

Arborist Report

Client: Health One

Address: Corner Jacaranda Avenue &
Swan Street Raymond Terrace N.S.W 2324



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Table of Contents

| | | |
|------------|---|----|
| 1.0 | Executive Summary | 3 |
| 2.0 | Arborist Details | 4 |
| 2.1 | Introduction..... | 4 |
| 2.2 | Aims of this report/Procedure..... | 5 |
| 3.0 | Disclaimer | 5 |
| 3.2 | Site Description..... | 6 |
| 3.3 | Surrounding Vegetation | 8 |
| 3.4 | Soil Considerations | 9 |
| 4.0 | Tree Schedule..... | 10 |
| 4.1 | Trees & Impact on Development | 13 |
| 5.0 | Discussion | 14 |
| 6.0 | Conclusions..... | 24 |
| 7.0 | Recommendations..... | 25 |
| 8.0 | References..... | 30 |
| 9.0 | APPENDIX 1 Site Maps..... | 31 |
| | (A3 Site Plan attached) | 32 |
| APPENDIX 2 | U.L.E (Useful Life Expectancy) Categories and Subgroups | 33 |
| APPENDIX 3 | Notes on Tree Assessment..... | 34 |

1.0 *Executive Summary*

Health one has commissioned Abacus Tree Services to assess thirty two (32) trees within the proposed development & eleven (11) Jacaranda mimisifolia along Jacaranda Avenue on their health and condition and proximity to a proposed new health care facility and provide recommendations on forty three (43) trees only.

There are approximately thirty two (32) trees earmarked for removal before commencement of works. It is recommended due to species type, age (health & condition) and location of trees to the proposed building and hardstand areas that trees 12 - 43 (thirty two in total) be removed in the short term (before construction certificate). Trees 1 – 11 (eleven in total) could be retained and incorporated into the development. All works and recommendations within this report are to be sanctioned by Port Stephens Council.

This report is to be read in its entirety and all work pertains to thirty two (32) trees within the proposed development & eleven (11) trees located along Jacaranda Avenue. All work is to be sanctioned by Port Stephens Council and all recommendations are based on forty three (43) trees only.

2.0 Arborist Details

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|--|--|
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2.1 Introduction

Abacus Tree Services was commissioned by Health One to assist in the preparation of an arborist report. An assessment was made on forty three (43) trees located within the road reserve (eleven trees) & thirty two trees within the subject property. There is in total forty three (43) trees that were assessed as per the client's instructions.

The purpose of this report is to provide information and guidance to the applicant in relation to forty three (43) trees only. The information in this report is to be used in correlation with other reports identified by Port Stephens Council and will provide Port Stephens Council with a framework for determining the Development Application.

This report and its recommendations are based upon a physical site inspection undertaken on the 14th March 2011.

The photographs included in this report were taken at the time of the inspection on the 14th March 2011.

2.2 Aims of this report/Procedure

The aim of this report is to assess the health and condition of forty three (43) trees. The condition of the trees was assessed from ground level using the VTA (Visual Tree Assessment) method as outlined by Mattheck & Breloer (1999). The following criteria will be addressed within this report –

- An assessment of the dimensions (age, class, height and Diameter at Breast Height (D.B.H) Australian Standards 4970-2009 & 4373-2007 have been adopted
- An assessment of the health and condition of the trees;
- An assessment of the Useful Life Expectancy (U.L.E)
- Compilation of an appropriate report detailing the results of the above assessments
- Hazard Rating
- Recommendations for each tree

The (U.L.E) method of tree assessment, as outlined by Jeremy Barrell (1999) has been adopted within this report. U.L.E categories give an indication of the useful life expectancy anticipated for the tree that has been adopted for this report. Several factors are considered in determining this rating such as species, location, age, condition and health of the tree. The five U.L.E categories are outlined in detail within Appendix 2.

3.0 Disclaimer

This assessment has been prepared for the exclusive use of the client Health One & Port Stephens Council. Information in this report relates to forty three (43) trees within the road reserve (Swan Street) & premises of Jacaranda Avenue, Raymond Terrace N.S.W 2324 only and should not be used in conjunction with any other property.

This assessment was carried out from the ground, and covers what was reasonably able to be assessed and available to the assessor at the time of the inspection. The assessor carried out no aerial inspections. Information contained in this report covers only the trees that were examined and reflects the condition of the trees at the time of the inspection; furthermore the inspection was limited to a visual examination of the subject trees without dissection, excavation, probing or coring. Trees are living things and their condition will change over time. Therefore there is no guarantee that problems or deficiencies of the subject trees may not arise in the future.

3.1 Site Map



Figure 1 – Site location of the subject property

Source: www.whereis.com.au

3.2 Site Description

Thirty two (32) trees are located wholly within the subject property (Jacaranda Avenue, Raymond Terrace) and the remainder are located along both sides of the road verge at Jacaranda Avenue. The site is located in the municipality of Port Stephens Council. The species on site come under the requirements set out in Port Stephens Tree Preservation Order.

The site is set on a flat block with the immediate area being dominated by heritage buildings and the bowling green and associated club. The nearest major arterial roads are Pacific Highway to the east and Adelaide Street to the east. The trees within the subject property are located within a vacant block of land within Jacaranda Avenue, Raymond Terrace.

Jacaranda Avenue, Raymond Terrace N.S.W 2324 is located 26 kilometres to Newcastle CBD and 167 kilometres to Sydney CBD.



Figure 2 – Looking north along Jacaranda Avenue showing the avenue of Jacaranda mimosifolia. These trees are earmarked for retention and will be protected during the construction phase.



Figure 3 – Looking south along Jacaranda Avenue showing the start of the streetscape that extends down the street as indicated by Figure 2.

3.3 Surrounding Vegetation

The trees in the local area within close proximity to Jacaranda Avenue, Raymond Terrace are a mix of Australian natives and exotic species. The dominant native species are –

| Tree No | Species |
|---------|-----------------------------|
| 1 | Araucaria heterophylla (X2) |
| 2 | Jacaranda mimosifolia |
| 3 | Eucalyptus nicholii |
| 4 | Eucalyptus scoparia |

3.4 Soil Considerations

From a visual observation there is moderate soil disturbance in the last few years within the subject property. From a visual observation there has been no recent excavation works in around Trees 12 - 43. The subject site is overgrown with small weeds and gramineous species. The trees are situated within an over grown area within a flat site. There were minor debris present or within the Structural Root Zone (S.R.Z) at the time of inspection. A root investigation would need to be undertaken if any roots have been damaged or diseased.

4.0 *Tree Schedule*

Species & dimension requirements on Pages 11 - 12. This page intentionally left blank

Key

MS = Multi stemmed

Age Class: Y = Young, SM = semi mature, M = Mature, OM = over mature

Vigour: E= Excellent, G = Good, A = Average, D= Declining, SD = Severe decline,

N = North, E = East, S = South, W = West

ULE = Useful Life Expectancy (See appendix 2 for guidelines)

| Tree No | Scientific Name | Common Name | DBH (MM) | Height (M) | AGE CLASS | Vigour | SPREAD N.E.S.W. | UL E | Comments |
|---------|-----------------------|-------------|----------|------------|-----------|--------|-----------------|------|---|
| 1 | Jacaranda mimosifolia | Jacaranda | 370 | 9 | M | G | 2,2,3,3 | 2d | Co dominant leaders at 2.2 metres. Retain tree and incorporate into the development. Protection measures applicable to trees 1 & 2. |
| 2 | Jacaranda mimosifolia | Jacaranda | 730 | 11 | M | G | 6,6,6,7 | 2d | Co dominant leaders at 2 metres. Retain tree and incorporate into the development. |
| 3 | Jacaranda mimosifolia | Jacaranda | 900 | 14 | M | G | 7,6,8,7 | 2d | Minor deadwood less than 40mm. Retain and remove all accessible dead wood. |
| 4 | Jacaranda mimosifolia | Jacaranda | 800 | 12 | M | G | 6.6.6.6 | 2d | Tree has been previously pruned over wires near footpath. Retain tree and incorporate into the development |
| 5 | Jacaranda mimosifolia | Jacaranda | 700 | 10 | M | G | 5,5,6,5 | 2d | Three main leaders at 1.6 metres. Retain tree and incorporate into the development |
| 6 | Jacaranda mimosifolia | Jacaranda | 100 | 3 | Y | G | 1,1,1,1 | 2d | Juvenile tree that could be retained and incorporated into the development. |
| 7 | Jacaranda mimosifolia | Jacaranda | 110 | 3.5 | Y | G | 1,1,1,1 | 2d | Co dominant leaders at 1 metre. Retain tree and incorporate into the development |
| 8 | Jacaranda mimosifolia | Jacaranda | 120 | 4.5 | Y | G | 2,2,2,2 | 2d | No works to be undertaken. Retain tree and incorporate into the development. |
| 9 | Jacaranda mimosifolia | Jacaranda | 730 | 14 | M | G | 10,6,5,6 | 2d | Driveway 1.5 metres from the tree. Bollard could be installed to minimize damage from cars. Retain tree and incorporate into the development. |
| 10 | Jacaranda mimosifolia | Jacaranda | 190 | 6 | SM | G | 3,2,2,2 | 2d | Mechanical damage on the western side of trunk at the base. Retain tree and incorporate into the development. |
| 11 | Jacaranda mimosifolia | Jacaranda | 920 | 14 | M | G | 10,6,10,10 | 2d | Co dominant leaders at 1.8 metres. Remove all accessible dead wood with scissor lift. Retain tree and incorporate into the development. |
| 12 | Tecoma species | Tecoma | MS | 3 | M | G | 1,1,1,1 | 3a | Weed like species. Remove tree due to weed characteristics and replace with native species. |
| 13 | Lophostemon confertus | Brushbox | 590 | 10 | M | G | 4,6,4,6 | 3d | Tree has been topped like all the other Lophostemon confertus on site. Tree will be within the proposed car park hardstand area. Remove tree |
| 14 | Lophostemon confertus | Brushbox | 370 | 10 | M | G | 2,4,4,5 | 3d | Tree has been topped like all the other Lophostemon confertus on site. Tree will be within the Jacaranda Entrance. Remove tree |
| 15 | Lophostemon confertus | Brushbox | 360 | 10 | M | G | 4,1,3,3 | 3d | Tree has been topped like all the other Lophostemon confertus on site. Tree will be within the proposed car park hardstand area. Remove tree |
| 16 | Lophostemon confertus | Brushbox | 230,180 | 7 | M | G | 3,3,3,3 | 3d | Tree has been topped like all the other Lophostemon confertus on site. Tree will be within the proposed car park hardstand area. Remove tree |
| 17 | Lophostemon confertus | Brushbox | 390 | 10 | M | G | 4,4,4,4 | 3d | Tree will be within the proposed car park area. Remove tree |
| 18 | Lophostemon confertus | Brushbox | 240 | 5 | M | G | 3,2,2,2 | 3d | Tree will be within the proposed car park hardstand area. Remove tree |

| | | | | | | | | | |
|-------|-----------------------|----------------|---------|----|----|----|----------|----|--|
| 19 | Photinia glabra | Photonia | MS | 5 | M | G | 3,3,3,3 | 3a | The tree requires removal due to being within proposed car park. |
| 20 | Lophostemon confertus | Brushbox | 240,340 | 12 | M | G | 5,4,4,4 | 3d | Tree will be within the proposed building footprint area. Remove tree |
| 21 | Melia azederach | White Cedar | 110 | 6 | SM | A | 1,1,1,2 | 2a | Bow and sweep at 3 metres. The tree requires removal due to being within the proposed building area. |
| 22 | Lophostemon confertus | Brushbox | 230 | 6 | M | D | 2,2,2,2 | 3d | Extensive tip dieback in upper canopy. Poor form and within proposed building footprint. Remove tree |
| 23 | Cinnamomum camphora | Camphor Laurel | 300,300 | 12 | SM | A | 4,4,4,4 | 2d | Within car park turning bay area. Remove tree |
| 24 | Nerium oleander | Oleander | MS | 10 | M | G | 4,4,4,4 | 2a | Weed species. Remove tree |
| 25 | Eucalyptus robusta | Mahogany | 420 | 17 | m | D | 4,4,4,4 | 3d | Minor epicormic growth & major encroachment into proposed hardstand area. Remove tree |
| 26 | Cinnamomum camphora | Camphor Laurel | 450 | 14 | SM | D | 5,5,5,2 | 2d | Weed species. Remove tree |
| 27-28 | Nerium oleander | Oleander | MS | 8 | M | G | 4,4,4,4 | 2a | Weed species. Tree will be within the car park hardstand area. Remove tree |
| 29 | Eucalyptus robusta | Mahogany | 350 | 15 | OM | D | 4,5,5,4 | 4a | One large aborted branch. Fair condition. Remove tree |
| 30-31 | Nerium oleander | Nerium | MS | 9 | M | D | 6,4,3,3 | 3d | Weed species, Remove tree |
| 32 | Eucalyptus robusta | Swamp mahogany | 430 | 17 | OM | SD | 5,4,4,3 | 4a | Extensive epicormic growth. Remove tree |
| 33 | Eucalyptus robusta | Swamp mahogany | 400 | 16 | OM | SD | 4,7,3,4 | 4a | Extensive epicormic growth. Remove tree |
| 34 | Eucalyptus robusta | Swamp mahogany | 450 | 17 | OM | SD | 4,5,4,5 | 4a | Extensive epicormic growth. Remove tree |
| 35 | Eucalyptus robusta | Swamp mahogany | 370 | 16 | OM | SD | 4,4,3,5 | 4a | Extensive epicormic growth. Remove tree |
| 36 | Lophostemon confertus | Brushbox | 330,220 | 10 | SM | G | 4,2,2,2 | 2d | Tree will be within proposed car park and access road. Remove tree |
| 37 | Lophostemon confertus | Brushbox | 310 | 9 | SM | G | 3,4,2,2 | 2d | Tree will be within proposed car park area. Remove tree |
| 38 | Lophostemon confertus | Brushbox | 320 | 9 | SM | G | 3,2,3,3 | 2d | Tree will be within proposed car park area. Remove tree |
| 39 | Eucalyptus robusta | Swamp Mahogany | 580 | 20 | M | A | 10,8,9,4 | 3d | Tree will be within proposed car park area. Remove tree |
| 40 | Euc. tereticornis | Forest Red Gum | 590 | 19 | M | A | 6,5,4,6 | 3d | Major deadwood to the south. Poor form. Remove tree |
| 41 | Pittosporum undulatum | Pittosporum | 210 | 7 | M | G | 4,5,3,2 | 3d | Require removal due to proposed car park area. Remove tree |
| 42 | Phoenix canariensis | Date Palm | 400 | 4 | Y | E | 2,2,2,2 | 2a | Tree will be within proposed car park area. Remove tree |
| 43 | Cinnamomum camphora | Camphor Laurel | 170,170 | 9 | SM | A | 3,3,3,3 | 2d | Inclusion at ground level. Exempt species, remove tree. |

4.1 *Trees & Impact on Development*

Trees are living organisms and their root systems play an integral role in stability and providing nutrient storage as well as water uptake. Majority of tree roots for Dicotyledons occur within the first metre of the soil. Therefore construction works can have a profound effect on their health and longevity as well as their structural stability. Tree distances from excavation works must be taken into consideration at the planning stage to ensure that the tree is not damaged.

There are several main factors that occur at the construction phase that can have a negative impact on the trees health and stability. These practices can include but not limited to –

- Parking of vehicles and heavy machinery within the drip line of the tree.
- Stockpiling of materials within the drip line of the tree.
- Excavating within the drip line and damaging the structural root system.
- Raising soil levels in and around the base of the tree therefore reducing the trees ability for gaseous exchange.
- Damage to the tree due to heavy machinery and equipment resulting in large bark tears or loss of branches and scaffolds.

To reduce the effects of construction it is imperative to provide an area underneath the tree where no works are undertaken. The area where supervised works are undertaken is referred to as the structural root zone (SRZ). The S.R.Z is an area where no to minimal activities occur such as those listed above should occur. All trees require a S.R.Z and will vary species to species but for the purposes of this report the Australian Standards 4970 has now been adopted.

In conclusion the Australian Standards like similar methods for protecting trees is only a guide. To ensure the health and longevity of trees within construction sites it is imperative to provide a large protection zone taking into consideration that the tree will also grow over time. The greater area that can be put aside where no works occur will aid in the preservation of the tree. Activities listed above would be kept to a minimum and encroachment within the SRZ would require the supervision by a qualified AQF 5 arborist. These impacts will be taken into consideration in the discussion & recommendations section of the report.

5.0 Discussion

There are approximately eleven (11) trees along the road reserve within Jacaranda Avenue and the remaining thirty two (32) trees within the subject property that were assessed and tabulated into an arborist report.

Trees 1 – 5, 9 – 11 were planted as an avenue and play a major role in the amenity of the area. The trees have been identified as *Jacaranda mimosifolia* and they range from 9 – 14 metres in height. The trees overall are in good health and condition with minor deadwood only. Tree 1 has co dominant leaders at 2 metres and is 2.2 metres to the edge of the proposed driveway. Tree 1 is within an existing garden bed and could be retained and incorporated into the design.



Figure 4 - Location of Tree 1 near the entry point into the subject property.

Tree 2 is located within a 3.2 metre long garden bed and could be retained and incorporated into the proposed development. The tree required no works at the time of inspection.

Tree 3 has minor deadwood less than 40mm and could be retained and incorporated into the development.

Tree 4 has been directionally pruned to the west over wires in the past that has resulted in epicormic leaders forming at the wound. The tree will require moderate pruning works in the medium term as the tree continues to grow near the service wires.



Figure 5 – Showing the area highlighted in red that has been directionally pruned to minimise damage to the service wires.

Tree 5 has three main leaders at 1.6 metres above ground level. The tree is located in a mulched garden bed in a similar pattern to the other *Jacaranda mimosifolia*. The tree requires no work in the short term and could be retained and incorporated into the design.

Trees 6 – 8 are juvenile specimens that have been planted within the last five years. The trees have no deadwood and require no works. The trees could be retained and incorporated into the development.



Figure 6 – Location of Tree 5 within a mulched garden bed on the corner of Jacaranda Avenue.

Tree 9 is located on the eastern side of Jacaranda Avenue within close proximity to an existing driveway. The tree is within an existing garden bed that has previously been mulched. The tree would benefit from a bollard to prevent mechanical damage from cars hitting the trunk of the tree & minimising compaction within the SRZ. The tree requires no work in the short term and could be retained and incorporated into the design.

Tree 10 located on the eastern side of Jacaranda Avenue is located in a 1.6 metre wide garden bed. The tree has previous mechanical damage to the western side of the trunk. The tree could be retained and incorporated into the development.

Tree 11 is located on the eastern side of Jacaranda Avenue. The tree has co dominant leaders at 1.8 metres with major deadwood over road and garden bed areas. The deadwood could be accessed by a scissor lift to minimise damage to the tree.



Figure 7 – showing the close proximity of Tree 9 to an existing driveway



Figure 8 – showing the mechanical damage that has occurred to Tree 10



Figure 9 – An example of a 2nd order scaffold tear (Tree 11) out that is overhanging the road way.

Tree 12 has been identified as a Tecoma tree that has weed like characteristics and therefore earmarked for removal. The tree would also be within 0.5 metres of the proposed car parking area to the north east.

Trees 13 – 18 & 20 have been identified as *Lophostemon confertus* that were planted at the same time. The tree heights vary from 5 – 14 metres and overall are in good health. The entire row of trees has been topped previously and as a result several main leaders have formed on all the trees. The topping points vary however most were topped at 2.0 – 2.5 metres above ground level. This pruning technique contravenes Australian Standards 4970 – 2009. As a result the trees are not growing true to form with multiple attachments. Trees 13, 15 – 18 will be within the proposed car parking areas to the north east and Tree 14 will be within the driveway entry/exit area off Jacaranda Avenue. Trees 19 & 20 will be severely damaged by the excavation works due to the proposed car parking and building. The western root plate (TPZ) of Trees 19 & 20 would be severed by 35 – 40%.



Figure 10 – An example of the topped points on the cluster of *Lophostemon confertus* identified as trees 13 – 18, 20 & 22 on the north eastern side.

Tree 19 has been identified as a *Photinia glabra* that is located on the fence line on the north eastern side of the property. The tree overall is in good health and condition and is situated outside of the car parking area. The Structural Root Zone (SRZ) is 2.13 metres and a Tree Protection Zone of 4.2 metres. A large portion of the SRZ will be encroached on the western side of the root plate. The tree will continue to grow and impede on the car parking area. The tree has been earmarked for removal due to its proximity to the proposed car parking area.

Trees 20, 21 & 22 have been identified as *Lophostemon confertus*, *Melia azedarach* & *Lophostemon confertus*. Trees 20 & 22 have been topped previously and are not growing true to form. The trees are akin to the tree depicted in Figure 10. The trees due to their position will be just outside the proposed building. Trees 20 & 22 would require 35 – 40% of the canopy removed in order to accommodate the building. These trees have been earmarked for removal in order to accommodate the proposed building. Tree 21 would require minor pruning works of no more than 10% however

is only semi mature and would impede on the building as the tree continues to grow. The tree has a SRZ of 1.40 metres that will increase over time. This type of species when mature can grow to 12 – 15 metres in height. This species would not be suitable in the long term. The tree has been earmarked for removal before commencement of works.



Figure 11 – showing the semi mature Tree 21 that is earmarked for removal due to its location to the proposed hardstand area.

Trees 23, 24, 26 – 28, 30 & 31 are located on the south western side of the property. The trees have been identified as *Cinnamomum camphora* and *Nerium oleander*. Both species have been checked against the tree preservation order and are classified as exempt species and can be removed without further permission from council. These trees would require removal due to their location being within a metre or within the proposed building and hardstand area.

Trees 25 & 29 have been identified as *Eucalyptus robusta* that are located on the southern and south western sides of the property. Tree 25 is in average health and condition with minor epicormic growth. Tree 25 has a SRZ of 2.97 metres that would be severely impacted upon by the proposed car parking area. The tree has been earmarked for removal before commencement of building works. Tree 29 is located within the proposed driveway area.

The tree is in poor health and condition with major epicormic growth and has one large 1st order aborted branch. The tree has been earmarked for removal due to these defects.



Figure 12 – Showing the location of exempt species within the subject property.

Trees 32 -35 are located on the western boundary of the subject property. These trees have been identified as *Eucalyptus robusta*. The trees are all in poor form with a live crown ratio of 30 – 35% for the cluster of trees. The trees display major dieback and extensive epicormic growth (see Figure 13). The trees have short life spans and would be beneficial to remove and replace with native trees.

Trees 36 – 38 have been identified as *Lophostemon confertus* that are in good health and condition. The trees are semi mature and have a medium life span under normal environmental conditions. The trees due to their location to the proposed upper level car parking would require removal.



Figure 13 – Showing the row of over mature Eucalyptus robusta (Trees 32 – 35) located on the western boundary of the subject property.

Tree 39 has been identified as a Eucalyptus robusta that is in average health and condition. The tree has one dead stub at three metres above ground level. There is minor deadwood and minor epicormic growth. The tree due to its location would be within the proposed car parking area and therefore require removal.

Tree 40 has been identified as a Eucalyptus tereticornis that is in fair health and condition. The tree has major deadwood to the south and poor structural form to the east. The tree has a short life span and is earmarked for removal.

Tree 41 has been identified as a Pittosporum undulatum that is in good health and average structural condition. The tree has a tropism to the east into the subject property. The tree is generally symmetrical and has a medium life span under normal environmental conditions.

The trees root plate would encroach into the proposed car parking area by 20 – 25% and therefore has been considered for removal before commencement of works.

Tree 42 has been identified as a young *Phoenix canariensis* that is 4 metres tall. The tree comes under the requirements of Port Stephens tree preservation order. Tree 42 is in good health and condition and has a long life span. The trees root plate would be within the proposed car parking area by 60 – 65%. This is considered a major encroachment into the TPZ and therefore has been earmarked for removal.



Figure 14 - The location of Tree 42 is within the north western corner of the subject property.

Tree 43 is a semi mature camphor laurel that has been earmarked in the landscape plan for retention. The tree has co dominant leaders at ground level with included bark. The tree is exempt species (weed species) and would be beneficial to remove whilst the tree is still small. It would also be cost effective to remove the tree whilst still in a semi mature state.

6.0 Conclusions

- Trees 1 – 11 play an integral role in the streetscape and have been earmarked for retention. Trees 1 – 11 will be outside the scope of works however Trees 1 - 4 will require protection measures in accordance with Australian Standards 4970-2009 to protect the trees during construction.
- Trees 12, 23, 24, 26 – 30, 31 & 43 have been identified as exempt species under Port Stephens Council's tree preservation order. These trees can now be removed without further notice to council.
- Trees 13 – 18, 20 & 22 have been identified as *Lophostemon confertus*. All trees have been previously topped and are not growing true to form. The trees will be within the proposed car parking bays. Trees 19, 20, 21, 22 & 25 will be within close proximity to the car parking bays & proposed building. Trees 20 & 22 would require 35 – 40% of the canopy removed in order to accommodate the proposed dwelling. Due to their location and previous pruning works these trees have been earmarked for removal.
- Trees 32 – 35 have been identified as *Eucalyptus robusta* that are in a declining condition with extensive epicormic growth. The trees have a life span less than 5 years and have been earmarked for removal.
- Trees 36 – 39 have been identified as *Lophostemon confertus* & *Eucalyptus tereticornis* that are in good health and condition. These trees will be within the proposed car parking area and will therefore require removal before commencement of building works.
- Tree 40 is in average health and condition and poor structural form to the east. The tree has been earmarked for removal before commencement of building works.
- Trees 41, 42 will have excavation works that will impede on the root plate by 20 – 25% and 60 – 65% respectively. Both trees have been earmarked for removal before commencement of building works.
- Tree 43 has co-dominant leaders at ground level and is an exempt species. The tree has been earmarked for removal in the short term before commencement of building works.

7.0 Recommendations

- It is recommended that Health One embark on a management program for the forty three (43) trees before commencement of the proposed building and associated works as follows:
- It is recommended to remove trees 12 – 43 (thirty two in total) to allow for the development to proceed.
- It is recommended to retain trees 1 – 11 (eleven in total) and incorporate into the development. The following tree protection, setbacks and pruning measures are recommended for retained trees:
- It is recommended to erect tree protection measures to Trees 1 & 2 in accordance with Australian Standards 4970 2009 before commencement of any trucks entering the site. Tree guards are to be installed to minimise damage to the trees during the construction phase. Tree protection measures are to consist of 2 metre (or similar size) wooden beams installed to the trunk of the tree. Hessian or a similar non abrasive material is to be placed behind the planks to ensure minimal damage occurs to the tree. A temporary layer of mulch is to be applied to the area to a depth of 200mm. Rumble boards are to be placed over the mulch to minimise compaction to the Trees. It is recommended to allocate a different entry point for trucks and heavy machinery if feasible away from the Jacarandas. If this is not feasible than protection measures outlined will need to be adopted for Trees 1 & 2.



Figure 15 – Tree protection measures (for Trees 1 & 2) as indicated by the photo above will minimise damage by trucks and cars entering the site and protect against accidental damage by such vehicles.

- Tree protection fencing to trees 3 and 4 to be erected a minimum three metres on all sides where feasible. Trees 3 & 4 to have protection fencing to the edge of the road reserve on the eastern side and to three metres on all other sides.
- Protection fencing is to be in accordance with AS 4687 and should include as a minimum shade cloth attached to reduce the transport of dust or liquids into the protected area.
- All workmen entering the site to be inducted and made aware of the no go areas and Tree Protection Zones. All stockpile sites to be maintained a minimum 4 metres away from retained trees.

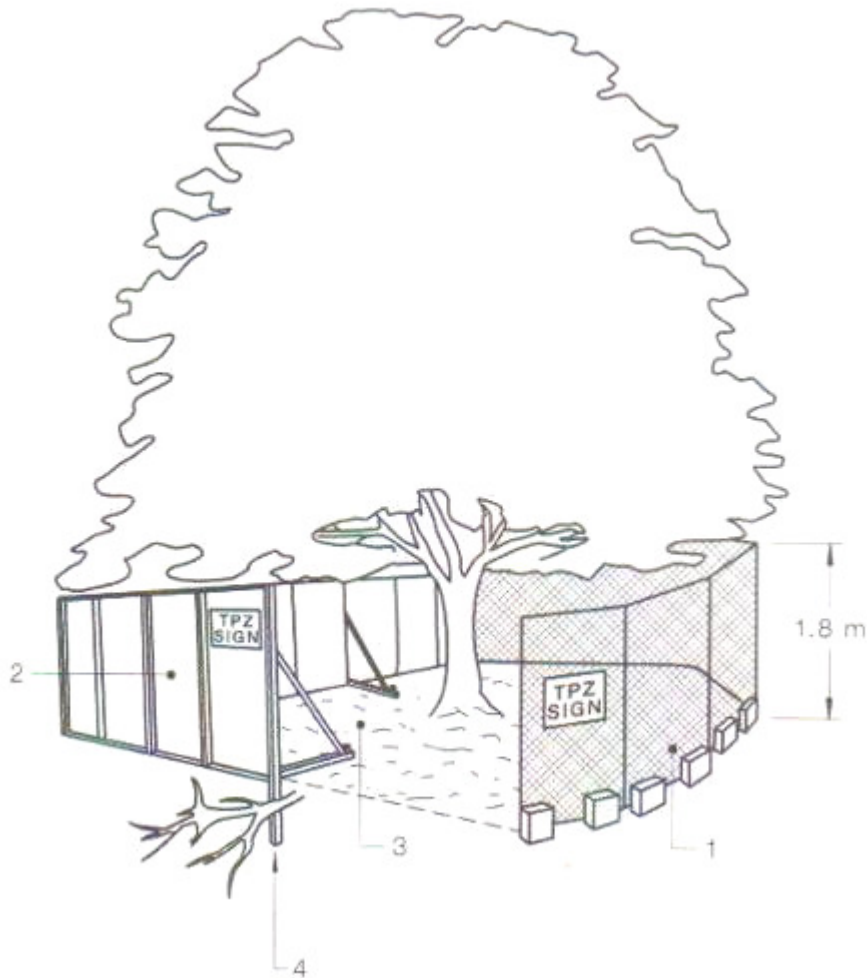


Figure 16 - Extract from: AS4970 2009

Legend:

- Chain wire mesh panels with shade cloth attached, held in place with concrete feet.
- Trees 5 – 11 are outside the scope of works and do not require protection fencing.
- It is recommended to remove accessible deadwood to Tree 11. This is to include removing all accessible dead wood (Code D – 7.2.2) in accordance with Australian Standards 4373 2007. It is recommended to remove all accessible dead wood and dead stubs to Trees 4 & 11 with the aid of a scissor lift. This will minimise damage to the trees.
- It is recommended to erect a bollard in close proximity to Tree 9. This will provide a barrier and minimise compaction from cars/trucks entering within the SRZ during the construction phase. The bollard would be placed as a temporary measure within councils land as indicated by Figure 17.



Figure 17 – erection of a bollard in a similar location to the red line will minimise compaction issues and minimise car movement within the SRZ.

- It is recommended to monitor the mechanical damage to Tree 10 within a two year period.
- It is recommended to provide an area where no to minimal works are undertaken, set aside as the SRZ. An SRZ should be set aside to Trees near proposed buildings or hardstand areas. This includes the SRZ's to trees 1 – 4. These have been tabulated in the table below -

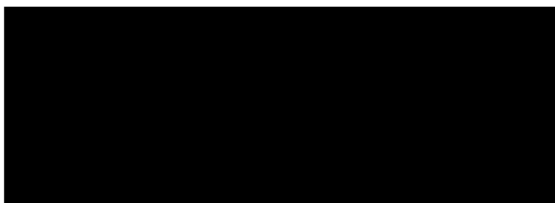
Tree Protection Guidelines – Australian Standards 4970 2009

| Tree No | SRZ | TPZ | Encroachment by 20% into TPZ |
|---------|------|------|---------------------------------|
| 1 | 2.25 | 4.44 | 3.55 |
| 2 | 3.01 | 8.76 | 7.01 |
| 3 | 3.12 | 10.8 | 8.64 |
| 4 | 3.17 | 9.6 | 7.68 |

Figure 18

Note = All SRZ, TPZ & encroachment into TPZ are expressed in metres.

- It is recommended that trees 1 – 4 have minimum setbacks where minimal to no works occur. This zone is referred to as the SRZ and is stipulated in Figure 18 (column 2). Minor encroachment is allowed into the TPZ recommended by no more than 20% as indicated above (column 4). Encroachment into the TPZ requires an area set aside equal to on another quadrant of the tree. Majority of the root plate is located under the roadway of Jacaranda Avenue. Minor encroachment of the TPZ will occur on the western side by no more than 10%. This is considered a minor encroachment into the TPZ and a viable option. Root severance that may occur on the western side greater than 40mm are to be pruned by a minimum AQF 3 arborist. The supervision of Trees 1 – 4 and construction works around these trees are to be supervised by a minimum AQF 5 arborist.
- It is recommended to mulch in an around Trees 1 – 11 within a two year period. It is recommended to maintain a minimum buffer to Trees 1 – 11 as per the current configuration on site.



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Bachelor of Horticulture Science

8.0 References

AS4373-2007 Pruning of Amenity Trees. Standards Australia

AS 4970 – 2009 Protection of trees on development sites

Clark R.J & Matheny N (1998) Trees & Development – A technical guide to Preservation of trees during land development: International Society of Arboriculture

Mattheck C., Breloer, (1999) The Body Language of Trees – a handbook for failure analysis 5th ed., London: The Stationery Office, U.K

Port Stephens Council Tree Preservation Order

Internet Sites

www.whereis.com.au

www.nearmaps.com.au

9.0 APPENDIX 1 Site Maps



Figure 19 - Location of subject property identified as Jacaranda & Swan Street.

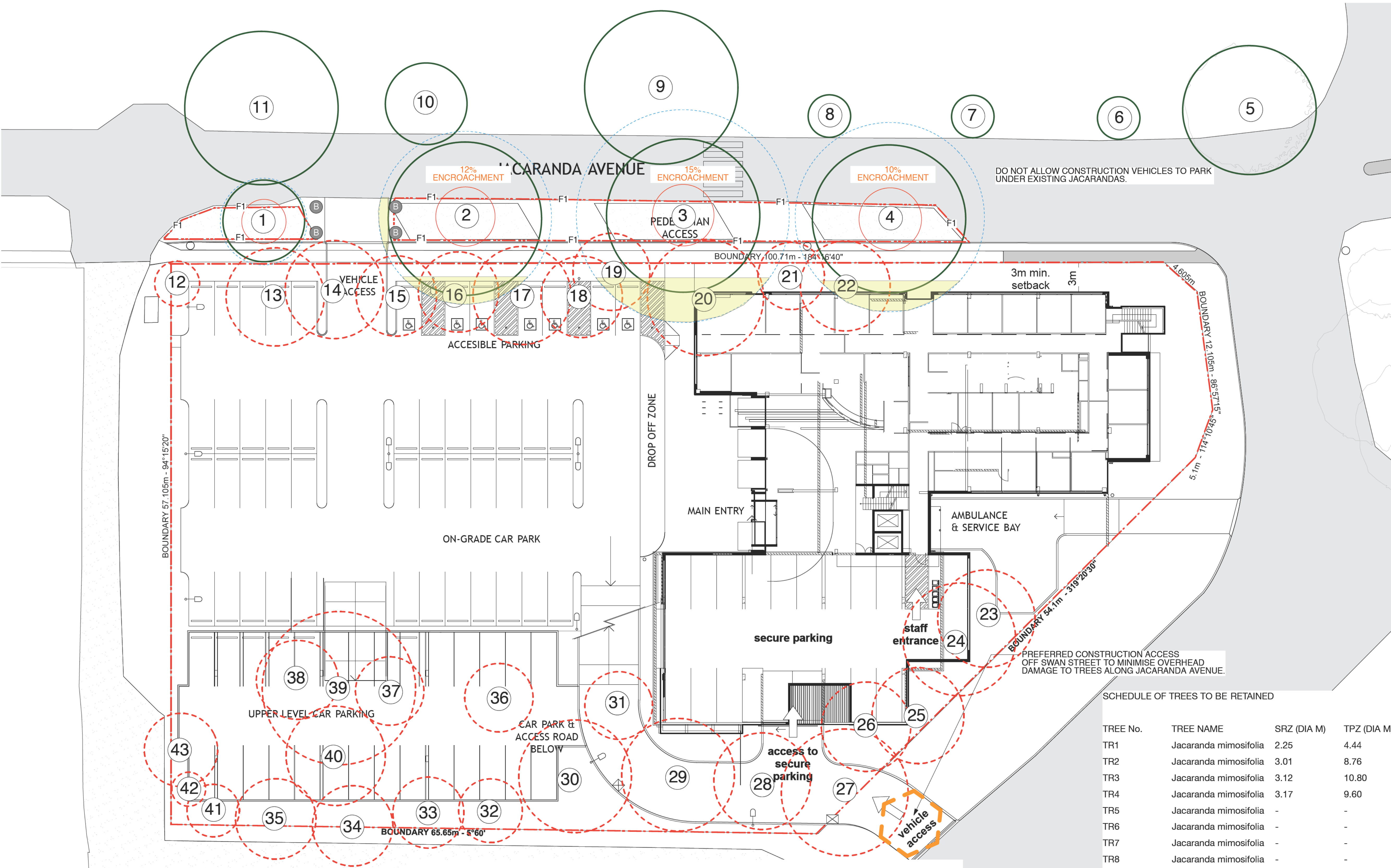
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Date: 12th December 2011

Client: Health One

Project: Corner Swan & Jacaranda Avenue, Raymond Terrace N.S.W 2324

(A3 Site Plan attached)



LEGEND

- Proposed tree to be removed.
- Existing Tree to be retained and protected.
- STRUCTURAL ROOT ZONE (SRZ)
- TREE PROTECTION ZONE (TPZ)
- Proposed bollard.
- Tree protective fencing. Refer to detail.
- Site boundary.
- Proposed building footprint. (Refer Architects)
- Proposed car park footprint. (Refer Architects)
- Zone of TPZ Encroachment

NOTES:
1. Trees nominated for retention to be retained and protected in accordance with the recommendations outlined in the Arborist report.
2. Tree locations are approximate only. Exact locations to be confirmed at construction certificate phase.

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CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCING CONSTRUCTION.
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| Iss. | Date | Appr | Revision Notes |
|------|----------|------|------------------|
| A | 16/12/11 | DM | DRAFT FOR REVIEW |

Client
HEALTH ONE

Project Title
RAYMOND TERRACE HEALTH ONE
JACARANDA AVENUE, RAYMOND TERRACE

Drawing Title
TREE PROTECTION ZONES

| | |
|------------------------------------|--------------------|
| Project Manager KEMP CONSULTING | Project ID 0779 |
| Drawn By AR | Scale 1:200@A1 |
| Reviewed By DM | Northpoint |
| Date 16/12/11 | |
| CAD File Name 0779-LP03 | |



SCHEDULE OF TREES TO BE RETAINED

| TREE No. | TREE NAME | SRZ (DIA M) | TPZ (DIA M) |
|----------|-----------------------|-------------|-------------|
| TR1 | Jacaranda mimosifolia | 2.25 | 4.44 |
| TR2 | Jacaranda mimosifolia | 3.01 | 8.76 |
| TR3 | Jacaranda mimosifolia | 3.12 | 10.80 |
| TR4 | Jacaranda mimosifolia | 3.17 | 9.60 |
| TR5 | Jacaranda mimosifolia | - | - |
| TR6 | Jacaranda mimosifolia | - | - |
| TR7 | Jacaranda mimosifolia | - | - |
| TR8 | Jacaranda mimosifolia | - | - |
| TR9 | Jacaranda mimosifolia | - | - |
| TR10 | Jacaranda mimosifolia | - | - |
| TR11 | Jacaranda mimosifolia | - | - |

SRZ = STRUCTURAL ROOT ZONE

TPZ = TREE PROTECTION ZONE

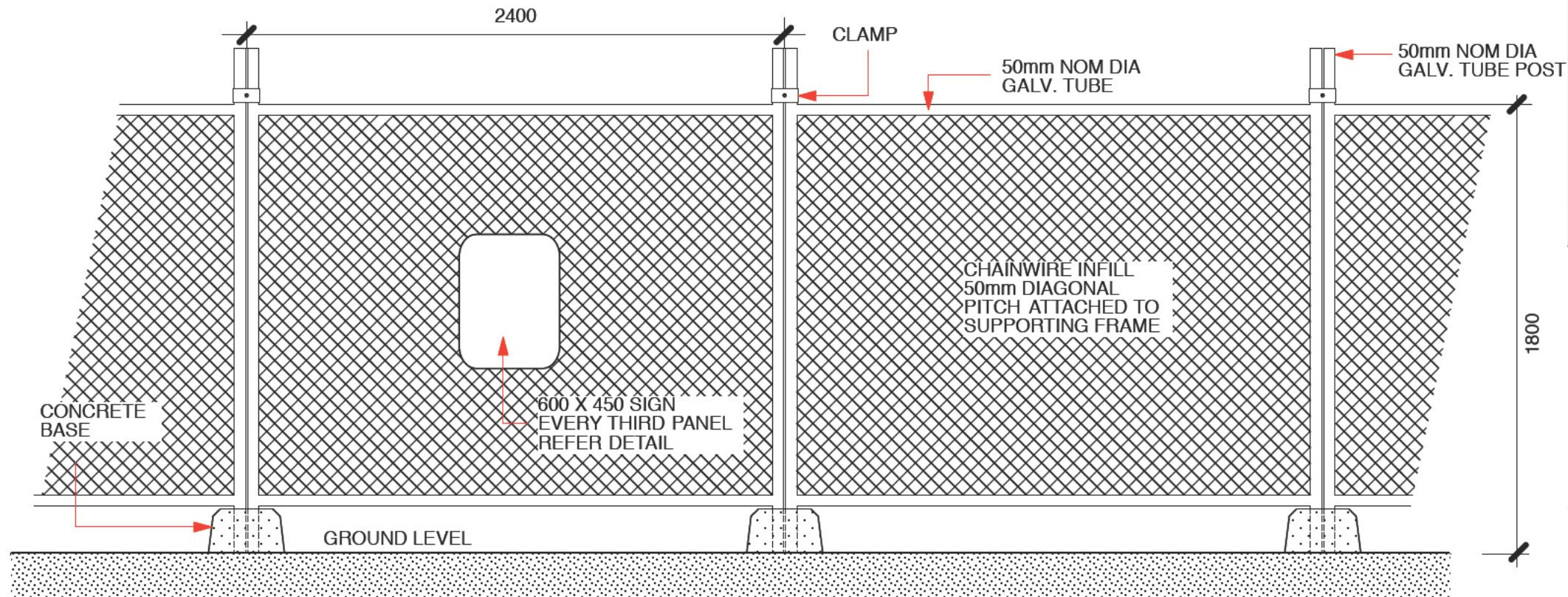
NOTES:

PROTECTIVE FENCING
Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project Arborist. The TPZ should be secured to restrict access.
AS 4687 specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area. Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots. Existing perimeter fencing and other structures may be suitable as part of the protective fencing.

SIGNS
Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site. The lettering on the sign should comply with AS 319.



SIGNAGE DETAIL (Not to Scale)



1800 HIGH CHAINWIRE FENCE DETAIL (Scale 1:25@A1)

APPENDIX 2 *U.L.E (Useful Life Expectancy) Categories and Subgroups*

Useful Life Expectancy – Classification

1. Long ULE > 40 Years

- a. Structurally sound and can accommodate future growth
- b. Long term potential with minor remedial treatment
- c. Trees of special significance which warrant extra care

2. Medium ULE of 15-40years

- a. Will live between 15 – 40 years
- b. Will live for more than 40 years but would be removed for safety or other reasons
- c. May live for more than 40 years but will interfere with more suitable specimens and need removal eventually
- d. More suitable for retention in the medium term with some remedial care

3. Short ULE of 5-15 years

- a. Trees that may only live between 5 – 15 more years
- b. May live for more than 15 years but would need removal for safety or other reasons
- c. Will live for more than 15 years but will interfere with more suitable specimens or provide space for replacement plantings
- d. Require substantial remedial care but are only suitable for short term retention

4. Remove tree within 5 years

- a. Dead, dying or seriously diseased
- b. Dangerous trees through instability or loss of adjacent trees
- c. Structural defects such as cavities
- d. Damaged that are clearly not safe to retain
- e. May live for more than 5 years but will need replacement to prevent interference or make space for more suitable trees
- f. May or are causing damage to structures
- g. That will become dangerous

5 Trees suitable to transplant

- a. Small trees can be reliably moved or replaced
- b. Young trees between 5 – 15 years
- c. Trees that have been regularly pruned to control growth

| Key | Criteria | Comments |
|---------------------------------------|--|----------------------------------|
| Tree no | | |
| Species | Relates to the number on the site plan | |
| Remnant /planted Self Sown | May be coded – See Key for details | |
| Special Significance | A – Aboriginal C- Commemorative Ha- Habitat Hi- Historic M- Memorial R- Rare U- Unique form O- Other | May require specialist knowledge |
| Age Class | Y- Young- Recently Planted S- Semi mature (<20% of life expectancy) M- Mature (20-80% of life expectancy) O- Overmature (>80% of life expectancy) | |
| Height | In Metres | |
| Spread | Average diameter of canopy in metres | |
| Crown Condition | Overall vigour and vitality 0 – Dead 1 – Severe decline (<20% canopy, major deadwood) 2 – Declining 20-60% canopy density, twig dieback 3- Average/low vigour (60-90% canopy density, twig dieback) 4- Good (90-100% crown cover, little or no dieback or other problems) 5- Excellent (100% crown cover, no deadwood or other problems) | |
| Failure Potential | Identifies the most likely failure and rates the likelihood that the structural defects will result in failure within the inspection period. 1- Low – Defects are minor (eg dieback of twigs, small wounds with good wound development) 2 – Medium – Defects are present and obvious egg Cavity encompassing 10-25% of the circumference of the trunk) 3 High- Numerous and/or significant defects present (eg cavity encompassing 30-50% of the circumference of the trunk, major bark inclusions) 4- Severe- Defects are very severe (eg fruiting | Requires specialist knowledge |

| | | |
|-------------------------------|--|--|
| | bodies, cavity encompassing more than 50% of the trunk) | |
| Size of defective part | <p>Rates the size of the part most likely to fail. The larger the part that fails the greater the potential for damage.</p> <p>1- Most likely failure less than 150mm in diameter</p> <p>2- Most likely failure 150-450mm in diameter</p> <p>3- Most likely failure 450-750mm in diameter</p> <p>4- Most likely failure more than 750mm in diameter</p> | |
| Target rating | <p>Rates the use and occupancy that would be struck by the defective part:</p> <p>1. Occasional use (jogging, cycle track)</p> <p>2. Intermittent use (e.g picnic area, day use parking)</p> <p>3. Frequent use, secondary structure (eg seasonal camping, storage facilities)</p> <p>4. Constant use structures (year round use for a number of hours each day, residences)</p> | |
| Hazard rating | <p>Failure potential + size of part + target rating</p> <p>Add each of the above sections for a number out of 12</p> | <p>The final number identifies the degree of risk. The next step is to determine a management strategy. A rating in this column does not condemn a tree but may indicate the need for more investigation and a risk management strategy.</p> |
| Root Zone | <p>C-Compaction</p> <p>D- Damaged/wounded roots</p> <p>E- Exposed roots</p> <p>Ga- Tree in graded bed</p> <p>Gi- Girdled roots</p> <p>Gr- Grass</p> <p>K-Kerb close to tree</p> <p>L+- Raised soil level</p> <p>L- Lowered soil level</p> <p>M- Mulched</p> | |

| | | |
|-------------------------------------|--|----------------------------------|
| | Pa- Paving concrete bitumen Pr- Roots pruned O-Other | |
| Defects | B-Borers C-Cavity D-Decay Dw-Deadwood E-Epicormics I-Inclusions L- Lopped LDCMP- Leaf damage by chewing mouthpiece insects M- Mistletoe/parasites MBA- Multi branch attachments PD- Parrot damage PFS- Previous failure sites S-Splits/Cracks T-Termites TL- Trunk lean TW- Trunk wound O-Other | |
| Services/adjacent structures | Bs- Bus stop Bu- Building within 3 metres Hvo- High voltage open wire construction Hvb- High voltage bundled (ABC) Lvo- Low voltage open wire construction Lvb- Low voltage bundled (ABC) Na- No services above Nb- No services below ground Si- Signage SL- Street light T- Transmission U- Underground services O- Other | More than one of these may apply |