



WILLIS BOND

Proposed development at 110 Jervois Quay, Wellington

Arborist Report and Tree Protection Management Plan

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Brief: Assess the trees at the site and assess the effects of the proposed development. Provide tree root protection zones with design and construction constraints for working within each zone. In addition, provide an initial assessment of the feasibility of relocating some trees within the site.



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1. Introduction

- 1.1. Tend Trees Limited was instructed by Theresa Chang of Willis Bond, to inspect the trees at 110 Jervois Quay, Wellington. The purpose of the inspection was to capture basic tree information, provide root zones and assess the potential effects of the proposed development at the site and recommend construction methodologies to avoid adverse effects on the health and function of the trees to be retained.
- 1.2. In addition, a basic assessment of the feasibility of transplanting or relocating two trees within the site was carried out.
- 1.3. A Tree Protection Management Plan (TPMP) has been provided (refer to sections 18 and 19 of this report) to enable suitable proposals to be put forward for the protection of the retained trees and their roots during the proposed development.

2. Qualifications

- 2.1. I have been a practising arborist for 20 years and hold the following qualifications.

- Level 3 Technicians Certificate in Arboriculture
- BTEC National Diploma in Horticulture
- Quantified Tree Risk Assessment (QTRA - Advanced User)
- VALID Tree Risk Assessment
- ISA's Tree Risk Assessment Qualification (TRAQ)

3. Methodology and Limitations

- 3.1. The trees were inspected using the Visual Tree Assessment (VTA) method from ground level only. The root zone calculations and tree protection methodology are based on the Australian Standard (AS 4970 - 2009 Protection of Trees on Development Sites).
- 3.2. Measurement of trunk girths were taken using a conventional measuring tape. Tree height and canopy spread measurements were estimated using the surveyor's experience.
- 3.3. This report is based on the documentation provided and an assessment of each of the trees within the site.

4. The Site

- 4.1. The subject trees are in the car park at 110 Jervois Quay Street, Wellington. The site is roughly triangular and bordered on two sides by Wakefield Street and Jervois Quay. The third site boundary is the Michael Fowler Centre itself. The trees form boundary planting on the two road sides, with one large Pohutukawa (Tree 20) adjacent to the MFC building. The site itself is relatively flat and contains an existing temporary building, car park surfaces and low walls along the road boundaries. It can be considered a modified urban environment from an arboricultural perspective.

4.2. The trees and main site features can be seen in the aerial image following, Figure 1.



Figure 1: The site with trees and main features with approximate site boundary in red.

5. Proposal

5.1. The proposal is for a new base isolated commercial development. It comprises commercial office accommodation on upper levels with a range of ground floor tenancies, including café / food and beverage and other commercial spaces. The proposal also includes cross-site links, a significant area of curtilage landscape along with associated servicing infrastructure.

6. Tree Information

6.1. The following table is to be used in conjunction the arboricultural drawing in Appendix 1. The number plots in the drawing correspond to the numbering in Table 1.



Table 1: Tree Inventory.

Tree Number	Tree Species	Height (m)	CSR (m)	Form	Structure	Health	Age Class	TPZ Radius (m)	TPZ Area (m ²)	SRZ Radius (m)	SRZ Area (m ²)	Comments
1	<i>Metrosideros excelsa</i>	9	7	Good	Good	Good	Mature	10	315	3.95	49.02	Retain and protect.
2	<i>Metrosideros excelsa</i>	10.5	9	Good	Good	Good	Mature	13	531	4.24	56.48	Retain and protect.
3	<i>Metrosideros excelsa</i>	9	6	Good	Good	Good	Mature	7	154	3.38	35.89	Relocate.
4	<i>Metrosideros excelsa</i>	9	6	Good	Good	Good	Mature	7	154	3.78	44.89	Relocate. Additional stems - 450, 520, 410.
5	<i>Metrosideros excelsa</i>	8	7.5	Fair	Good	Good	Mature	9	255	3.81	45.6	Retain and protect.
6	<i>Metrosideros excelsa</i>	11	9	Fair	Good	Good	Mature	11	381	3.66	42.08	Retain and protect.
7	<i>Metrosideros excelsa</i>	11	8	Fair	Good	Good	Mature	10	315	4.49	63.33	Remove.
8	<i>Metrosideros excelsa</i>	12	8	Good	Good	Good	Mature	11	381	4.02	50.77	Retain and protect.
9	<i>Metrosideros excelsa</i>	14	11	Good	Good	Good	Mature	15	707	4.63	67.35	Retain and protect. Aerial roots prevented actual stem measurements. Suggest max of 15m is used based on tree age and size.
10	<i>Metrosideros excelsa</i>	9.5	7.5	Good	Good	Good	Mature	7	154	3.78	44.89	Remove.
11	<i>Alnus cordata</i>	7	3	Fair	Poor	Poor	Semi mature	2.45	18.86	1.87	10.99	Remove.
12	<i>Alnus cordata</i>	9	4.5	Good	Fair	Fair	Mature	4.58	65.9	2.39	17.95	Remove.
13	<i>Metrosideros excelsa</i>	9.5	7.5	Good	Good	Good	Mature	11	381	4.49	63.33	Remove.
14	<i>Metrosideros excelsa</i>	5.5	3.5	Fair	Good	Good	Semi mature	3	29	1.87	10.99	Relocation under consideration
16	<i>Fraxinus angustifolia</i> subsp. <i>oxycarpa</i>	5	4	Poor	Fair	Good	Semi mature	3	29	1.79	10.07	Remove. Storm damaged central leader.
17	<i>Fraxinus angustifolia</i> subsp. <i>oxycarpa</i>	5.5	3.5	Good	Good	Good	Semi mature	1.87	10.99	1.67	8.76	Relocation under consideration
18	<i>Metrosideros excelsa</i>	6	4	Good	Good	Good	Semi mature	4	51	2.07	13.46	Relocation under consideration
19	<i>Fraxinus angustifolia</i> subsp. <i>oxycarpa</i>	7	3.5	Good	Good	Good	Semi mature	2.34	17.2	1.79	10.07	Relocation under consideration
20	<i>Metrosideros excelsa</i>	9	11	Good	Good	Good	Mature			4.49	63.33	Retain and protect. Pruning required for new pathway. Two second order branches to remove. See photo.

Structural Root Zone (SRZ) - The SRZ is the area of root zone required for tree stability.

Tree Protection Zone (TPZ) - The TPZ is the area of root zone required or healthy tree function.

Crown Spread Radius (CSR) – The CSR is the greatest distal branch spread out from the centre of the canopy.

7. Arboricultural Concepts

Likely root spread

7.1. The image in Figure 2 shows the likely root spread of a tree growing in an open field environment, with no restrictions to root growth.



Figure 2: Tree Root Zone

7.2. It is important to note from Figure 2 that the majority of the tree's root zone is in the upper portion of the soil and spreads well beyond the tree's canopy or 'dripline'.

7.3. Trees in urban environments often have their root zones restricted by hard surfaces and structures. This needs to be considered when determining the TPZ or the effects of any proposed construction. As a general example, tree roots are unlikely to grow under road surfaces but will instead grow into the berms or neighbouring gardens.

7.4. The most effective way to ensure retained trees are protected during construction is to measure and understand the root zones around the trees and to physically mark the area clearly. This area is then monitored and supervised by a Works Arborist to ensure that no construction activity causes detrimental effects to retained trees. The following measurements are key to establishing these protected areas.

Tree Protection Zones (TPZ)

7.5. The Tree Protection Zone (TPZ) is an area where restricted activities apply to all contractors working on site. An arborist would consider the trees in their current location and establish the TPZ as a maximum encroachment distance without the supervision of a Works Arborist. This is a critical measure put in place to protect the tree parts most vulnerable to damage in a development environment, the roots, trunk, and branches.



7.6. The TPZ would need to be clearly defined and must be communicated to all contractors working on the site.

7.7. Work can be carried out within the TPZ, but under strict protocols agreed with the Works Arborist.

7.8. Table 1 shows the TPZ for each of the trees proposed to be retained and protected from construction activity.

Structural Root Zones (SRZ)

7.9. In addition to the TPZ, the Structural Root Zone (SRZ) should be considered. The SRZ is the area of root zone required for tree stability. In general, it is only calculated when major encroachments into the TPZ are proposed.

7.10. Table 1 also shows the SRZ for each of the trees. No work is to be carried out within the SRZ.

8. Transplanting Trees

8.1. Transplanting trees requires the relocation of the entire above ground parts of the tree, plus as large a root ball as possible. The ideal size of the root ball should be 10 to 12 times the diameter of the main stem measured at 1.4m from ground level. Different species have different tolerances to root removal and transplanting, so this could be reduced for certain trees, for example Pōhutukawa.

8.2. A successful transplant is also dependent on several other factors. These should all be investigated prior to any transplant being carried out. They are as follows.

- Health of tree
- Soil type and structure (Clay, sand, loam and number of rocks or large stones).
- Ground contours (flat, slight elevation, steep angle).
- Clear of services and freedom to excavate around the trees.
- Clear access into the site and room for safe operation of a Tree Spade, excavators and other machinery required to transplant the trees.
- The final location of these trees.
- Location of underground services at new site.
- Timing and methodology.
- Handling and temporary storage (if required).
- Irrigation and aftercare strategy

9. Key Limitations to transplants

9.1. There is always risk involved in relocating trees. All the above factors should be investigated and managed, but other factors such as pathogens, genetics and stress tolerance of individual trees

can result in decline or poor health. This cannot be totally avoided but can be mitigated by correct transplant and aftercare methodologies.

- 9.2. Root ball size is most likely the biggest factor when assessing the likely success of any transplant operation. A root ball of 10 to 12 times the diameter of the main stem measured at 1.4m from ground level needs to be achieved to ensure a successful transplant (Harris et al 2010). The root ball size is dependent on the tolerance of a particular species to root removal, so can be reduced to 8 times the diameter of the stems for Pohutukawa or other trees with a high degree of tolerance to root disturbance.
- 9.3. Additionally, the underlying soil structure cannot be fully understood. Upon starting to excavate and prepare the root ball of trees to be transplanted it might become evident that rocks or other underground structures mean the transplant is no longer feasible.

10. Transplant Methodology Outline

- 10.1. A trench is excavated around the root ball up to depth of around 600mm to 1m. Perpendicular to this trench a second trench is excavated, and a wire cable pulled underneath the root ball to sever any tap or sinker roots.
- 10.2. This can be limited by large quantities of rock or aggregate. If the cable cannot successfully undercut the root ball, then a larger adjacent area will need to be excavated to allow the thrusting of pipe or steel beams under the root ball to create a platform for lifting.
- 10.3. A lifting frame is then placed over the root ball and load binding straps or chains are used to secure the root ball in preparation for lifting. The tree is then lifted onto a trailer for transport or into its new location using a crane.
- 10.4. The following photograph 1 shows a tree with the excavation required and its root ball framed and ready for lifting.



Photograph 1. Tree framed and ready for lifting.



11. Securing the Transplanted Tree

- 11.1. When the transplanted tree is in its new location and placed in the required orientation. It is backfilled with quality soil containing a high content of organic compost. In general, trees should be secured in the ground. This 'guying' is most commonly carried out with an in-ground system.
- 11.2. The underground system typically consists of ground anchors placed under the root ball then strapped over the root plate. This means there are no unsightly aerial cables or trip hazards.
- 11.3. An above ground guying system can be used but also needs to be secured to the above ground portions of the tree as well as being a trip hazard and unsightly.
- 11.4. On occasion the root ball is large and heavy enough to mean securing the tree into the ground is not required.

12. Expert Contractors

- 12.1. Specialist advice from experienced tree transplanting contractors should be sought and their experience used when carrying out any tree transplant operation.

13. After Care

- 13.1. To maximise the likely success of any transplant operation an aftercare program should be developed. This should be inclusive of the following.
 - Soil moisture monitoring
 - Irrigation
 - Mulch, including regular top ups as required
 - Tree health monitoring
- 13.2. It is imperative that soil moisture levels be maintained after the transplant operation. Since the trees will have a reduced root mass because of the transplant operation, soil moisture levels in the new location must be monitored and maintained to ensure the trees survival.

14. Tree Protection during Transplanting

- 14.1. While it is acknowledged that tree roots will be removed, and branches pruned it is important to recognise that unintentional damage to the tree should be avoided.
- 14.2. This can be achieved through a tree transplant methodology being outlined and agreed to prior to any transplant operation. This should include, but not be limited to the following.
- 14.3. A Works Arborist should be appointed at the beginning of the project to ensure all tree work recommendations and the Tree Transplant Methodology are always adhered to



- 14.4. Any retained roots that are discovered but need to remain exposed for longer than 2 hours should be protected from drying out and mechanical damage. This can be done using moisture retaining materials such as hessian or wool mulch.

15. Arboricultural Assessment

- 15.1. When assessing the likely root spread of trees, it is important to consider the existing topography, any structures or existing infrastructure. This site is heavily modified and contains an existing building, car park surface, low walls, and underground infrastructure.
- 15.2. These modifications have likely led to restricted root growth of the trees at the site. The temporary ballet building is within the root zone of the trees at the site, as are the low walls and the majority of the trees root zones are covered in the existing car park surface.
- 15.3. The root zones for the trees have been provided and an assessment made of the effect of the proposed design on their root zones.
- 15.4. The following guidelines apply when assessing potential effects from a development on the health of trees to be retained:
- No excavation shall be undertaken within the Structural Root Zone (SRZ).
 - Any excavation must retain 90% of the Tree Protection Zone (TPZ).
 - The permeability of the soil (access to air and moisture) should not be altered by more than 20% of a TPZ.

Construction Constraints.

Within the TPZ, the following activities shall be avoided unless tree sensitive methods are used and approved by a works arborist:

- Excavation for silt fencing
- Cultivation of soil
- Storage of machinery, chemicals, or materials
- Preparation of chemicals, including concrete, cement etc.
- Parking of vehicles and machinery
- Refuelling of any kind including small machinery such as chainsaws
- Dumping of waste products
- Wash down and cleaning of equipment.
- Placement of fill
- Lighting of fires
- Soil level changes
- Temporary or permanent installation of utilities and signs
- Up to 10% of specific root pruning can be permitted but no damage shall be done to roots through machines and compaction etc. Further consideration should be given to root removal greater than 10% (existing underground infrastructure, species tolerance etc).



- 15.5. Trees 7, 10, 11, 12, 13, 14, 16, 17, 18 and 19 are proposed to be removed. These either fall within the proposed building footprint or in the case of Tree 7, the required root and canopy removal to allow building construction will be detrimental to the tree's health, so it is proposed to be removed.
- 15.6. The new building is proposed to be constructed within the root zone of Trees 2, 5, 6 and 8. Due to the highly modified nature of the site it is difficult to predict the root zone spread. However, an assessment of the effect of the proposed building on these trees has been made.
- 15.7. The excavation required within the TPZ of Tree 2 will require an incursion into the TPZ of approximately 8%, this will be for the construction of the foundation of the proposed pillar supporting the upper levels.
- 15.8. Within the TPZ of Tree's 5, 6 and 8 the following incursions into their root zones are proposed.
- Tree 5 – 23 to 24%
 - Tree 6 – 15%
 - Tree 8 – 20%
- 15.9. Pohutukawa are tolerant to root disturbance and pruning, therefore these amounts are within acceptable limits providing the remaining TPZ is protected from construction activities.
- 15.10. There are proposed changes to the ground surface within the TPZ of these trees, which will involve the removal of the existing asphalt and the installation of new paving. It is likely this new paving will be more permeable to gaseous and moisture exchange within the soil and therefore an improvement to the root zone of the trees in these areas.
- 15.11. It should also be noted that the existing temporary building is in approximate alignment with most of the proposed new building. It is likely there are no root or very few roots under the temporary building.
- 15.12. No work is proposed (except the relocation of tree 3) within the TPZ of Tree 9, however it will need to be protected from construction activity on the remainder of the site.
- 15.13. Tree 20 will require the realignment of the footpath within its root zone and some minor pruning to facilitate unimpeded pedestrian access. The pruning required is shown in the following photograph 2.



Photograph 2: Pruning required for Tree 20.

- 15.14. Trees 3 and 4 are proposed to be relocated within the site. Tree 4 is proposed to be placed between trees 6 and 8. Tree 3 is proposed to be placed between trees 8 and 9.
- 15.15. This will require the pruning of the canopies of the relocated trees, and those which they are proposed to be placed between. On site observation suggests this pruning is within the tolerance of the trees, however more detail measurements should be taken to determine the exact pruning requirement.
- 15.16. It should be noted that Tree 4 is essentially proposed to be relocated into a similar location to Tree 7 (which is proposed to be removed). There is therefore likely to be an existing gap between the canopies of Trees 6 and 8.
- 15.17. Both Trees 3 and 4 are in good condition, structurally sound and of a species that is tolerant to root pruning and therefore relocation.
- 15.18. No investigation of soil type, structure or condition has been carried out. However, depending on further investigation there appears to be enough space around the trees to achieve a large enough root ball for transplant/relocation.
- 15.19. There is likely to be a pruning requirement for height clearance for the building itself and to allow access for some construction vehicles (under strict protocols). Any pruning should be limited to second and third order branches. This should apply to all trees to be retained (Trees 1, 2, 3, 4, 5, 6, 8, 9 and 20).
- 15.20. The installation of underground services should also consider the root systems of the protected trees. This should be done either through trenchless methods or with the use of air excavations.



15.21. The construction methodology needs careful consideration. The Tree Protection Management Plan in sections 18 and 19 of this report outlines the factors to consider when carrying out any construction activity with the root zone of the trees.

16. Conclusion

16.1. It is proposed to construct a new building in the 110 Jervois Quay, Wellington. This requires excavations for the building foundations and underground infrastructure upgrades.

16.2. The trees at the site have been surveyed and the following are proposed to be removed – Trees 7, 10, 11, 12, 13, 14, 16, 17, 18, 19.

16.3. Trees 1, 2, 5, 6, 8 and 9 are proposed to be retained and protected from construction activity.

16.4. Trees 3 and 4 are proposed to be relocated within the site. An initial feasibility assessment suggests that this is possible. However, a full assessment should be carried out in line with sections 8 to 14 of this report.

16.5. To meet the proposed design and minimise the effects to the trees their root zones should be considered in both the design and construction phases of the project and work should be undertaken in accordance with the Tree Protection Management Plan set out in this document.

16.6. Tree root zones have been provided to allow the design to avoid the SRZ and create tree sensitive design within the TPZ. In addition, these root zones have been used to develop a tree sensitive construction methodology.

16.7. The project can be carried out without detrimental effects to the retained trees providing care is taken around their root zones.

16.8. The following recommendations will allow this work to be carried out without detrimental effects to the trees to be retained and should always be adhered to.

17. Recommendations

17.1. A full investigation into the feasibility of any tree relocation or transplant operation should be carried out in line with sections 8 to 14 of this report.

17.2. All physical tree work should be carried out by an arboricultural contractor that meets the clients' requirements, inclusive of health and safety, insurance and pruning standards.

17.3. The tree work should be in line with current industry best practice and the Minimum Industry Standards (MIS). The following non-exhaustive list of MIS documents should be followed:

- MIS300 - Safe Tree Work
- MIS303 Tree Dismantling 2nd ed.



- MIS308 - Tree Pruning
- MIS313 - Tree Health & Maintenance
- MIS315 Chainsaw Operation and Tree Felling

17.4. When carrying out tree pruning or removal, the arboricultural contractor shall take the necessary precautions to prevent injury to people, damage to property and the trees to be retained.

17.5. All physical tree work should be carried out by an NZARB approved contractor. A list of these contractors can be found here.

<https://www.nzarb.org.nz/find-an-approved-contractor>

17.6. The successful implementation of the project, while ensuring the health of the tree, depends on the strict adherence to the Tree Protection Management Plan, which should be followed throughout.

17.7. A Works Arborist should be appointed at the beginning of the project to ensure all tree work recommendations and the Tree Protection Management Plan (TPMP) are always adhered to.

18. Tree Protection Management Plan

18.1. Several tree protection measures should be employed to ensure the survival of the trees during the construction phase of the project. These measures can generally be divided into two types:

- Activities – construction work is managed and overseen by the Project or Works Arborist
- Structures – used to identify and isolate trees from construction activity and show the TPZ.

18.2. Some works within the TPZ will have already been authorised by the controlling authority, however additional encroachments or activities may arise as the works progress and will need to be reviewed by the Works Arborist and then accepted by the controlling authority.

18.3. To ensure changes and updates are recorded, a monthly arboricultural monitoring memorandum is required alongside an end of project arboricultural completion memorandum. This is to be provided by the Works Arborist.

18.4. The following check list should be implemented for effective tree protection during the construction phase:

- Pre-commencement meeting on-site. This should include the Works Arborist, Council's nominated arboricultural expert, the project manager and site foreman.
- The location of the protective fencing, if required, is to be determined by the Works Arborist before the start of any construction activity.



- The required ground protection measures are to be installed within the TPZ prior to the start of any construction activity.
- Any consent should be checked and adherence to its conditions ensured.
- Works Arborist should be on site during any works within the TPZ.
- Arboricultural monitoring memorandum provided at key project milestones.
- Arboricultural completion memorandum to be compiled at the end of the project.

Prohibited Activities within the Tree Protection Zone (TPZ)

18.5. The below list of activities will be prohibited within the TPZ, unless approved by the Works Arborist:

- Machine access and excavation excluding air vac for trenching for specified service placement.
- Excavation for silt fencing
- Cultivation of soil
- Storage of machinery, chemicals, or materials
- Preparation of chemicals, including concrete, cement etc.
- Parking of vehicles and machinery
- Refuelling of any kind including small machinery such as chainsaws
- Dumping of waste products
- Wash down and cleaning of equipment.
- Placement of fill
- Lighting of fires
- Soil level changes
- Temporary or permanent installation of utilities and signs
- Physical damage to the tree including its roots. This excludes specified pruning or pot holing for identified specific foundations.

Protective Fencing

18.6. Prior to the commencement of any construction work at the site, protective fencing should be installed. This includes before machinery or materials arrive. The protective fencing must remain in place unless approval is given by the Works Arborist to allow previously agreed upon works. Unless otherwise approved, the TPZ should always be protected.

18.7. The fencing should be sufficiently robust to exclude construction activities and deter accidental encroachment into the TPZ. It should also be suitable for the task(s) being carried out.

18.8. Signs should be affixed to the tree protection fencing. These signs should clearly identify the purpose of the fence and be visible from within the construction zone. The following Figure shows examples of the types of protective fencing that are sufficient.



Legend

- 1 – Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
- 2 – Alternative plywood or wooden paling fence paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
- 3 – Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind permitted within the TPZ.
- 4 – Bracing is permissible within the TPZ. Installation of supports should not damage roots.

Figure 2. Tree protective fencing from the Australian Standard.

18.9. Sometimes it is not possible to erect a fence, so all staff on site should be made aware of the TPZ and why they are not to encroach into this area.

19. Tree Protection Measures

19.1. When protective fencing cannot be installed or is required to be removed temporarily, the following tree protection measures should be used:

Ground Protection Measures

19.2. If temporary access is required within the TPZ then the ground will need to be protected. These measures need to ensure no soil compaction and root damage can occur and be permeable to moisture and gaseous exchange within the soil. The following are some examples that could be used:

- Plywood boards over a bed of mulch 100mm thick
- Track mats or similar over a bed of mulch 100mm thick



- Rumble boards over a bed of mulch or aggregate
- Steel plates or equivalent, with or without mulch.

19.3. Each of these methods should have a geotextile membrane under the mulch or aggregate.

19.4. If there is an existing hard surface within the TPZ then machinery can operate on that surface with the approval of the Works Arborist.

Root Protection during works within the TPZ

19.5. It may be necessary to work within the TPZ for some parts of the construction project. To ensure these can be carried out without detrimental effects to the trees to be retained, the Works Arborist should be onsite supervising these activities or carrying them out.

19.6. Any excavation within the TPZ should be carried out by a careful combination of hand, hydro or air excavation. Machine excavation can be used provided the above ground protection measures are used and is under the supervision of the Work's Arborist.

19.7. Any roots encountered during excavations should be retained where possible or pruned under the supervision of the Works Arborist and done so cleanly back to the edge of the excavation using sharp pruning tools. Any pruned roots should be covered to prevent them drying out during the construction phase and back filled with the original material.

19.8. Any proposed pile locations should first be probed and/or excavated by hand, hydro or air to check for the presence of roots. These roots should be pruned at the discretion of the Works Arborist to the edge of the excavation.

19.9. Any retained roots that are discovered but need to remain exposed for longer than 2 hours should be protected from drying out and mechanical damage. This can be done using moisture retaining materials such as hessian in combination with a protective layer such as nova coil.

19.10. If large areas of roots are to be left exposed, then a protective layer of mulch and/or geofabric should be used to ensure the roots and surrounding soil remain moist.

19.11. If concrete is proposed to be poured adjacent to retained roots within an excavation, then those roots should be protected from contact with the concrete by a protective layer, such as polythene.

19.12. If it is necessary to pour concrete or asphalt over exposed roots, a protective layer should be placed between the roots and poured material. This protective layer can be sand (no less than 80mm thick) or a geotextile sufficient to protect the roots.

Installation of services

19.13. If services are required to be installed within the TPZ, they should be installed in such a way as to minimise root disturbance. This can be done by trenchless methods such as directional drilling or thrusting, or by the careful hand or air excavation of any service trench.



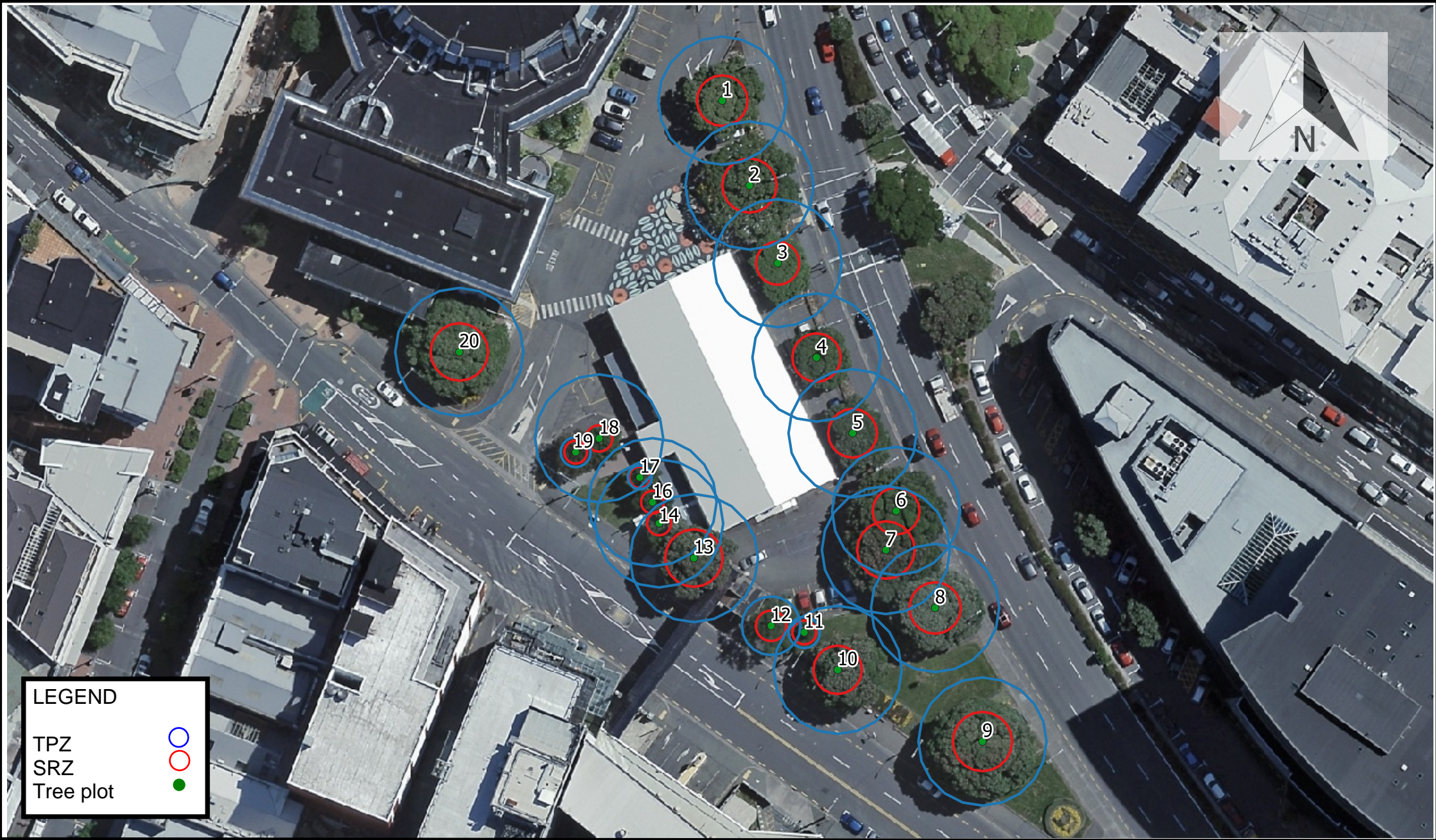
19.14. Trenchless methods should be at a depth of at least 1500mm, preferably deeper. Any entry and exit pits, test pits, or bore pit locations should be assessed for their likely effect on the roots of the trees to be retained.

20. Appendices

20.1. Appendix 1 – Arboricultural Site Drawing

20.2. Appendix 2 - SK220127 _ TREE PLAN WITH AERIAL

20.3. 20.3 Appendix 3 - SK 220216 _tpz-00 – TREE PLAN WITH TPZs



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Michael Fowler Centre,
Car Park

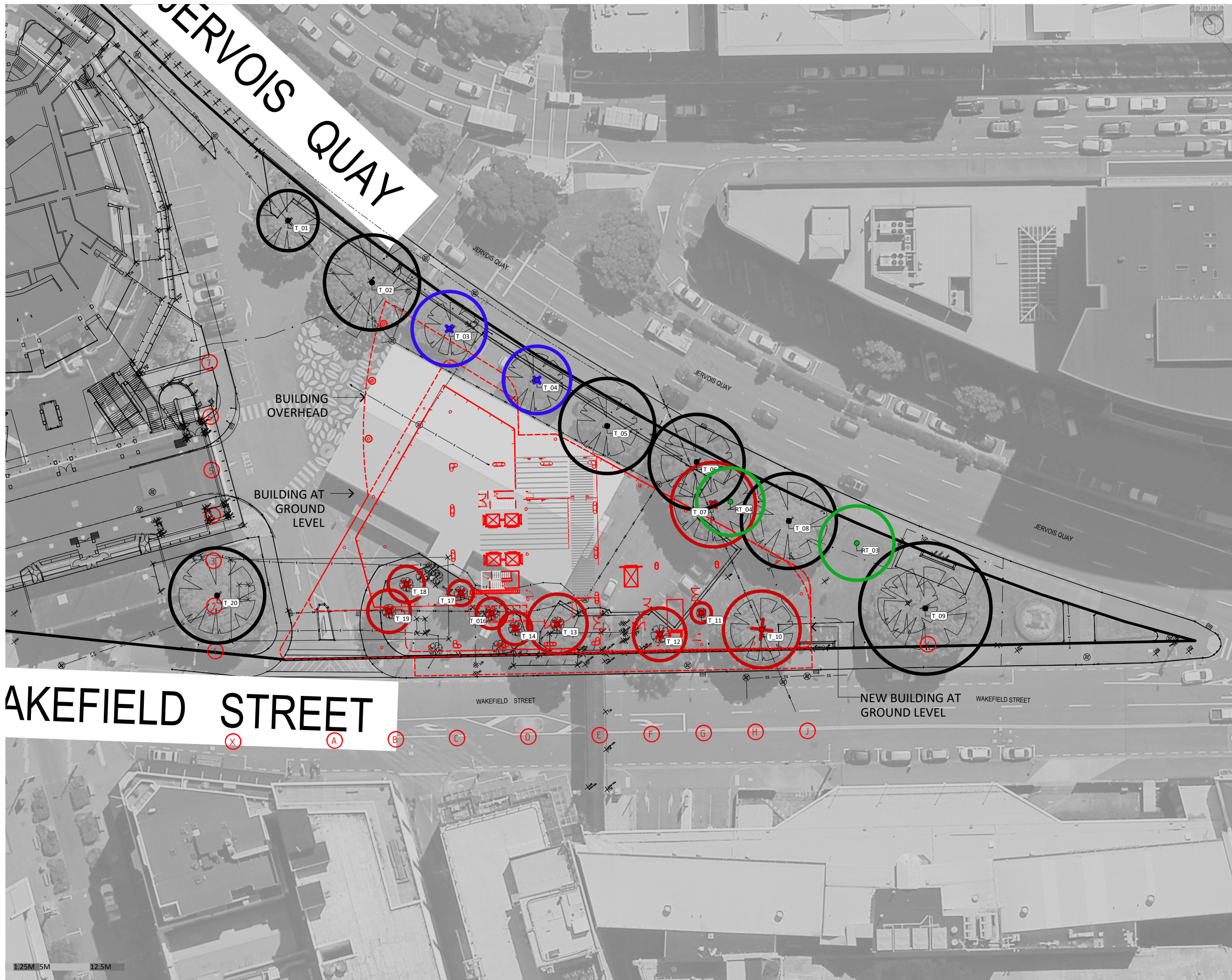
Tree Inventory

Plotted
Date





Plotted by

10/02/22

DS



EXISTING TREE PLAN | 1:250

-  TREE RETAINED
-  TREE TO BE RELOCATED
-  RELOCATED TREE
-  TREE TO BE REMOVED

DRAFT

NOT FOR CONSTRUCTION

issue: amendment: date:
 A STRUCTURAL COORD 27.10.21

DO NOT SCALE DRAWING.

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drawing title:
**EXISTING
 TREE SKETCH**

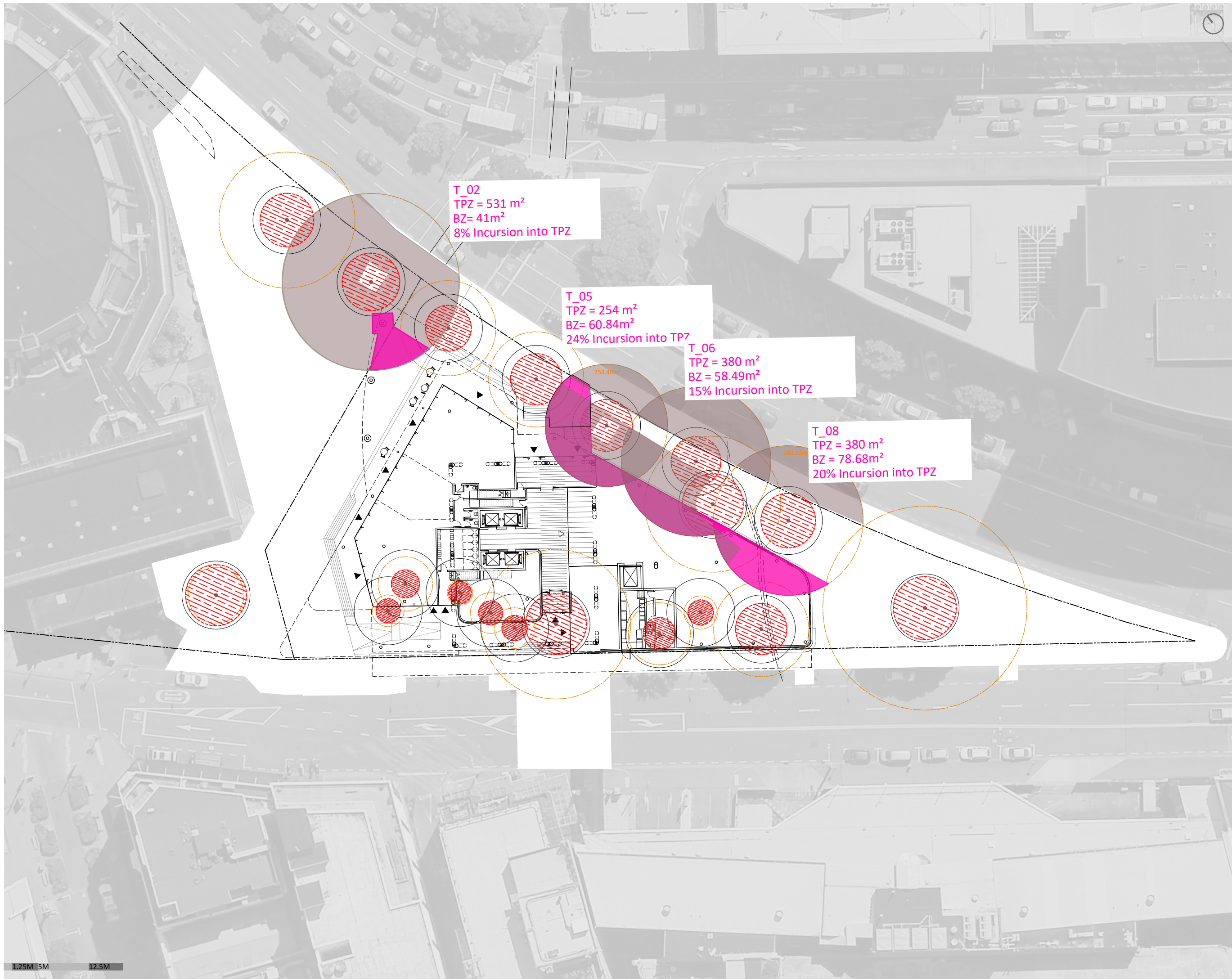
scale:
 1:250 @ A1, 1:500 @ A3
 date:
 27.01.2021





drawing no.
SK220128

project name
**MFC Car Park
 Development**

project phase. project no.
**PRELIMINARY 2114
 DESIGN**

client:
WILLIS BOND



-  STRUCTURAL ROOT ZONE
-  TREE PROTECTION ZONE
-  BUILDING ZONE (BZ)
-  EXISTING COMPACTED HARD SURFACES

T_02
 TPZ = 531 m²
 BZ = 41m²
 8% Incursion into TPZ

T_05
 TPZ = 254 m²
 BZ = 60.84m²
 24% Incursion into TPZ

T_06
 TPZ = 380 m²
 BZ = 58.49m²
 15% Incursion into TPZ

T_08
 TPZ = 380 m²
 BZ = 78.68m²
 20% Incursion into TPZ

DRAFT

NOT FOR CONSTRUCTION

issue: A amendment: REVISED T02 date: 24.02.22

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drawing title:
**TREE PROTECTION
 ZONE (TPZ)**

scale:
 1:250 @ A1, 1:500 @ A3
 date:
 16.02.2022

drawing no.
SK220216

project name
**MFC Car Park
 Development**

project phase. project no.
 PRELIMINARY 2114
 DESIGN

client:
 WILLIS BOND