Arboricultural Impact Assessment

Figure 1 Trees 1 – 10 on the adjoining site

Site Address: Lot 33, DP 1078910, fronting 46 Fitzroy & 65 Denison St's Carrington

Client: Ramboll Australia Pty Ltd

Date: February 2021

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1.0 Summary

Accurate Tree Assessment has been commissioned by Ramboll Australia Pty Ltd on behalf of Port of Newcastle (the client) to provide an arboricultural impact assessment for trees located on and adjoining the site at Lot 33, DP 1078910, fronting 46 Fitzroy & 65 Denison St's Carrington (the site) where it is proposed to construct a new commercial development.

Thirty-four (34) trees have been assessed using the Visual Tree Assessment Method (VTA) developed by Matheny and Clark, 1994 and having regard for the provisions of The Australian Standard AS4970-2009, 'Protection of Trees on Development Sites'.

Conclusions

Retention of trees along the Southern property boundary will require the implementation of revised work methods and tree protection measures meeting the requirements of AS4970-2009, Protection of Trees on Development Sites' as detailed at section 9.0 and 9.1 of this report.

Tree 9A which is located within the proposed driveway access and, Trees 25A and 27 which are exempt from Council's protection due to their small size are proposed for removal in conjunction with the development of the site.

Trees 3, 4, 9 and 15 which are located on the adjoining site appear in poor form or declining condition and are not considered suitable for retention due to their declining condition.

The remaining twenty-seven trees will be subject to levels of encroachment ranging from Nil to 43% of the respective Tree protection Zones and up to 28% of the Structural Root Zones and will require the implementation of amended design and tree sensitive work practices to ensure their successful retention.

Council may require the engagement of a project arborist to certify tree protection measures and oversee works within the TPZ of retained trees.

Recommendations

Tree 9A *Phoenix canariensis* cannot be accommodated in the current design of the driveway access into the site and is recommended for removal subject to the provision of compensatory planting of one standard tree in accordance with section 4.3 of Newcastle Technical manual Urban Forest, 2018.

That Trees 3 *Eucalyptus punctata*, 4 *Melaleuca armillaris*, 9 *Eucalyptus saligna*, 15 *Eucalyptus sideroxylon*, meet several of the tree assessment tests detailed in Section 4 of Newcastle Technical manual Urban Forest, 2018 and could be considered for removal under a complying development application for tree removal.

That Trees 9A *Phoenix canariensis,* 25A *Olea europaea* and 27 *Archontophoenix cunninghamina* are removed in conjunction with the proposed development of the site.

That the remaining twenty-seven trees are retained and protected for the duration of the project by:

implementing an amended design that increases the setback along the Southern boundary to 2.5 metres,
the use of permeable paving within the TPZ of all retained trees

That all tree protection measures are to be implemented prior to the commencement of any site works.

That tree works are undertaken by a suitably qualified and insured contracting arborist in accordance with AS4373-2007 Pruning of Amenity trees and The Code of Practice for Amenity Tree Work 2013.

2.0 Disclaimer

This report is to be read and considered in its entirety. The subject trees were inspected from the ground using Visual Tree Assessment methodology, no aerial investigations; underground or internal investigations were undertaken. It is the responsibility of the client to implement all recommendations contained in this report

The assessment is made having regard for the prevailing site conditions; and does not account for the effects that extreme weather events may have on trees.

Information contained in this report reflects the condition of the trees at the time of the inspection. As trees are living organisms their condition will change over time, there is no guarantee that problems or deficiencies of the subject trees may not arise in the future. It must be accepted that living near trees involves some level of risk.

No investigation into heritage significance or the presence on the site of threatened or endangered species of shrubs, groundcovers, grasses, herbs or orchids has been undertaken.

This report is for the use of Ramboll Australia PTY Ltd, and the Port of Newcastle to assist in determining the tree management measures to be undertaken in conjunction with the proposed development of the site. Distribution to other parties is not permitted except with the express permission of the author, Ian Hills.

3.0 Brief

Accurate Tree Assessment has been commissioned by Ramboll Australia Pty Ltd on behalf of Port of Newcastle (the client) to provide an arboricultural impact assessment for trees located on and adjoining the site at Lot 33, DP 1078910, fronting 46 Fitzroy & 65 Denison St's Carrington (the site) where it is proposed to construct a new commercial development.

4.0 Method

A ground-based site inspection was carried out on 5 February 2021.

The assessment of the trees was made using Visual Tree Assessment (VTA) procedure (Matheny & Clark, 1994), (Mattheck & Breloer, 2004) having regard for the provisions of The Australian Standard AS4970-2009.

Tree height was determined using a Nikon Forestry Pro™ laser hypsometer. Tree dimensions have been measured using a standard arboricultural diameter tape.

Sounding of some trunks was carried out using a Thor®710 soft faced hammer. The canopy structure was examined using binoculars from ground level.

Trees have been identified and tagged with each allocated a reference number will be used as reference throughout this report.

4.1 Reference Documents

The following documents have been used as reference in the preparation of the report:

- State Environmental Planning Policy (Three Ports) 2013. Part 5, section 29 '*Preservation of Trees and Vegetation*'

- Newcastle Development Control Plan, 2018 section 5.03 Vegetation Management

- Newcastle Urban Forest Technical Manual, 2018

- The Australian Standard AS4970-2009, '*Protection of Trees on Development Sites*' (AS 4970-2009)

- The Australian Standard 4373-2007 '*Pruning of Amenity Trees*' (AS 4373-2007)

- Workcover NSW, 1998 Amenity Tree industry Code of Practice.

- Existing Site Plan prepared by Rainsford Architecture and Design, Project No. 2020-116, Dwg A-004, Revision I, dated 15 December 2020 (Appendix 12.2)

- Concept Site Plan prepared by Rainsford Architecture and Design, Project No. 2020-116, Dwg A-100, Revision I, dated 15 December 2020 (Appendix 12.3)

5.0 Site Conditions

Trees located on the adjoining site outside the Southern boundary are mainly native species and appear to have been planted during the landscaping of that site.

The subject trees are proposed for retention in accordance with the objective of State Environmental Planning Policy (Three Ports) 2013. Part 5, section 29 'Preservation of Trees and Vegetation' which …' *is to preserve the amenity of the area, including biodiversity values, through the preservation of trees and other vegetation"* Notwithstanding the above development consent is not required for pruning or removal of trees within the lease area (in which the property is situated) as detailed in SEPP (Three Ports) 2013. Part 5, section 30 '*Other Trees or Vegetation'*

According to data from the Office of Environment and Heritage the soil landscape is mapped as Disturbed Terrain - 9131xx, which has the following characteristics:

> *"Landscape—level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Local relief and slopes highly variable. Landfill includes soil, rock, building and waste materials. Original vegetation completely cleared, replaced with turf or grassland.*
>
> *Soil—highly variable.*
>
> *Limitations—highly variable depending on the site. Limitations may include mass movement hazard, steep slopes, foundation hazard, unconsolidated low wet bearing strength materials, impermeable soils, poor drainage, erosion hazard, very low fertility and toxic materials."* (NSW Environment and Heritage, 2021)

The subject trees are adapted to the local soil conditions which is indicated by the size of the Iron-barks and Blue Gums which have reached their landscape potential in most cases.

According to climate data from the Nobbys AWS, which is approximately 3 kilometres from the site, the district experiences prevailing winds from the North-west, with infrequent occurrences of winds above 60km/h (Willy Weather, 2020). The subject trees are exposed in these directions due to their height and the open terrain.

Figure 2 Aerial Photomap (Sixmaps, 2021)

6.0 Tree Assessment

No	Common Name	Species	DBH (M)	TPZ (M)	SRZ (M)	HEIGHT (M)	SPREAD (M)	Vigour	Age Class	SULE	Comments
1	Bangalay	*Eucalyptus botryoides*	0.37	4.44	2.41	18	9	G	M	2A	Adjoining site, 4.5m from boundary
2	Moreton Bay Fig	*Ficus macrocarpa*	0.57	6.84	3.01	10	10	G	M	1A	Adjoining site, 0.7m from boundary
3	Grey Gum	*Eucalyptus punctata*	0.45	5.4	2.37	7	0	DEAD	OM	4A	Adjoining site, 2.2m from boundary
4	Honey Myrtle	*Melaleuca armillaris*	0.12	2.0	1.68	3	2	AV	M	3A	Adjoining site, 1.0m from boundary
5	Wallangarra White Gum	*Eucalyptus scoparia*	0.15	2.0	1.68	7	4	AV	M	2A	Leans on boundary fence
6	Lemon Scented Gum	*Corymbia citriodora*	0.28	3.36	2.25	15	6	G	SM	1A	Adjoining site, 0.5m from boundary
7	Lemon Scented Gum	*Corymbia citriodora*	0.1	2.0	1.68	5	3	G	J	1A	Adjoining site, 1.5m from boundary
8	Wallangarra White Gum	*Eucalyptus scoparia*	0.43	5.16	2.53	16	9	AV	M	2A	Adjoining site, 1.5m from boundary
9	Sydney Blue Gum	*Eucalyptus saligna*	0.67	8.04	3.01	20	15	G	F	3A	Extensive borer damage, adjoining site 0.5m from boundary
9A	Canary Is. Date Palm	*Phoenix canariensis*	0.3	3.6	2.25	3	4	G	J	5A	On subject site, 0.5m inside boundary
10	Mugga Ironbark	*Eucalyptus sideroxylon*	0.33	3.96	2.30	12	7	G	M	1A	Adjoining site, 1.9m from boundary
11	Mugga Ironbark	*Eucalyptus sideroxylon*	0.1x 2	2	1.68	3	2	J	J	5A	Adjoining site, 1.0m from boundary
12	Mugga Ironbark	*Eucalyptus sideroxylon*	0.36	4.32	2.39	12	7	M	M	1A	Adjoining site, 1.0m from boundary
13	Mugga Ironbark	*Eucalyptus sideroxylon*	.1 x 5	2.64	2.05	4	3	G	J	5A	Adjoining site, 1.0m from boundary
14	Mugga Ironbark	*Eucalyptus sideroxylon*	0.84	10.08	3.22	20	18	G	M	1A	Adjoining site, 0.3m from boundary
15	Mugga Ironbark	*Eucalyptus sideroxylon*	0.3	3.6	2.25	10	6	AV	M	3A	Suppressed, adjoining site, 1.1m from boundary
16	Bangalay	*Eucalyptus botryoides*	0.32	3.84	2.37	14	10	G	M	1A	Adjoining site, 1.1m from boundary
17	Lemon Scented Gum	*Corymbia citriodora*	0.11	2.0	1.68	7	1	G	J	1A	Adjoining site, 1.2m from boundary
18	Sydney Blue Gum	*Eucalyptus saligna*	0.44	5.28	2.57	20	9	G	M	2A	Adjoining site, 0.6m from boundary
19	Bangalay	*Eucalyptus botryoides*	0.5	6	2.67	16	9	F	M	3A	Suppressed, adjoining site, 1.0m from boundary

No	Common Name	Species	DBH (M)	TPZ (M)	SRZ (M)	HEIGHT (M)	SPREAD (M)	Vigour	Age Class	SULE	Comments
20	Spotted Gum	*Corymbia maculata*	0.15	2.0	1.85	8	4	AV	SM	3A	Suppressed, adjoining site, 1.0m from boundary
21	Wallangarra White Gum	*Eucalyptus scoparia*	0.7	8.4	3.01	20	12	AV	M	2A	Nest in Northern canopy, adjoining site, 0.9m from boundary
22	Grey Gum	*Eucalyptus punctata*	0.75	9	3.17	22	19	G	M	1A	Adjoining site, 1.0m from boundary
23	Weeping Paperbark	*Melaleuca leucodendron*	0.42	5.04	2.47	11	6	G	SM	1A	Adjoining site, 2.3m from boundary
24	Sydney Blue Gum	*Eucalyptus saligna*	0.64	7.68	2.93	22	10	AV	M	3A	Extensively pruned, lower branches removed, adjoining site 0.8m from boundary
25	Spotted Gum	*Corymbia maculata*	0.22	2.64	2.00	7	4	G	SM	1A	Adjoining site, 1.1m from boundary
25A	Olive	*Olea europaea*	0.1	2.0	1.68	4	4	AV	SM	3A	Invasive species, exempt due to small size
26	Spotted Gum	*Corymbia maculata*	0.34	4.08	2.25	8	6	G	SM	1A	Adjoining site, 2.0m from boundary
27	Bangalow palm	*Archontophoenix cunninghamiana*	0.1	2.0	1.68	3	2	G	J	5A	On subject site, 1.0m inside boundary
28	Tuckeroo	*Cupaniopsis anacardiodes*	0.33	3.96	2.37	4	5	G	M	1A	Located on road reserve, 2.3m outside boundary
29	Tuckeroo	*Cupaniopsis anacardiodes*	0.37	4.44	2.41	4	4	G	M	1A	Located on road reserve, 2.3m outside boundary
30	Tuckeroo	*Cupaniopsis anacardiodes*	0.26	3.12	2.15	3	2	F	M/OM	3A	Stunted, located on road reserve, 2.3m outside boundary
31	Tuckeroo	*Cupaniopsis anacardiodes*	0.47	5.64	2.47	4	5	G	M	1A	Located on road reserve, 2.3m outside boundary
32	Tuckeroo	*Cupaniopsis anacardiodes*	0.37	4.44	2.41	4	5	G	M	1A	Located on road reserve, 2.3m outside boundary

DBH – Trunk diameter at 1.4 metres

Vigour - P = Poor, F = Fair, Av = Average, G =Good

TPZ = Tree Protection Zone (calculated in accordance with AS4970)

SRZ = Structural Root Zone (calculated in accordance with AS4970)

Age class – J = Juvenile, SM =Semi-mature M = Mature, OM= Over mature

SULE = (Barrel, J -1995) see appendix 12.1

7.0 Tree Retention Value

No.	Species	Health and Vigour	Condition	Suitability	Sustainability	Landscape rating	Retention Value	Proposed Encroachment level	Proposal
1	*Eucalyptus botryoides*	Good	Good	High	15-40 years	2	High	Nil	Retention
2	*Ficus macrocarpa*	Good	Good	Medium	40+ years	2	Moderate	36% TPZ 19% SRZ	Retention
3	*Eucalyptus punctata*	Dead	Poor	Low	<5 years	4	Very low	N/A	Possible removal
4	*Melaleuca armillaris*	Average	Fair	Medium	5-15 years	3	Moderate	2% TPZ	Possible removal
5	*Eucalyptus scoparia*	Average	Good	High	15-40 years	3	Moderate	25%TPZ 20%SRZ	Retention
6	*Corymbia citriodora*	Good	Good	High	40+ years	2	Moderate	26%TPZ 15%SRZ	Retention
7	*Corymbia citriodora*	Good	Good	High	40+ years	2	Moderate	Nil	Retention
8	*Eucalyptus scoparia*	Average	Good	High	15-40 years	3	High	22%TPZ 2%SRZ	Retention
9	*Eucalyptus saligna*	Good	Average	Medium	5-15 years	3	High	39%TPZ 23%SRZ	Possible removal
9A	*Phoenix canariensis*	Good	Good	Medium	40+ years	4	Moderate	27%TPZ 15%SRZ	Removal
10	*Eucalyptus sideroxylon*	Good	Good	High	40+ years	3	Moderate	11%TPZ	Retention
11	*Eucalyptus sideroxylon*	Good	Good	High	40+ years	3	High	2%TPZ	Retention
12	*Eucalyptus sideroxylon*	Good	Good	High	40+ years	2	High	24%TPZ 7%SRZ	Retention
13	*Eucalyptus sideroxylon*	Good	Good	High	40+ years	3	High	10%TPZ 2%SRZ	Retention
14	*Eucalyptus sideroxylon*	Good	Good	High	40+ years	2	High	43%TPZ 28%SRZ	Retention

No.	Species	Health and Vigour	Condition	Suitability	Sustainability	Landscape rating	Retention Value	Proposed Encroachment level	Proposal
15	*Eucalyptus sideroxylon*	Average	Fair	High	5-15 years	4	Low	18%TPZ 3%SRZ	Possible removal
16	*Eucalyptus botryoides*	Good	Good	High	40+ years	3	Moderate	20%TPZ 11%SRZ	Retention
17	*Corymbia citriodora*	Good	Good	High	40+ years	3	Moderate	Nil	Retention
18	*Eucalyptus saligna*	Good	Good	High	15-40 years	3	Moderate	33%TPZ 17%SRZ	Retention
19	*Eucalyptus botryoides*	Fair	Fair	High	5-15 years	4	Moderate	31%TPZ 10%SRZ	Retention
20	*Corymbia maculata*	Average	Fair	High	5-15 years	4	High	2%TPZ <1%SRZ	Retention
21	*Eucalyptus scoparia*	Average	Good	High	15-40 years	2	High	34%TPZ 9%SRZ	Retention
22	*Eucalyptus punctata*	Good	Good	High	40+ years	2	High	28%TPZ	Retention
23	*Melaleuca leucodendron*	Good	Good	High	40+ years	2	High	1%TPZ	Retention
24	*Eucalyptus saligna*	Average	Average	High	5-15 years	3	High	23%TPZ	Retention
25	*Corymbia maculata*	Good	Good	High	40+ years	2	High	Nil	Retention
25A	*Olea europaea*	Average	Fair	Low	5-15 years	4	Moderate	Nil	Removal
26	*Corymbia maculata*	Good	Good	High	40+ years	2	High	Nil	Retention
27	*Archontophoenix cunninghamiana*	Good	Good	High	40+ years	2	High	Nil	Removal
28	*Cupaniopsis anacardiodes*	Good	Good	High	40+ years	2	High	32%TPZ 21%SRZ	Retention
29	*Cupaniopsis anacardiodes*	Good	Good	High	40+ years	2	High	34%TPZ 21%SRZ	Retention

No.	Species	Health and Vigour	Condition	Suitability	Sustainability	Landscape rating	Retention Value	Proposed Encroachment level	Proposal
30	*Cupaniopsis anacardiodes*	Fair	Fair	High	5-15 years	4	Low	23%TPZ 18%SRZ	Retention
31	*Cupaniopsis anacardiodes*	Good	Good	High	40+ years	2	High	37%TPZ 22%SRZ	Retention
32	*Cupaniopsis anacardiodes*	Good	Good	High	40+ years	2	High	34%TPZ 21%SRZ	Retention

Vigour – based on production of new growth and wound occlusion E = Excellent, G = Good, Av = Average, P = Poor, F = Fair.
Condition – based on structural faults or diseases or provides comparison to an archetypal example of the species.
Suitability - High = adequate space to accommodate future growth and growing conditions suited to the species, Medium = inadequate space and good growing conditions, Low = inadequate space and poor growing conditions.
Retention Value – combines Landscape significance and sustainability to rank the trees value (Refer Appendix 12.5)
Landscape Rating – refer to Appendix 4.1 of NUFTM Table 2 (pages 16,17)

8.0 Development impact

All parts of a tree may be damaged by construction activities, and the effects of damage are often cumulative meaning that seemingly minor damage to the tree can have adverse effects that may not become apparent until well after the project has been completed.

Crown damage often occurs when machinery impacts branches of the tree resulting in a loss of foliage. As the foliage is where the tree produces the sugars required for healthy growth it therefore stands to reason that any loss of foliage will affect the trees ability to function normally.

In addition, when branches are torn or improperly pruned the trees ability to recover is affected and pathogens that cause wood decay or disease have an increased opportunity to penetrate the trees natural defenses.

Trunk damage is usually caused by mechanical impact, and again wounding predisposes the tree to infection by pathogens.

Root damage is the most common cause of damage to trees on development sites, and often has the most serious effects as it commonly goes un-noticed for some time. Damage can be caused by mechanical factors such as tearing during excavation, as well as factors such as chemical contamination, changes in hydrology and altering gaseous exchange rates by filling, and compaction during movement of equipment.

Australian Standard 4970, *Protection of Trees on Development Sites* was adopted in 2009 to provide Arborists and the construction industry with a guide to assist in the preservation of retained trees on all types of development sites.

To assist professionals working to protect trees the Standard proposes the following:

> "Tree Protection Zone - A specified area above and below ground level at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.
>
> *Structural Root Zone – The area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres.*
>
> *This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be much larger."* (Ref. AS4970-2009)

Minor encroachment of the TPZ is sometimes unavoidable and at levels less than 10% of the total TPZ area can be tolerated if there is scope to increase the area of the TPZ contiguously about the unaffected perimeter. Where encroachment exceeds 10% further investigation will be required to determine the measures required to offset the incursion. Encroachment of the SRZ is not recommended as tree health, condition and stability will almost certainly be adversely affected.

9.0 Discussion

Although the subject trees are not subject to the provisions of Newcastle City Development Control Plan 2012 (NDCP) section 5.03 the proponent acknowledges the objectives of the DCP and proposes the retention of trees wherever possible in conjunction with the development of the site.

The subject site is approximately 8600m² is zoned SP1 Special Activities and is owned by the Port of Newcastle as is the adjoining site where the subject trees are located. The site is generally level with an Easterly aspect.

The development proposes the construction of a 4-storey commercial building and 175 space off-street carpark with extensive landscaping. Landscaping is proposed to the site boundaries, as well as garden beds in the carpark and around the building.

Thirty-four trees have been assessed in the preparation of this report; three (3) trees within the site boundary have been identified for removal, Tree 9A due to its location within the plan area of proposed driveway access, and Trees 25A and 27 meet Council's criteria for exempt removal due to their small size.

Four (4) trees numbered 3, 4, 9 and 15 on the adjoining site are dead or in poor condition and may be considered for removal by the occupant of that site on that basis as they meet the tree assessment tests for unacceptable risk, diseased condition or suppressed growth as detailed in Section 4.0 of the NUFTM.

The plans provided do not provide the location of all trees along the Southern boundary, confirmation of the additional trees positions has not been undertaken. As discussed with the project manager during the inspection it was decided that the protection zone for the largest tree will be considered as the 'best fit' for tree protection measures that will protect the remainder of retained trees.

The TPZ for Tree 14 *Eucalyptus sideroxylon* is calculated at 10.08 metres radius from the centre of the trunk and extends 9.36 metres into the subject site, the SRZ which is calculated at 3.22 metres radius extends 2.5 metres into the site.

It is noted that the proposed driveway along the Southern boundary is setback 0.8 metres from the boundary and will cause an encroachment upon Tree 14 calculated at 43% of the TPZ and 28% of the SRZ which constitutes a major encroachment under the provisions of AS4970.

To manage the potential adverse impacts to trees 1- 21, it is proposed that the landscaped buffer between the two sites is maintained at approximately 2.5 metres width for the entire length of the Southern boundary, this would remove the encroachment of the SRZ.

It is further proposed that relevant sections of the driveway are paved using turf-cells or an equivalent permeable pavement system continuing from the North-eastern portion of the carpark along the driveway to approximately 78 metres from the Denison St kerb. This will assist in the retention of trees by spreading the load caused by vehicles over the TPZ and thereby reducing compaction which is a major cause of tree decline on development sites. The trees will also benefit from continued ability for water to percolate into the soil and gaseous exchange between the root-zone and the atmosphere.

Trees 22 – 26 will be subject to reduced encroachment due to the proposed width of the landscaped buffer, only trees 22 and 24 will be impacted by the construction of the proposed driveway. It is proposed that exploratory excavation is undertaken at the edge of the proposed driveway to determine the size and position of roots that may be affected. If required roots can be pruned at 5.8 metres from the trunk of Tree 22, and 5.0 metres from the trunk of Tree 24. If its suitable to the proposed use of the building, the turf cells could be continued to include the TPZ of the trees.

Trees 28 – 32 *Cupaniopsis anacardiodes* are consistent with the street tree planting along the rest of Fitzroy St providing an informal avenue, which is a significant feature of the local landscape. The trees will be subject to major encroachment from the proposed pedestrian footpath. Minimum setbacks from the trees to a concrete slab on ground path are calculated between 2.15 and 3.9 metres which cannot be accommodated within the limited width of the road reserve. The trees can be retained subject to tree sensitive design and construction methods such as raising the path above ground level using timber decking or a suspended slab; or the use of permeable paving material such as Filtapave® (https://filtapave.com.au/) which is made from recycled material and provides a porous and flexible surface over the TPZ.

9.1 Tree management

Implementation of the following measures will ensure that retained trees are not damaged during the project.

Site establishment

- trees to be retained have been identified by tagging and/or numbering on the landscape plan.
- protective fencing is erected at the perimeter of the respective TPZ, the fenced areas are to be included on the landscape plan and marked as a “no go zone”
- where space does not permit fencing of the entire TPZ branch or trunk armouring can be used, the ground is to be protected from compaction by rumble boards or steel plates laid over a 100mm mulch layer
- staff are to be made aware of tree protection measures during induction to the site
- the area of the TPZ is to be mulched using 100mm depth of organic material, mulch must be kept clear of the base of tree trunks
- fencing is to include signage clearly denoting the TPZ as a “no go zone”
- tree protection is to be certified by an AQF5 qualified arborist

During construction

- tree protection measures are to be maintained in serviceable condition
- no storage of equipment or materials is permitted within the TPZ, no cement wasting, or other pollutants must be allowed to enter the TPZ
- damage to any part of a protected tree is to be reported to the certifying arborist for assessment and remediation
- if services must pass through an established TPZ excavation is to be carried out by hand
- if required minor pruning of branches can be undertaken to avoid mechanical impacts that are likely to result in branch or bark tearing
- no roots are to be severed within an established TPZ, except under the supervision of the certifying arborist

Post construction

- protective fencing is to be removed from site
- at 12 months following completion retained trees are to be inspected by the certifying arborist for signs of decline.
- steps can be taken to improve growing conditions if required such as de-compaction of soil, introduction of irrigation
- general maintenance pruning can be undertaken (in accordance with AS4373-2007) to remove deadwood or other defective branches up to 10% of the total canopy area of retained trees if required

Tree Management Schedule

Alterations to this schedule may be required due to necessity however this shall be through consultation with the Project Arborist only.

Stage	Task	Responsibility	Certification	Timing of Inspection
1	Complete foundation design so to avoid woody roots greater than 40mm	Principal Contractor	Project Arborist	Prior to construction certificate application
2	Indicate Clearly (with spray paint on trunks) trees approved for removal only	Principal Contractor	Project Arborist	Prior to demolition and site establishment
3	Install TPZ fence and additional root, trunk and/or branch protection	Principal Contractor	Project Arborist	Prior to demolition and site establishment
4	Supervise all excavation works proposed within the TPZ	Principal Contractor	Project Arborist	As required prior to the works proceeding adjacent to tree
5	Inspection of Trees by Project Arborist	Principal Contractor	Project Arborist	Monthly during construction period
6	Inspection of Trees by Project Arborist	Principal Contractor	Project Arborist	Following the removal of tree protection measures
7	Final Inspection of trees by Project Arborist	Principal Contractor	Project Arborist	Prior to issue of occupation certificate

10.0 Conclusions

Retention of trees along the Southern property boundary will require the implementation of revised work methods and tree protection measures meeting the requirements of AS4970-2009, Protection of Trees on Development Sites' as detailed at section 9.0 and 9.1 of this report.

Tree 9A which is located within the proposed driveway access and, Trees 25A and 27 which are exempt from Council's protection due to their small size are proposed for removal in conjunction with the development of the site.

Trees 3, 4, 9 and 15 which are located on the adjoining site appear in poor form or declining condition and are not considered suitable for retention due to their declining condition.

The remaining twenty-seven trees will be subject to levels of encroachment ranging from Nil to 43% of the respective Tree protection Zones and up to 28% of the Structural Root Zones and will require the implementation of amended design and tree sensitive work practices to ensure their successful retention.

Council may require the engagement of a project arborist to certify tree protection measures and oversee works within the TPZ of retained trees.

11.0 Recommendations

Tree 9A *Phoenix canariensis* cannot be accommodated in the current design of the driveway access into the site and is recommended for removal subject to the provision of compensatory planting of one standard tree in accordance with section 4.3 of Newcastle Technical manual Urban Forest, 2018.

That Trees 3 *Eucalyptus punctata*, 4 *Melaleuca armillaris*, 9 *Eucalyptus saligna*, 15 *Eucalyptus sideroxylon*, meet several of the tree assessment tests detailed in Section 4 of Newcastle Technical manual Urban Forest, 2018 and could be considered for removal under a complying development application for tree removal.

That Trees 9A *Phoenix canariensis,* 25A *Olea europaea* and 27 *Archontophoenix cunninghamina* are removed in conjunction with the proposed development of the site.

That the remaining twenty-seven trees are retained and protected for the duration of the project by:

implementing an amended design that increases the setback along the Southern boundary to 2.5 metres,
the use of permeable paving within the TPZ of all retained trees

That all tree protection measures are to be implemented prior to the commencement of any site works.

That tree works are undertaken by a suitably qualified and insured contracting arborist in accordance with AS4373-2007 Pruning of Amenity trees and The Code of Practice for Amenity Tree Work 2013.

Ian Hills - Principal Arborist
Accurate Tree Assessment

Figure 3 Trees 9A – 14 on the adjoining allotment

Figure 4 Trees 11 – 26 on the adjoining allotment

Figure 5 Trees 28 – 32 *Cupaniopsis anacardioides* on the Fitzroy St road reserve

Figure 6 The site has been cleared in preparation for development.

12.0 Appendices

12.1 Safe Useful Life Expectancy Categories

1: Long SULE: Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.
(a) Structurally sound trees located in positions that can accommodate future growth.
(b) Trees that could be made suitable for retention in the long term by remedial tree care.
(c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.

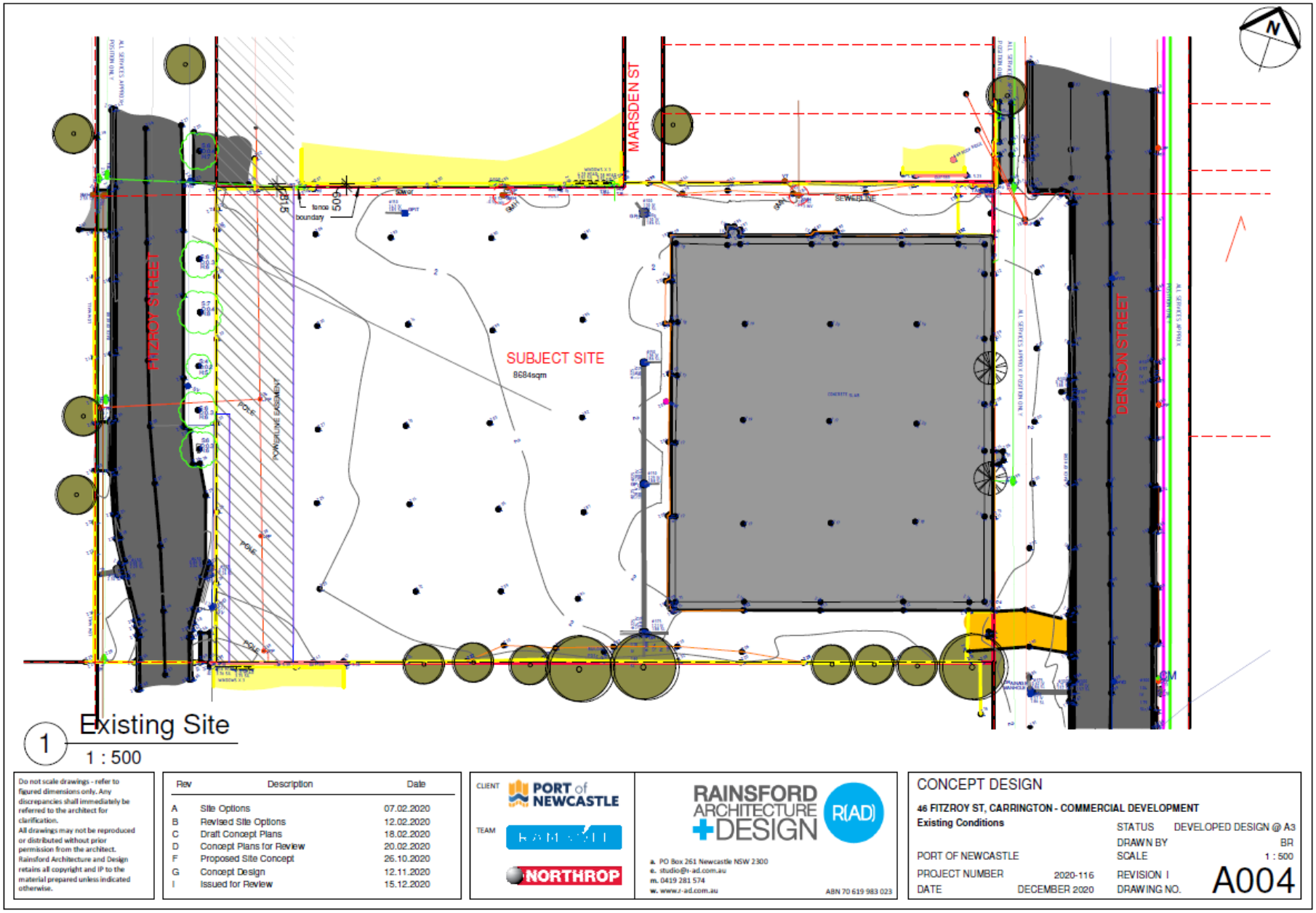
2: Medium SULE: Trees that appeared to be retainable at the time of assessment for 15–40 years with an acceptable level of risk.
(a) Trees that may only live between 15 and 40 more years.
(b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.
(c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(d) Trees that could be made suitable for retention in the medium term by remedial tree care.

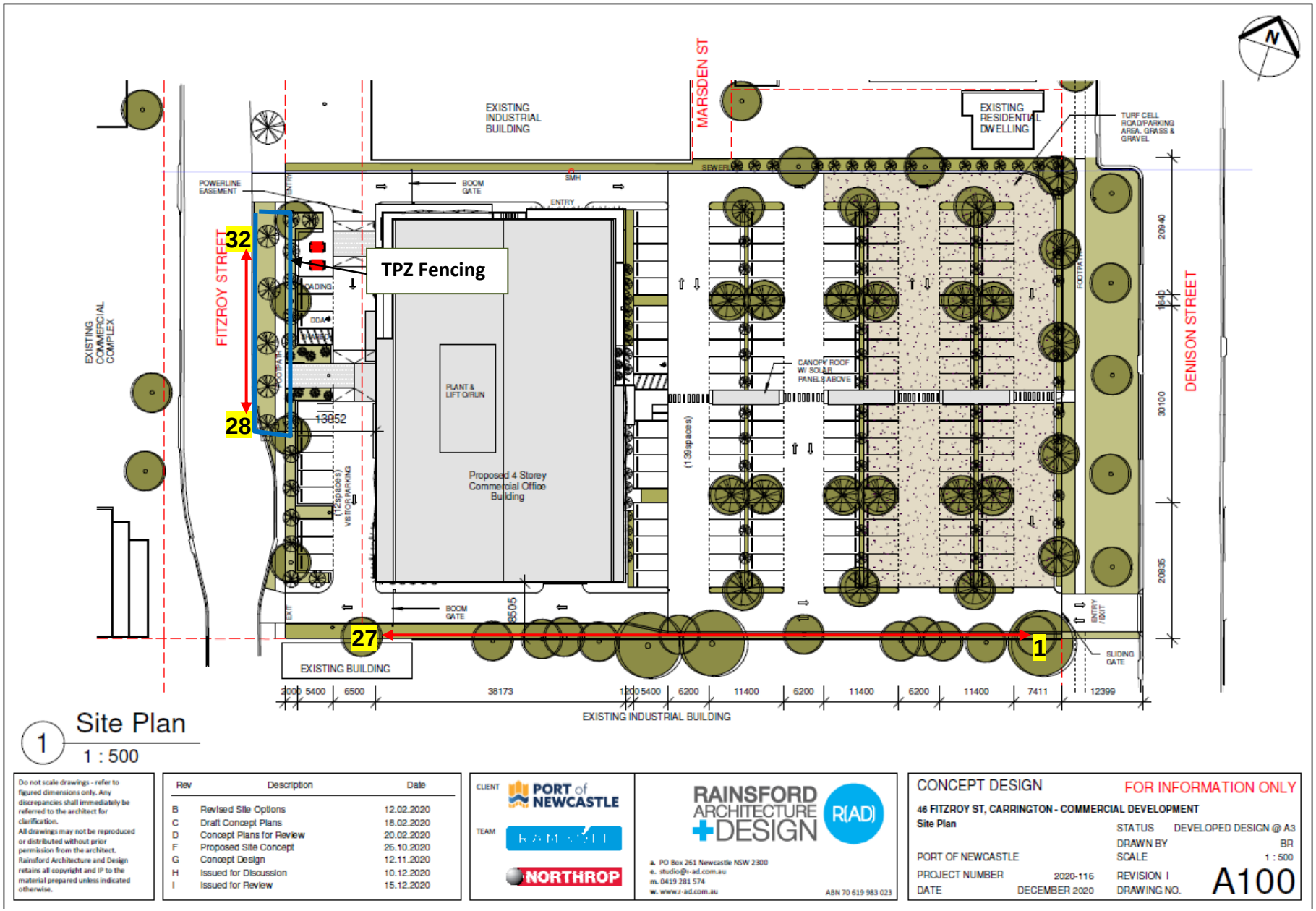
3: Short SULE: Trees that appeared to be retainable at the time of assessment for 5–15 years with an acceptable level of risk.
(a) Trees that may only live between 5 and 15 more years.
(b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
(c) Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(d) Trees that require substantial remedial tree care and are only suitable for retention in the short term.

4: Remove: Trees that should be removed within the next 5 years.
(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions.
(b) Dangerous trees because of instability or recent loss of adjacent trees.
(c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.
(d) Damaged trees that are clearly not safe to retain.
(e) Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(f) Trees that are damaging or may cause damage to existing structures within 5 years.
(g) Trees that will become dangerous after removal of other trees for the reasons given in (a)to(f)
(h) Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment could be retained subject to regular review.

5: Small, young, or regularly pruned: Trees that can be reliably moved or replaced.
(a) Small trees less than 5m in height.
(b) Young trees less than 15 years old but over 5m in height.
(c) Formal hedges and trees intended for regular pruning to artificially control growth.

12.2 Site Analysis Plan





1 Site Plan
1 : 500

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Rev	Description	Date
B	Revised Site Options	12.02.2020
C	Draft Concept Plans	18.02.2020
D	Concept Plans for Review	20.02.2020
F	Proposed Site Concept	26.10.2020
G	Concept Design	12.11.2020
H	Issued for Discussion	10.12.2020
I	Issued for Review	15.12.2020

CLIENT PORT of NEWCASTLE
TEAM NORTHROP

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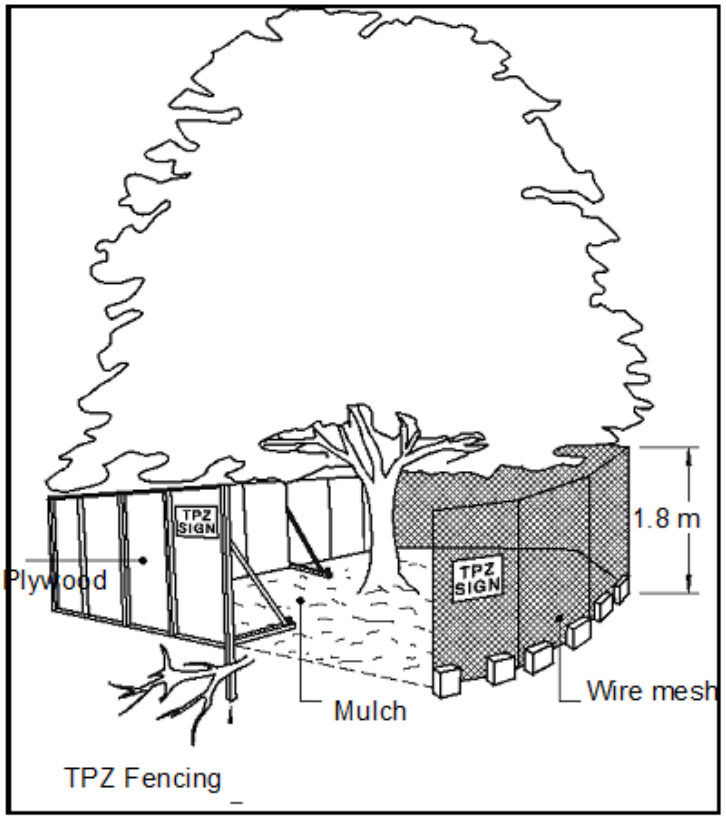
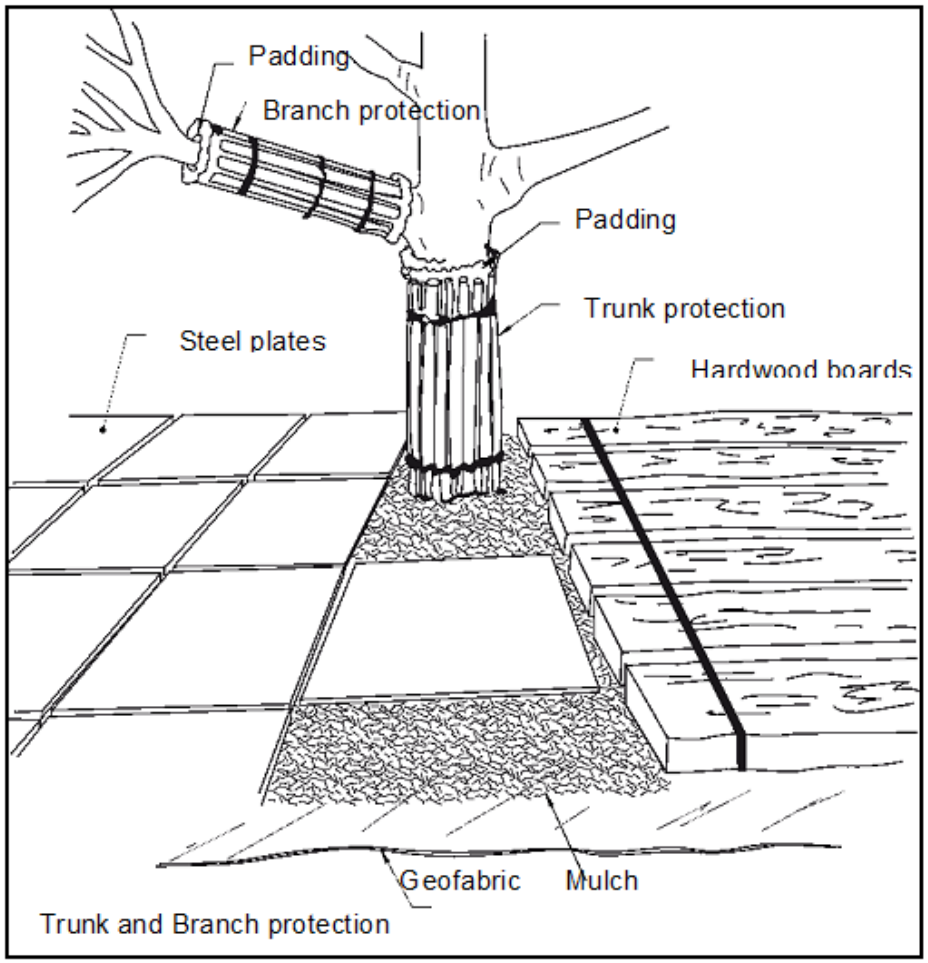
CONCEPT DESIGN — FOR INFORMATION ONLY
46 FITZROY ST, CARRINGTON - COMMERCIAL DEVELOPMENT
Site Plan
STATUS DEVELOPED DESIGN @ A3
DRAWN BY BR
PORT OF NEWCASTLE
SCALE 1 : 500
PROJECT NUMBER 2020-116
REVISION I
DATE DECEMBER 2020
DRAWING NO. A100

12.4 Tree, Trunk and Branch Protection Methods (Source AS4970-2009)

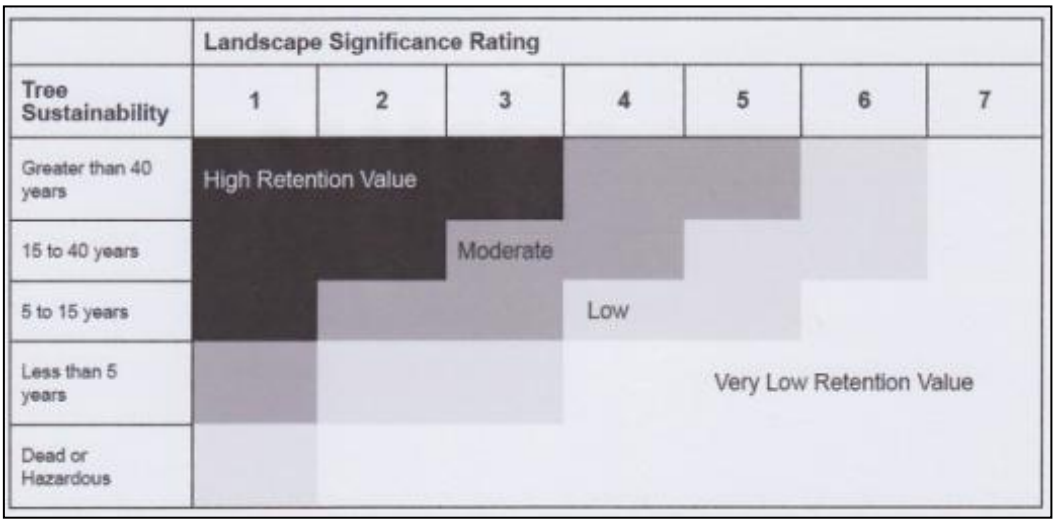
Method A.



Method B.



12.5 Calculating Tree retention Value



(Source NUFTM) Modified by A Morton from Couston and Howden (2001) Tree retention values table Footprint Green Pty Ltd Australia)

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12.7 Qualifications – Ian Hills

Associate Diploma Horticulture	Ryde TAFE 1984
AQF3 Horticulture (Arboriculture)	Ourimbah TAFE 1998
AQF5 Diploma Horticulture (Arboriculture)	Kurri Kurri TAFE 2009 (Dux) Cert No. 5934155
QTRA Registered User 2083	December 2013
QTRA Advanced User 4469	March 2018
Working with Children Check Number	WWC1780469E
National Coordinated Criminal History Check Certificate	CE0A623FD0
QTRA Advanced User 4469	March 2020