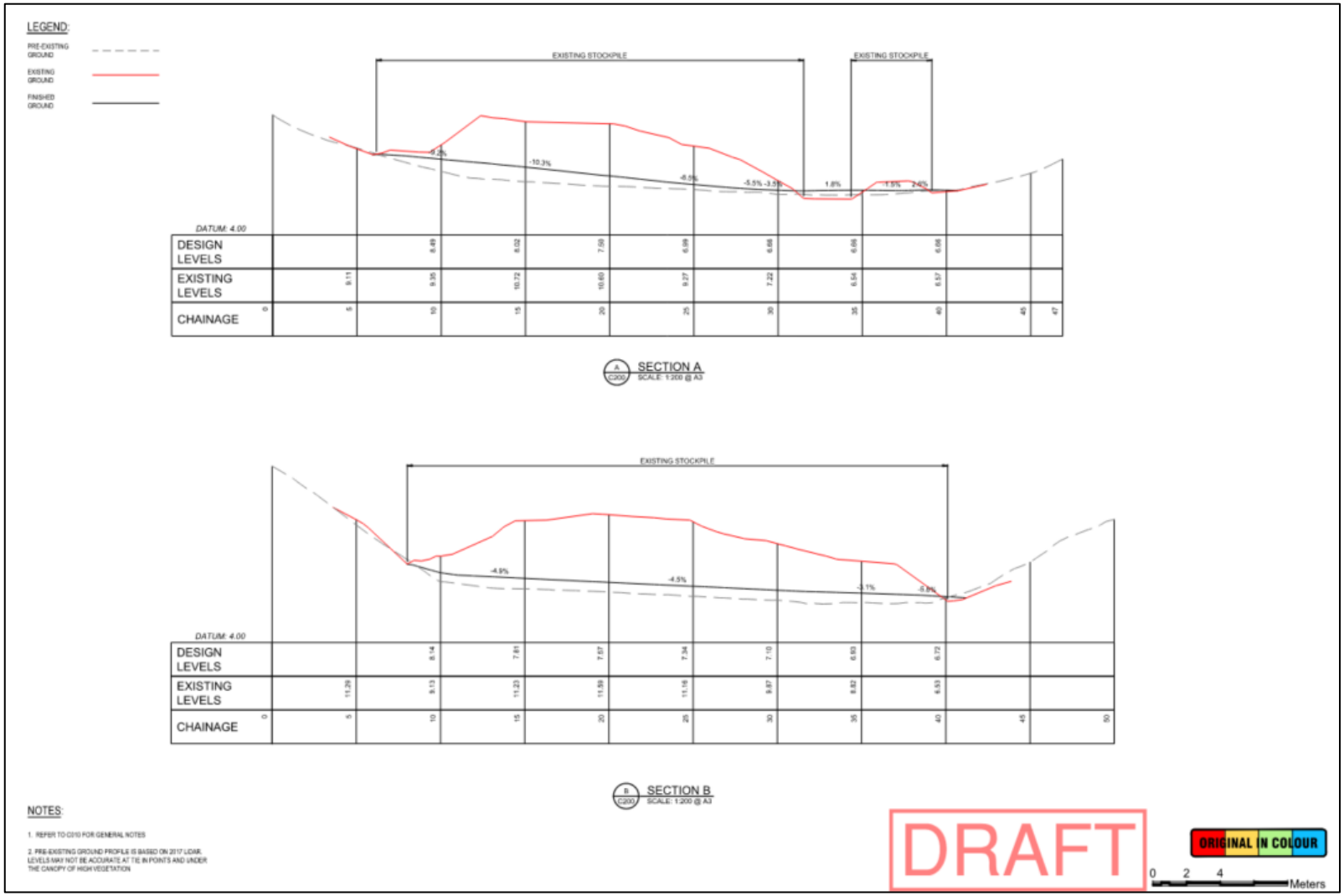


Figure J1.4.6 Protected root zone B



Appendix D: Stellar Plans

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EXISTING GROUND
FINISHED GROUND
EXISTING STOCKPILE
EXISTING STOCKPILE
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-10.3%
-6.5%
-5.5%
-3.5%
1.8%
1.5%
2.4%
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EXISTING LEVELS
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-4.5%
-3.1%
-5.8%
DATUM: 4.00
DESIGN LEVELS
EXISTING LEVELS
CHAINAGE
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SECTION B
SCALE: 1:200 @ A3
NOTES:
1. REFER TO C010 FOR GENERAL NOTES
2. PRE-EXISTING GROUND PROFILE IS BASED ON 2017 LIDAR. LEVELS MAY NOT BE ACCURATE AT TIE IN POINTS AND UNDER THE CANOPY OF HIGH VEGETATION
DRAFT
ORIGINAL IN COLOUR
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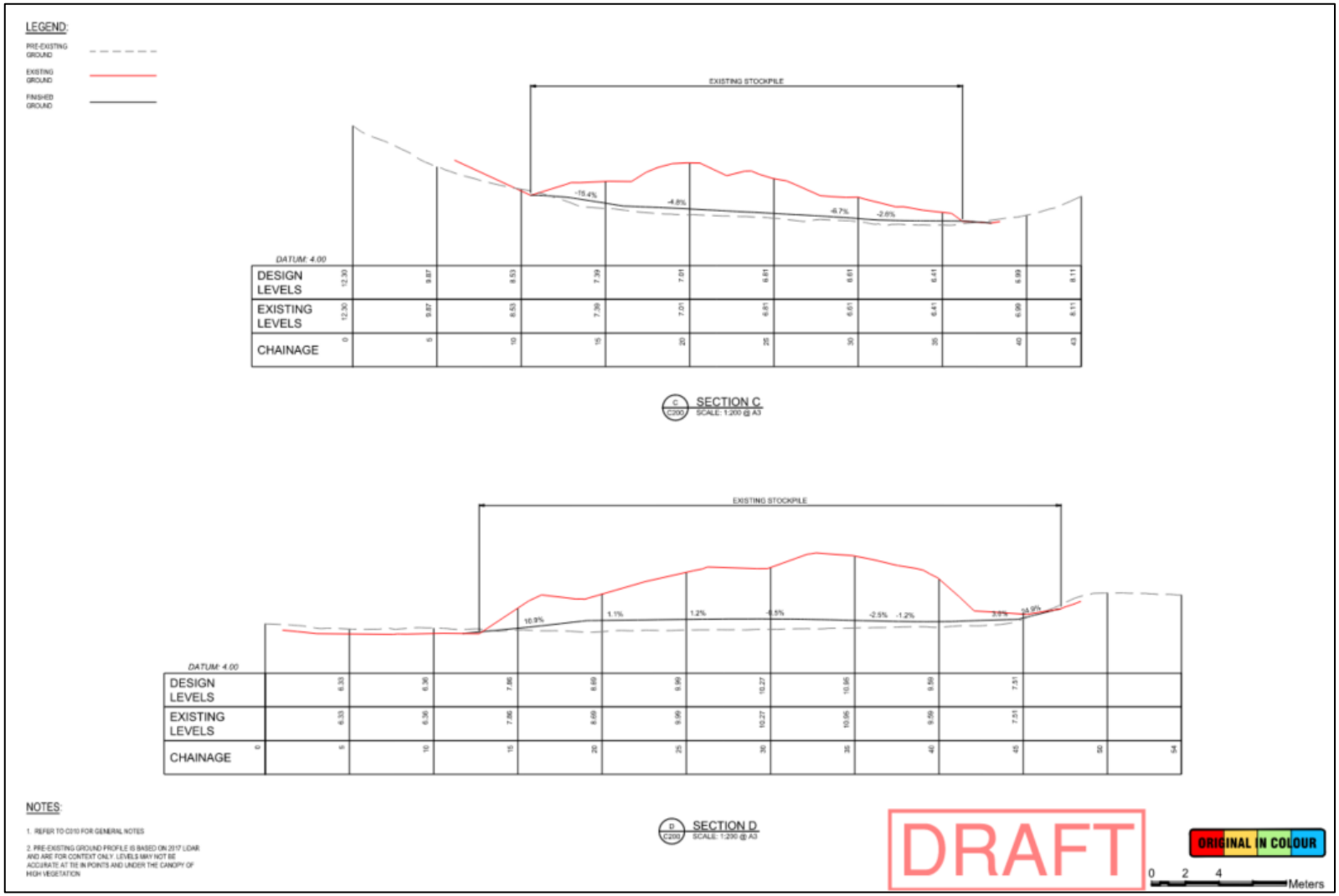
Meters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FINISHED GROUND
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CHAINAGE
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1.1%
1.2%
4.5%
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-1.2%
3.5%
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DATUM: 4.00
DESIGN LEVELS
EXISTING LEVELS
CHAINAGE
SECTION D
SCALE: 1:200 @ A3
NOTES:
1. REFER TO C010 FOR GENERAL NOTES
2. PRE-EXISTING GROUND PROFILE IS BASED ON 2017 LIDAR AND ARE FOR CONTEXT ONLY. LEVELS MAY NOT BE ACCURATE AT TIE IN POINTS AND UNDER THE CANOPY OF HIGH VEGETATION
DRAFT
ORIGINAL IN COLOUR
0 2 4
Meters