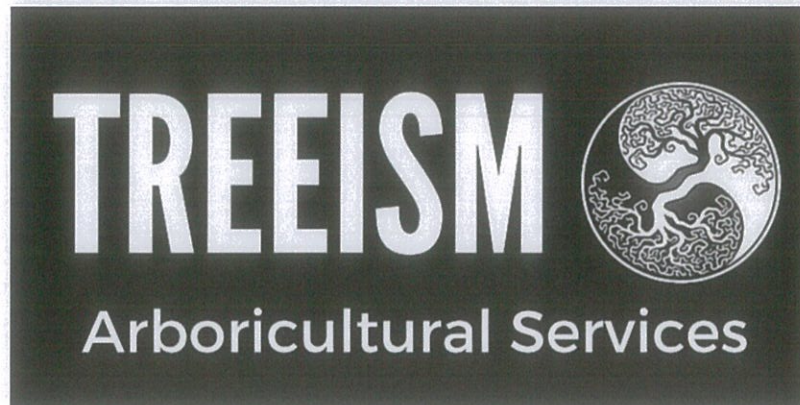


# Arboricultural Impact Assessment



## Prepared For

— Environment Co-ordinator  
CPB Contractors, Dragados and Samsung C&T Joint Venture (CDS-JV)  
30 Garema Ct  
KINGSGROVE NSW 2208

## Site Address

WESTCONNEX NEW M5  
ITS COMMUNICATION CONDUITS & FOOTPATH  
MARSH ST INTERCHANGE & WEST PRINCES HIGHWAY

## Prepared by

Consulting Arboriculturist & Horticulturist



*CDS reference: M5N-ES-RPT-ARN-0030*

Revision 2

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# NOVEMBER 2019

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# 1 Introduction

## 1.1 Brief

- 1.1.1 This Arboricultural Impact Assessment (AIA) was prepared by Treeism Arboricultural Services and was commissioned by [redacted] of CPB Contractors, Dragados and Samsung C&T Joint Venture (CDS-JV).
- 1.1.2 This report gives recommendations for tree retention or removal and provides guidelines for tree protection and maintenance.
- 1.1.3 Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible; however, I can neither guarantee nor be responsible for the accuracy of information provided by others.
- 1.1.4 This report is not intended to be a comprehensive tree risk assessment; however, the report may make recommendations, where appropriate, for further assessment, treatment or testing of trees where potential structural problems have been identified, or where below ground investigation may be required.
- 1.1.5 This AIA is not intended as an assessment of any impacts on trees by any proposed future development of the site, other than the current discussed scope of work.
- 1.1.6 The purpose of this report is to assess the vigour and condition of the trees, and identify the potential impacts the proposed development/works may have on those trees to be retained in proximity to the works.
- 1.1.7 The author of this report holds an AQF Level 5 Diploma of Horticulture (Arboriculture) and has 26 years in the horticultural industry. 21 of these 26 years have been specifically within the field of arboriculture.
- 1.1.8 Previous roles varied from working actively as a tree climber in private contracting companies to Tree Management Officer at several local Councils and working with independent Consultants. The author is independent from the project.
- 1.1.9 This AIA has been commissioned to ensure compliance with the requirements set out by the Department of Planning and Environment (DPE) as per Condition B63 - Table 1 (below/next page).

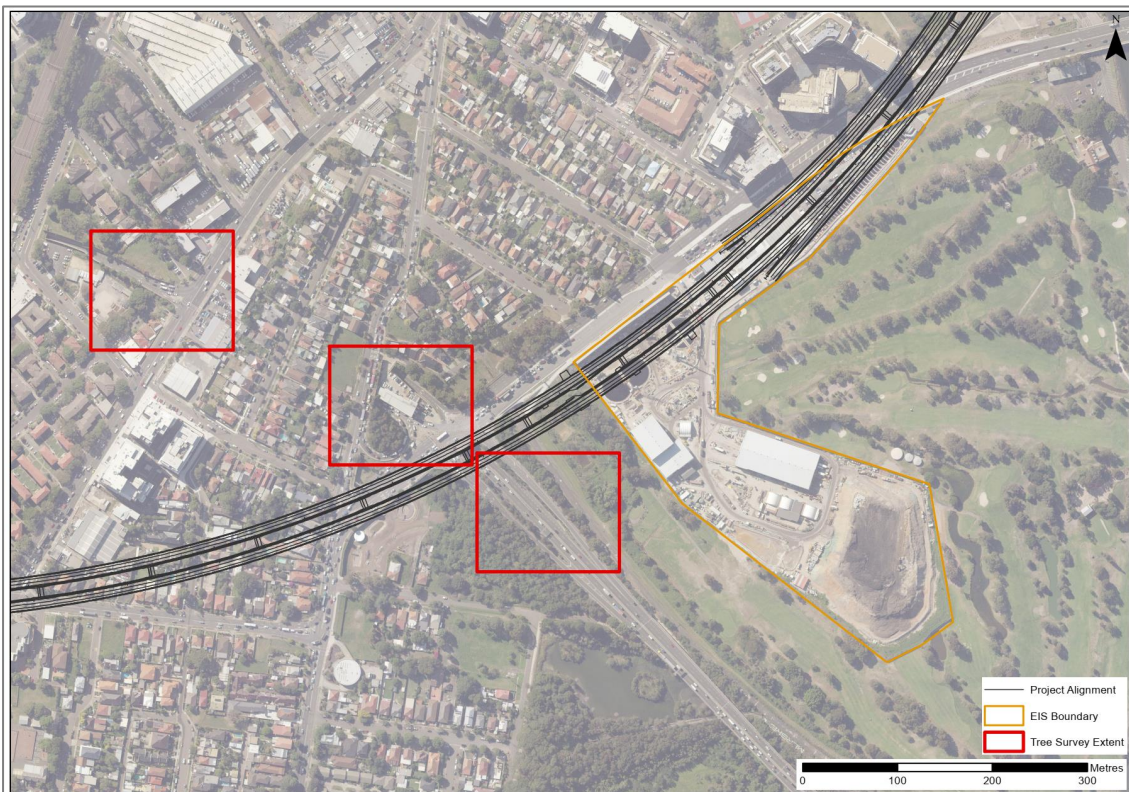
**Table 1 –Condition of Approval B63 Compliance Table**

Condition	Requirement	Addressed in:
B63	The Proponent must commission an independent experienced and suitably qualified arborist, to prepare a comprehensive Tree Report(s) prior to removing any trees on the periphery and/or outside the construction footprint as identified in the figures in Section 6 of the document referred to in condition A2(b), including any tree(s) removed along Euston Road. The Tree Report may be prepared for the entire SSI or separate reports may be prepared for individual areas where trees are required to be removed. The report(s) must identify the impacts of the SSI on trees and vegetation within and adjacent to the construction footprint. The report(s) must include:	This report prepared by suitably qualified arborist – Observation & Discussion & individual area as per Appendix I.
B63 (a)	a visual tree assessment with inputs from the design, landscape architect, construction team;	VTA noted in Appendix I & staff inputs as per Appendix D and onsite discussions.

Condition	Requirement	Addressed in:
B63 (b)	consideration of all options to amend the SSI where a tree has been identified for removal, including realignment, relocation of services, redesign of or relocation of ancillary components (such as substations, fencing etc.) and reduction of standard offsets to underground services; and	Appendix D, onsite discussion.
B63 (c)	measures to avoid the removal of trees or minimise damage to existing trees and is to ensure the health and stability of those trees to be protected. This includes details of any proposed canopy or root pruning, excavation works, site controls on waste disposal, vehicular access, storage of materials and protection of public utilities.	N/A
B63	A copy of the report(s) must be submitted to the Secretary for approval prior to the removal, damage and/or pruning of any trees, including those affected by site establishment works. All recommendations of the report must be implemented by the Proponent, unless otherwise agreed by the Secretary.	No tree removal, damage and/or pruning will occur to the subject trees prior to the Secretary's approval of this report.

1.1.10 The proposed works are part of the larger WestConnex New M5 project. The scope of work specifically for the discussed area is:

- trenching for ITS 6 communications conduits along the sound wall at the Marsh street M5 interchange;
- trenching for ITS 2 communication conduits at the Princes Highway M5 interchange and;
- footpath and safety barrier installation for the Marsh Street M5 interchange, trenching for 2 ITS communication conduits at the M5 on-ramp.



**Figure 1** - Location of proposed works for ITS installation at Marsh Street, Princes Highway as well as footpath, safety barrier and ITS conduit installation at Marsh St interchange.

1.1.11 The location of the ITS communications conduits, footpath and safety barrier are in accordance with the locations identified in the New M5 Environmental Impact Statement. The Tolling Gantries at Princes Highway, Marsh Street and M5 East Cooks River Tunnel and other ancillary tolling infrastructure is the subject of an RMS Consistency Assessment dated and approved September 2018.

## 1.2 Construction Options Considered

1.2.1 **Marsh Street Interchange:** The following options were considered to avoid or eliminate the impact to trees in this area:

- Under bore from Sydney Water easement to south eastern side of Marsh Street: Due to the location of the Southern and Western Suburbs Ocean Outfall Sewer (SWSOOS) within the proposed under bore area (Sydney Water Asset) this methodology was not deemed feasible.
- Trenching across the Sydney Water easement: Trenching works through the easement would require Sydney Waters approval. Due to the close proximity to the SWSOOS, approval to trench and install conduits above a Sydney Water Asset has not been granted.
- Trench to the north west of the easement and along Marsh Street (Cul-De-Sac to the north of easement): This option was considered but deemed not possible as the alignment crosses the SWSOOS and will encroach the 2 m buffer zone required from the asset.
- Secure the ITS along the noise barrier: This option was considered but deemed not practical as there are 6 ITS conduits to be installed and the current noise wall as are not rated to hold any load therefore this would require the noise walls to be replaced. The noise wall post has a 4.0m spacing with precast concrete panels in between. The ITS steel conduits need brackets every 1.5m and those brackets cannot be attached to the precast concrete panels as they are not designed for that. Refer to Appendix D for design information.
- Trench along the current M5 noise wall (South east of the Sydney Water easement): This option has been considered to be most appropriate due to the constraints of the Sydney Water easement and it does not require further land holder approval.
- Trench outside of the current M5 noise wall: This option was assessed but is extremely constricted by current services running throughout the intersection. This option would require more trees to be removed as well, including two (2) high Retention Value trees, and therefore was not considered further.
- Install conduits over head: Overhead mounting was investigated. The RMS standards require concrete encasement or a 600mm ground cover over conduits. The idea of cable trays supported along the alignment was discussed on site between DPIE and contractor Engineers/Environment staff, however this cannot be achieved due to RMS specifications. This option also increases the conduits to exposure to the elements and therefore is considered too high risk.

1.2.2 **Princes Highway – ITS:** The following options have been considered:

- Trench along the current M5 noise barrier: This is the standard construction methodology to install ITS conduits but also provides the most direct path for the ITS alignment along project land. Trees will be removed for this alignment.
- Mount the ITS cable to the noise barrier: It was proposed to have the ITS cable fixed to the noise barrier which runs to the north of the current M5 exit. This would need further engineering to ensure the noise wall could take the load of the conduit and is subject to approval from Ventia and RMS.
- Install conduit along maintenance footpath: This option is not standard practise and subject to Ventia and RMS approval. This would eliminate the need to remove any trees.

1.2.3 **M5 on-ramp - Marsh Street:** The following options were considered to avoid or eliminate the impact to trees in this area:

- Trench along the SWSOOS: As this is a heritage listed Sydney Water asset additional approval is required to work near the asset. Furthermore, the coverage levels required for the ITS to meet RMS standard are not achievable. Plate 1 below shows the SWSOOS looking east from Marsh Street and it depicts the decrease in ground level.



Plate 1 – Arrow notes SWSOOS, note the ground level change.

- Trench along M5 on ramp: This option will utilise an existing cleared route. The trench will be positioned as close as possible to the current kerb maximising distance to trees in order to minimise tree root disturbance. See Plate 2 below/next page showing relatively cleared route for northern section of on-ramp.



Plate 2 – Arrow notes existing area clear of vegetation.

### 1.3 Methodology

- 1.3.1 In preparation for this report, a ground-level, limited visual tree assessment (VTA) <sup>1</sup> was completed by the author of this report on 21<sup>st</sup> August 2018. This was undertaken during the scheduled monthly M5 maintenance shutdown (i.e. night-time, so tree assessment was carried out via torchlight). Inspection details of these trees are provided in Appendix I—Schedule of Assessed Trees.
- 1.3.2 The tree heights were visually estimated, and unless otherwise noted in Appendix I, the trunk Diameter at Breast Height were measured at 1.4 metres above ground level (DBH) using a diameter tape. Tree canopy spreads were stepped out with field observations written down.
- 1.3.3 No aerial inspections, root mapping or woody tissue testing were undertaken as part of this tree assessment. Information contained in this report only reflects the condition of the trees at the time of inspection.
- 1.3.4 Plans and documents referenced for the preparation of this report include:
- AS4970-2009 Protection of trees on development sites, Standards Australia;
  - Conditions B63 – (Table 1);
  - Marked up Aerial maps detailing proposed works location. These plans are attached as Appendix F—Site Overview Map & Appendix G- Tree Location Maps.
- 1.3.5 No landscape plans have been reviewed in preparation of this report.

### 1.4 Tree Preservation and Management Guidelines

- 1.4.1 The proposed works form part of the approved WestConnex New M5 State Significant Infrastructure project (SSI 6788), which overrides the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 'Vegetation SEPP' (which refers to prescribed and non-prescribed trees pursuant to the Rockdale Development Control Plan 2011 (RDCP) Part 4.1.7).
- 1.4.2 What constitutes a 'tree' as per planning approval is any tree that:
- is equal to or greater than three (3) metres in height; or
  - for a single trunk species, a trunk circumference of 300 millimetres at a height of one metre above ground level; or
  - for a multi-trunk species, a trunk circumference exceeding 100 millimetres at a height of one metre above ground level.

However, this excludes any species listed as invasive under the Biosecurity Act 2015 (previously Noxious Weeds Act).

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<sup>1</sup> Visual Tree Assessment (VTA) is a procedure of defect analysis developed by Mattheck and Breloer (1994) that uses the growth response and form of trees to detect defects.



## 2 Observations and Discussion

### 2.1 Summary of Assessed Trees

2.1.1 Forty seven (47) trees/tree groups were assessed and included in this report. Details of these are included in the Schedule of Assessed Trees – Appendix I. Of these trees:

- forty (40) are prescribed (i.e. ‘considered a tree’ under the DPE approval/conditions) trees/tree groups – T1-T3, G4, G5, T6, T8, T9, G10, T11-T19, T22-T26, G27, T28, T29, T31-T34, G35, T36, G39, T40-T44, G45, G46.
- seven (7) are non-prescribed trees/tree groups (i.e. exempt from DPE approval to remove or prune) – T7, T20, T21, T27A, G30, G37 & G38. It is assumed that all these non-prescribed trees would be removed if located within or near the proposed works zone.

2.1.2 Of the forty (40) prescribed trees/tree groups (trees within groups were provided a retention rating as a group rather than as individual trees) the following Retention Value (RV- see Appendix C) was ascribed to each:

- thirteen (13) trees/tree groups have high RVs – T17, T23, T24, T28, T29, T32, T33, G39, T42-T44, G45 and G46;
- thirteen (13) trees/tree groups have medium RVs – T1, G4, T8, T9, T12-T14, T16, T18, T31, T34, G35 and T36;
- fourteen (14) trees/tree groups have low RVs – T2, T3, G5, T6, T10, T11, T15, T19, T22, T25, T26, G27, T40 and T41.

### 2.2 Threatened Species

2.2.1 Three (3) assessed trees T32, T33 and one (1) tree in G35 *Syzygium paniculatum* (Magenta Lilly Pilly) are classified as ‘Endangered’ under the NSW Threatened Species Conservation Act 1995 and ‘Vulnerable’ under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

2.2.2 These individuals are not part of a naturally occurring population and were planted as part of the M5 East project (refer M5 East Planting Schedule for Marsh Street, Appendix E). Whilst the removal of vegetation would decrease vegetation cover locally, it is not expected that this would result in a significant impact upon and threatened species, populations or ecological communities based on the vegetation composition, the urbanised nature of the area and the fact that the site would be revegetated post-construction.

## 2.3 Proposed Removal of Prescribed Trees

- 2.3.1 Twenty two (22) of the forty (40) prescribed trees/tree groups are proposed to be removed as they are located within the zone of the proposed works and cannot be retained without significant detriment to the tree.
- 2.3.2 Twelve (12) trees (T23, T25, T28, T29, T32, T33, G39, T42-T44, G45 &G46) have been determined to have a 'High' Retention Value (RV- see Appendix C) and are proposed for removal.
- 2.3.3 The six (6) conduit communication trench proposed for the Marsh Street section is 860mm wide and 1180mm deep, this trench will run directly through the stem of most trees stated for removal or within the Structural Root Zones.
- 2.3.4 The tree root loss will be too great to allow tree retention should normal trenching methods be used. It is possible trees not within the actual footprint of the trench could be retained by employing non-destructive digging (NDD) methods (i.e water laser) however loss of tree vigour in the short term would be expected.
- 2.3.5 The proposed footpath to the Tolling Gantry is to be constructed with concrete. This will necessitate levelling and compaction of the base level, thus requiring removal of existing large diameter woody tree roots in this location – of which there are many. Alternatives such as decking, or an informal loose stone path would negate tree root severance and retain trees.
- 2.3.6 Significant soil level changes are unacceptable within the Tree Protection Zones (TPZ) of existing trees, lowering ground levels to any extent incurs root severance and raising ground levels significantly, leads to loss of available oxygen to tree roots and long term root death.
- 2.3.7 Appendix D provides input from the Design Engineer in regard to the design options that have been assessed to minimise impacts on trees. The ITS routes are largely governed by the tolling gantry locations. As such the constraints for the proposed works are presented in Appendix D and summarised in Table 2 below/next page.

**Table 2**—Relocation options.

Location	Suggested Change	Comment
Princes Highway	Move tolling gantry (eg. 10m east) and/or widen gantry so that footing fall clear of the trees.	Gantry cannot move east due to diverging lane and therefore will create tolling scanner problems. Gantry footing cannot extend any further due to property ownership.
Marsh Street	Move gantry to inside tunnel.	This will not achieve the required minimum 7.1m vertical clearance for the tolling camera to operate. Additionally, this option will not allow maintenance access.
Marsh Street – Off ramp gantry	Move technical shelter northward or eastward	Moving east will cause property ownership issues and moving north will clash with the motorway complex.

The trees within the Table 3 below/next page are located within RMS owned land and cannot be safely retained under the current proposal. Non-Destructive Digging (NDD) is proposed and may allow trees highlighted in orange to be retained, however this will be subject to an AQF Level 5 Arboriculturist directly supervising trenching works.

Low water pressure will be required to ensure roots are not stripped of bark and Arboriculturist will need to assess impacts of any root loss against tree stability and long term survival.

**Table 3**—Trees proposed to be removed to facilitate works. **Orange** highlight denotes NDD may allow tree to be retained, this will be subject to AQF Level 5 Arboriculturist directly supervising works and reviewing impacts on tree root system.

Tree No.	Common Name	Reason	RV
T1	Benjamin’s Fig	Tree positioned in site accessway location.	M
T19	QLD Silver Wattle	Removed for previous works.	L
T22	Mulberry	Tree positioned in location of proposed 6 conduit ITS trench.	L
T23	Red Mahogany?	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	H
T25	Southern Blue Gum?	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	H
T27	Golden Wreath Wattle Gum	Some of the group positioned adjacent to proposed 6 conduit ITS trench, with works within SRZ.	L
T28	Red Mahogany	Tree positioned in location of proposed 6 conduit ITS trench.	H
T29	Gum	Tree positioned in location of proposed 6 conduit ITS trench.	H
T31	Red Mahogany?	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	M
T32	Magenta Cherry	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	H
T33	Magenta Cherry	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	H
T34	Narrow-leaved Paperbark	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	M

Tree No.	Common Name	Reason	RV
G35	Magenta Cherry x 1, Narrow-leaved P'bark - several	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	M
T36	Tallowwood	Tree positioned adjacent to proposed 6 conduit ITS trench, works within SRZ.	M
T40	Wattle	Tree positioned in a location adjacent to footpath for access for maintenance of Tolling Gantry, works required in SRZ. Tree adjacent to location of proposed 2 conduit ITS trench.	L
T41	Coast Banksia	Tree positioned in a location adjacent to footpath for access for maintenance of Tolling Gantry. Tree adjacent to location of proposed 2 conduit ITS trench.	L
T42	Bangalay	Tree positioned in a location adjacent to footpath for access for maintenance of Tolling Gantry, works required in SRZ. Tree adjacent to location of proposed 2 conduit ITS trench.	H
T43	Coast Banksia	Tree positioned in the proposed location of access footpath for maintenance of Tolling Gantry. Tree adjacent to location of proposed 2 conduit ITS trench.	H
T44	Bangalay	Tree positioned in a location adjacent to footpath for access for maintenance of Tolling Gantry, works required in SRZ. Tree adjacent to location of proposed 2 conduit ITS trench.	H
G45	Bangalay	Tree positioned in a location adjacent to footpath for access for maintenance of Tolling Gantry, works required in SRZ. Tree adjacent to location of proposed 2 conduit ITS trench.	H
G46	Bangalay & Swamp She oak	Tree positioned in a location adjacent to footpath for access for maintenance of Tolling Gantry, works required in SRZ. Tree adjacent to location of proposed 2 conduit ITS trench.	H

## 2.4 Potential Impacts on Trees Proposed for Retention

- 2.4.1 The ITS installation along the Princes Highway now has been given approval to be run above ground along the outside (roadside) of the sound wall barrier. This negates any impact on trees along this area.
- 2.4.2 Under the Australian Standard 4970-2009 Protection of trees on development sites ("AS4970"), encroachments of less than 10% of the Tree Protection Zone (TPZ) are considered to be minor.
- 2.4.3 No specifications are provided in AS4970 for potential impacts of 10% or greater. This 10% is taken as the threshold figure, beyond which arboricultural investigations (as set out in clause 3.3.4) need to be considered.
- 2.4.4 Trees were not surveyed for this Report as all trees potentially impacted are located within RMS owned land. Without a detailed Survey Plan estimates have been provided via the aerial mapping to determine likely disturbance within the Structural Root Zone (SRZ), and into the TPZs of protected trees to be retained, these are summarised in Table 4, below/next page.

**Table 4** – Estimated encroachments into the SRZ and TPZ of trees proposed for retention. Please note site-specific constraints will heavily influence the location. The type of construction materials and methods used, and/or extent of change to soil/grade conditions during works may result in encroachment impacts lower or higher than estimated at the time of preparing this tree impact assessment.

Tree No.	Tree Common name	SRZ affected	TPZ area (m <sup>2</sup> )	TPZ encroachment (approx m <sup>2</sup> )	TPZ encroachment (approx %)	RV
T2	Canary Island Date Palm	✗	78	0	0	L
T3	Canary Island Date Palm	✗	78	0	0	L
G4	Tallowwood X 2	✗	23	0	0	M
G5	Weeping Bottlebrush X 12	✗	18	0	0	L
T6	Canary Island Date Palm	✗	39	0	0	L
T8	Tallowwood	✗	10	0	0	M
T9	Tallowwood	✗	10	0	0	M
G10	<i>Melaleuca</i> sp. X 4	✗	10	0	0	L
T11	Canary Island Date Palm	✗	78	0	0	L
T12	Tallowwood	✗	10	0	0	M
T13	Tallowwood	✗	10	0	0	M
T14	Tallowwood	✗	104	0	0	M
T15	Canary Island Date Palm	✗	50	0	0	L
T16	Tallowwood	✗	41	0	0	M
T17	Tallowwood	✗	137	0	0	H
T18	Sydney Red Gum	✗	18	0	0	M
T24	Norfolk Island Pine	✗	241	12	5	H
T26	Red Mahogany	✗	72	5.4	7.5	L

#### 2.4.5 Tree 2 – Canary Island Date Palm

- Structural Root Zone impacts: Under Section 3.3.5 of AS4970 the SRZ formula does not apply to palms or other monocots.
- Tree Protection Zone impacts: The proposed works are located outside the calculated TPZ of this specimen.
- Pruning impacts: No pruning is foreseen to accommodate the proposed works.

#### 2.4.6 Tree 3 – Canary Island Date Palm

- Structural Root Zone impacts: Under Section 3.3.5 of AS4970 the SRZ formula does not apply to palms or other monocots.
- Tree Protection Zone impacts: The proposed works are located outside the calculated TPZ of this specimen.
- Pruning impacts: No pruning is foreseen to accommodate the proposed works.

#### 2.4.7 Group 4 – Tallowwood x 2

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works.

#### 2.4.8 Group 5 – Weeping Bottlebrush x 12

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works.

#### 2.4.9 Tree 6 – Canary Island Date Palm

- Structural Root Zone impacts: Under Section 3.3.5 of AS4970 the SRZ formula does not apply to palms or other monocots.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works.

#### 2.4.10 Tree 8 – Tallowwood

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works.

#### 2.4.11 Tree 9 – Tallowwood

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works.

#### 2.4.12 Group 10 – *Melaleuca* sp. X 4

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works

#### 2.4.13 Tree 11 – Canary Island Date Palm

- Structural Root Zone impacts: Under Section 3.3.5 of AS4970 the SRZ formula does not apply to palms or other monocots.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works

#### 2.4.14 Tree 12 – Tallowwood

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works

#### 2.4.15 Tree 13 – Tallowwood

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works.

#### 2.4.16 Tree 14 – Tallowwood

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works.

#### 2.4.17 Tree 15 – Canary Island Date Palm

- Structural Root Zone impacts: Under Section 3.3.5 of AS4970 the SRZ formula does not apply to palms or other monocots.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works

#### 2.4.18 Tree 16 – Tallowwood

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works

#### 2.4.19 Tree 17 – Tallowwood

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works:

#### 2.4.20 Tree 18 – Sydney Red Gum

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone/Pruning impacts: The proposed works are located above ground and behind the existing sound wall. No ground level changes, or pruning are required to accommodate works

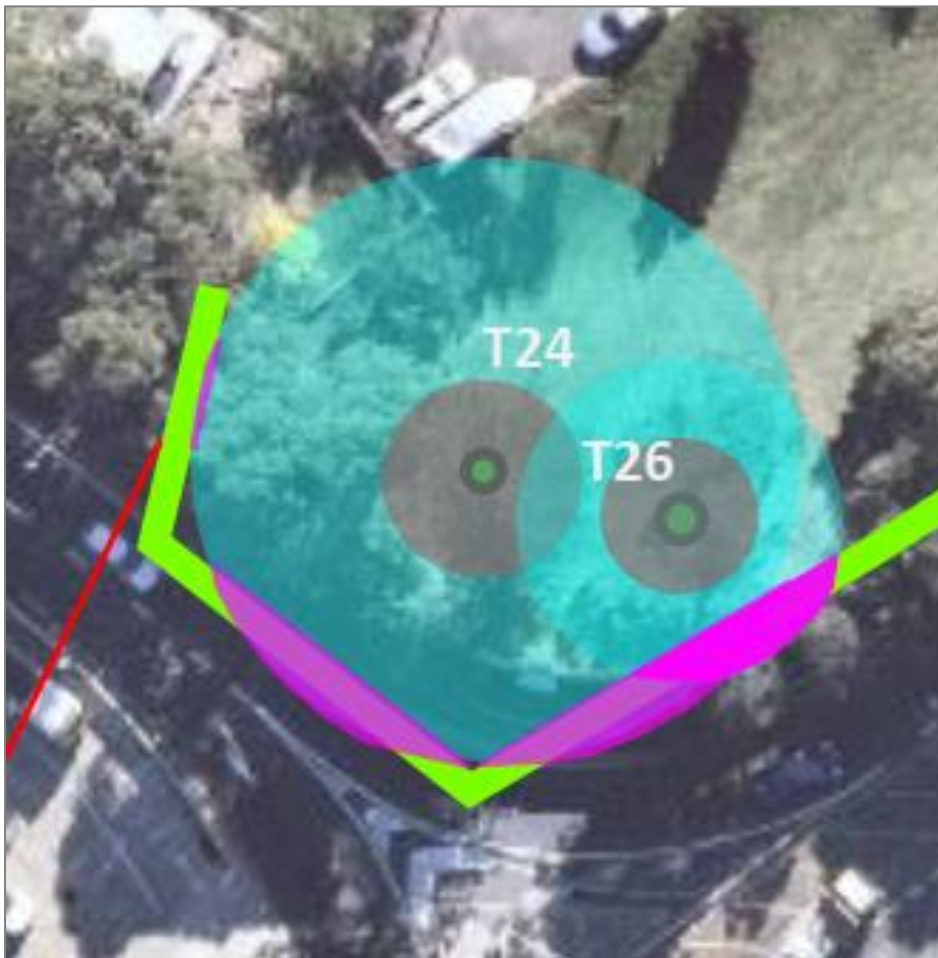
#### 2.4.21 Tree 24 – Norfolk Island Pine

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone impacts: Proposed works will incur a theoretical 12m<sup>2</sup> or 5% encroachment into the TPZ of this specimen (see Figure 1 below/next page). Under AS4970, encroachments less than 10% are considered minor. This level of encroachment is unlikely to reduce this trees viability.

- Pruning impacts: No pruning is foreseen to accommodate the proposed works.

#### 2.4.22 Tree 26 – Red Mahogany

- Structural Root Zone impacts: The proposed works are located outside the calculated SRZ of this tree.
- Tree Protection Zone impacts: Proposed works will incur a theoretical 5.4m<sup>2</sup> or 7.5% encroachment into the TPZ of this specimen (see Figure 2 below/next page). Under AS4970, encroachments less than 10% are considered minor. This level of encroachment is unlikely to negatively affect tree health and condition.
- Pruning impacts: No pruning is foreseen to accommodate the proposed works.



**Figure 2** – Tree 24 & T26. Blue shaded circle denotes TPZ, red shaded circle SRZ. Bright pink shading shows proposed encroachment from trenching. Marked up aerial photograph by C Hughes.



### 3 Recommendations

#### 3.1 Tree Removal

- 3.1.1 Trees to be retained at the Marsh Street site (Trees 24 and 26) to be marked up with either tape around stems or spray paint marks on stems to ensure the correct trees are retained.
- 3.1.2 Tree removals are subject to authority approval. No work should be carried out prior to receipt of approval.
- 3.1.3 Non-Destructive Digging (NDD) may allow an additional eleven (11) trees – Tree 22, 23, 25, 28, 29, 31-36 to be retained however this is subject to an AQF Level 5 Arboriculturist directly overseeing trenching works.
- 3.1.4 Tree removal works are to be carried out by an AQF Level 3 Arborist, shall be in accordance with the Work Health and Safety Act 2011 and the Work Health and Safety (WHS) Regulations 2011.
- 3.1.5 Tree removals are to be undertaken in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998) and Safe Work Guide to Managing Risks of Tree Trimming and Removal Work 2016.
- 3.1.6 Replanting is to be undertaken in accordance with Conditions B63A-B63C and ideally the mulch from tree removals is reused within the subject site.

#### 3.2 Minimising Impacts on Trees to be Retained

- 3.2.1 A Project Arboriculturist (PA) shall be engaged prior to further works commencing on the site. The PA must have a minimum Australian Qualification Framework Level 5 (AQF5) or above in Arboriculture.
- 3.2.2 Duties of the PA shall include, but not be limited to:
  - Liaising with the Project Manager/Head Contractor/Site Manager to confirm the tree protection fencing locations, construction access, and other specific tree protection requirements prior to site works commencing.
  - Inspection of Tree Protection Devices and supervision of works as recommended in this report or as specified in any Conditions of Consent associated with an approval.
- 3.2.3 All trees within the work zone, not directly affected, are required to have tree protection placed as per Tree Protection Measures Part 4.1 below, prior to and during works. Tree protection is to be as advised by Project Arborist and as per Appendix J – Tree Protection Devices.
- 3.2.4 Tree 2 - Canary Island Date Palm
  - Any ground-level change within 5m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
  - Tree Protection Fencing is to be placed a minimum 5m from the tree stem.
  - No pruning is approved.
  - Tree protection is to be placed as per Tree Protection Measures Part 4.1 below, prior to and during works.

### 3.2.5 Tree 3 - Canary Island Date Palm

- Any ground-level change within 5m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Tree Protection Fencing is to be placed a minimum 5m from the tree stem.
- No pruning is approved.
- Tree protection is to be placed as per Tree Protection Measures Part 4.1 below, prior to and during works.

### 3.2.6 Group 4 – Tallowood x 2

- Any ground-level change within 3m of the trees are to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Tree Protection Fencing is to be placed a minimum 4m from the tree stem.
- No pruning is approved.
- Tree protection is to be placed as per Tree Protection Measures Part 4.1 below, prior to and during works.

### 3.2.7 Group 5 – Weeping Bottlebrush x 12

- Any ground-level change within 2.5m of the trees are to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Tree Protection Fencing is to be placed a minimum 3m from the tree stem.
- No pruning is approved.
- Tree protection is to be placed as per Tree Protection Measures Part 4.1 below, prior to and during works.

### 3.2.8 Tree 6, 8, 9, Group 10, Tree 11-18 – Various species.

- All works are proposed on roadside of barrier wall, provided access is not required within nature-strip area that the trees are located, fence off 3.5m from the stem of Tree 6 to the south-east and block access to remaining trees.
- Open dialog is to be maintain with Project Arboriculturist should access to trees be required.

### 3.2.9 Tree 24 - Norfolk Island Pine

- Any ground-level change within 9m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Tree Protection Fencing is to be placed a minimum 8.5m from the tree stem.
- No pruning is approved.
- Tree protection is to be placed as per Tree Protection Measures Part 4.1 below, prior to and during works.

### 3.2.10 Tree 26 - Red Mahogany

- Any ground-level change within 5m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Tree Protection Fencing is to be placed a minimum 5m from the tree stem.
- No pruning is approved, tree protection is to be placed as per Tree Protection Measures Part 4.1 below, prior to and during works.

## 4 Tree Protection Measures

### 4.1 Tree Protection Devices

4.1.1 The tree protection is to be in accordance with the following:

- Tree Protection Devices (TPD) may include mulching, tree guards and other devices other than fencing.
- The TPD must be in place prior to any site works commencing, including clearing, demolition or grading.
- The most appropriate fencing for tree protection is 1.8m chainlink with 50mm metal pole supports. During installation, care must be taken to avoid damage to significant roots. The practicality of providing this fencing on this site must be addressed by the Arboriculturist.
- Locate large primary roots by careful removal of soil within the fencing area. Do not drive any posts or pickets into tree roots. Replace soil back over tree roots.
- Nothing should occur inside the tree protection fenced areas, so therefore all access is prohibited for personnel and machinery, storage of fuel, chemicals, cement and site sheds.
- Signage should explain exclusion from the area defined by TPD and carry a contact name for access or advice.
- The TPD cannot be removed, altered, or relocated without the project arborist's prior assessment and approval.

## 4.2 Stockpiling and Location of Site Sheds

- 4.2.1 Any ground identified for proposed stockpiling that is within the TPZ of trees to be retained shall be covered with thick, coarse mulch, placement of wooden pallets over the mulch, covering of the pallets with a tarpaulin (or similar), and the placement of materials on top of this device to prevent loose or potentially contaminating materials from moving into the soil profile.

## 4.3 Fill Material

- 4.3.1 Placement of fill material within the TPZ of trees to be retained should be avoided where possible. Where placement of fill cannot be avoided, the material should be a coarse, gap graded material such as 20 — 50mm crushed basalt or equivalent to provide some aeration to the root zone. Note that road base or crushed sandstone or other material containing a high percentage of fines is unacceptable for this purpose.
- 4.3.2 The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil.
- 4.3.3 A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade. No fill material should be placed in direct contact with the trunk.

## 4.4 Hygiene Practices

- 4.4.1 No washing or rinsing of tools or other equipment, preparation of any mortars, cement mixing, or brick cutting is to occur within 8m up slope of any palms/trees to be retained.

## 5 References

Barrell, J (1995) Pre-development Tree Assessment from Trees and Building Sites, Eds. Watson & Neely, International Society of Arboriculture, Illinois.

Hadlington, P. & Johnston, J. (1988) Australian Trees: Their Care & Repair. University of NSW Press, Kensington.

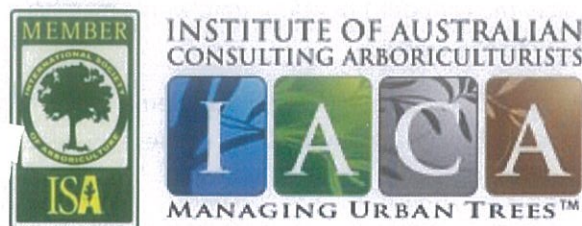
Mattheck, C. & Breloer, H. (1994) The Body Language of Trees: A handbook for failure analysis. Research for Amenity Trees No. 4, The Stationery Office, London.

Standards Australia AS4373-2007: Pruning of Amenity Trees, Standards Australia, Sydney.

Standards Australia AS4970-2009 Protection of trees on development sites, Standards Australia, Sydney.

Report prepared by

– November 2019



Consulting arboriculturist and horticulturist.  
Tree Surgery Certificate  
Advanced Certificate Urban Horticulture  
Diploma of Horticulture (Arboriculture) *Credit*  
ISA Tree Risk Assessment Qualification (TRAQ) 2016  
Accredited Member Institute of Australian Consulting Arboriculturists  
Member of the International Society of Arboriculture (ISA)

**6 Appendices**



## Appendix A - Terms and Definitions



**Aerial inspection:** where the subject tree is climbed by a professional tree worker/ arborist (typically AQF Level 3) specifically to inspect and assess the tree for signs of symptoms of defects, disease, etc.

#### **Age classes**

- Y** Young refers to an established but juvenile tree.
- SM** Semi-mature refers to a tree at growth stages between immaturity and full size.
- EM** Early-mature refers to a tree close to full sized still actively growing.
- M** Mature refers to a full sized tree with some capacity for further growth.
- LM** Late-Mature refers to a full sized tree with little capacity for growth that is not yet about to enter decline.
- OM** Over-Mature refers to a full sized tree with little capacity for growth that is entering or has entered decline.

**Co-dominant:** refers to stems or branches equal in size and relative importance.

**Condition/Structure:** refers to the tree's form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) and the state of the scaffold (i.e. trunk and major branches), including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition/structure.

**Deadwood:** refers to any whole limb that no longer contains living tissues (e.g. live leaves and/or bark). Some dead wood is common in a number of tree species.

**Diameter at Breast Height (DBH):** Refers to the tree trunk diameter at breast height (1.4 metres above ground level).

**Epicormic growth:** adventitious branches that are considered to be a weak attachment in the short term due to minimal wood formation. There are generally formed following storm-related branch breakage or poor pruning practices. Should sufficient holding wood form in the long-term this growth is less of an issue.

**Hazard:** refers to anything with the potential to harm health, life or property.

**Health:** Refers to the tree's vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion, and the degree of dieback.

**Inclusion stem/bark:** the pattern of development at branch or stem junctions where bark is turned inward rather than pushed out. This fault is located at the point where the stems/branches meet. This is normally a genetic fault and potentially a weak point of attachment as the bark obstructs healthy tissue from joining together to strengthen the joint.

**Scaffold branch/root:** a primary structural branch of the crown or primary structural root of the tree.

**Secondary Stem:** refers to stems or branches with one of unequal size and relative importance.

**SRZ:** refers to the Structural Root Zone of the tree, this is the area required for tree stability.

**SWSOOS:** acronym for 'southern and western suburbs ocean outfall sewer'.

**TPZ:** refers to the Tree Protection Zone of the tree, this is the primary method of protecting trees, it is a combination of the root area and the canopy and the SRZ is located within it.

**Visual Tree Assessment (VTA):** a procedure of defect analysis developed by Mattheck and Breloer (1994) that uses the growth response and form of trees to detect defects.



**Appendix B - ULE Guide**



## ULE categories (after Barrell 1996, Updated 01/04/01)

The five categories and their sub-groups are as follows:

1. Long ULE - tree appeared retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance:
  - a) Structurally sound trees located in positions that can accommodate future growth
  - b) Trees which could be made suitable for long term retention by remedial care
  - c) Trees of special significance which would warrant extraordinary efforts to secure their long term retention
2. Medium ULE - tree appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance:
  - a) Trees which may only live from 15 to 40 years
  - b) Trees which may live for more than 40 years but would be removed for safety or nuisance reasons
  - c) Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
  - d) Trees which could be made suitable for retention in the medium term by remedial care
3. Short ULE - tree appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance:
  - a) Trees which may only live from 5 to 15 years
  - b) Trees which may live for more than 15 years but would be removed for safety or nuisance reasons
  - c) Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
  - d) Trees which require substantial remediation and are only suitable for retention in the short term.
4. Removal - trees which should be removed within the next 5 years:
  - a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions
  - b) dangerous trees through 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 which may live for more than 5 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
  - f) Trees which are damaging or may cause damage to existing structures within the next 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

**Appendix C - STARS - Significance of a Tree Assessment Rating System**



## Appendix C - STARS - Significance of a Tree Assessment Rating System (IACA 2010)© (1 of 2)

The landscape significance of a tree is an essential criterion for establishing the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance and *Useful Life Expectancy* of an individual tree has been defined, the retention value can be determined.

### Tree Significance - Assessment Criteria

#### 1. High Significance in landscape.

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

#### 2. Medium Significance in landscape.

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area;
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street;
- The tree provides a fair contribution to the visual character and amenity of the local area;
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

#### 3. Low Significance in landscape.

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings;
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area;
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen;
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa *in situ* - tree is inappropriate to the site conditions;
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms;
- The tree has a wound or defect that has potential to become structurally unsound.

#### Environmental Pest / Noxious Weed Species:

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties;
- The tree is a declared noxious weed by legislation.

#### Hazardous/Irreversible Decline:

- The tree is structurally unsound and/or unstable and is considered potentially dangerous;
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

## Appendix C - STARS - Significance of a Tree Assessment Rating System (IACA 2010)© (2 of 2)

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are designed for individual trees only but can be applied to a monocultural stand in its entirety e.g. hedge.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd and Andrew Morton in June 2001.


		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
<p><u>Legend for Matrix Assessment</u></p> <div style="text-align: right;">  </div>						
	<p><b>Priority for Retention (High)</b> -These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i>. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.</p>					
	<p><b>Consider for Retention (Medium)</b> -These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.</p>					
	<p><b>Consider for Removal (Low)</b> -These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.</p>					
	<p><b>Priority for Removal</b> -These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.</p>					

Table 1 - Tree Retention Value - Priority Matrix.

IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, [www.iaca.org.au](http://www.iaca.org.au)

Appendix D - Record of Meetings and Design Input



attended the site inspections with the author in areas of night time only access (areas too close to the M5 to be inspected outside of M5 shut down – 17/4/2018) and on 25/5/2018.

attended the site inspection on 26/5/2018 with construction input.

Input from is provided below. No input from the Landscape Architect has been included as the tolling gantry design and location is not subject to any urban design or landscaping requirements.

were on site 8/11/2019 to discuss design issues at Marsh Street with contractor Engineers and Environment staff. Records of correspondence are included below.

---

**From:**  
**Sent:** Friday, 8 November 2019 3:15 PM  
**To:**  
**Cc:**  
**Subject:** FW: B63 Marsh St - Tree Report

Hi,

As per the below email could you arrange the amendment on the tree report as below.

Thanks,

---

**From:**  
**Sent:** Friday, 8 November 2019 3:13 PM  
**To:**  
**Cc:**  
**Subject:** RE: B63 Marsh St - Tree Report

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Thank you

I will let you know if anything else comes up. Could you also please get in contact with (the arborist) and see if she could include that noise wall diagram in the updated Tree Report as part of the justification for why mounting the ITS is not feasible.

Cheers,

---

**From:**  
**Sent:** Friday, 8 November 2019 2:58 PM  
**To:**  
**Subject:** RE: B63 Marsh St - Tree Report

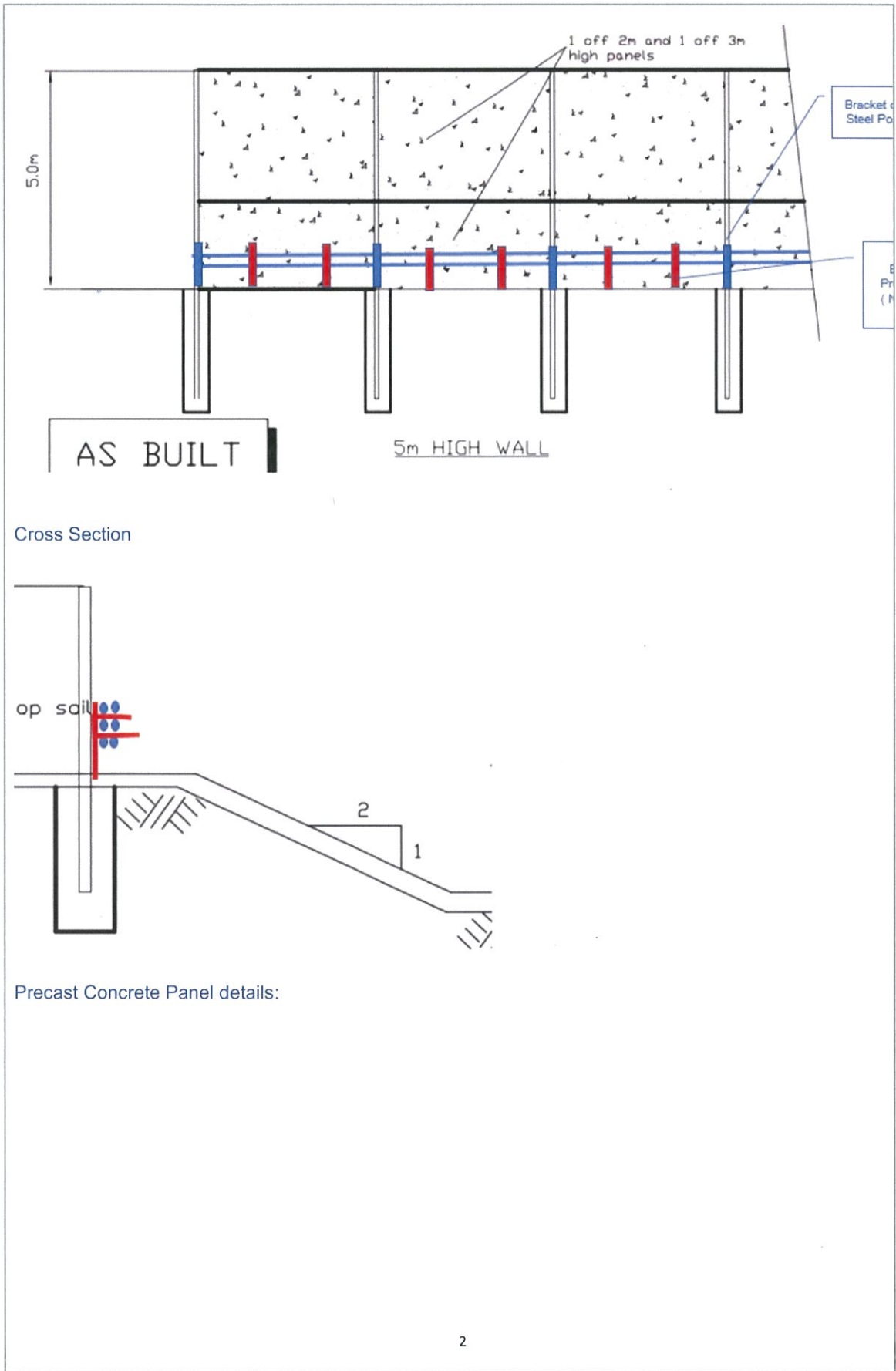
Hi

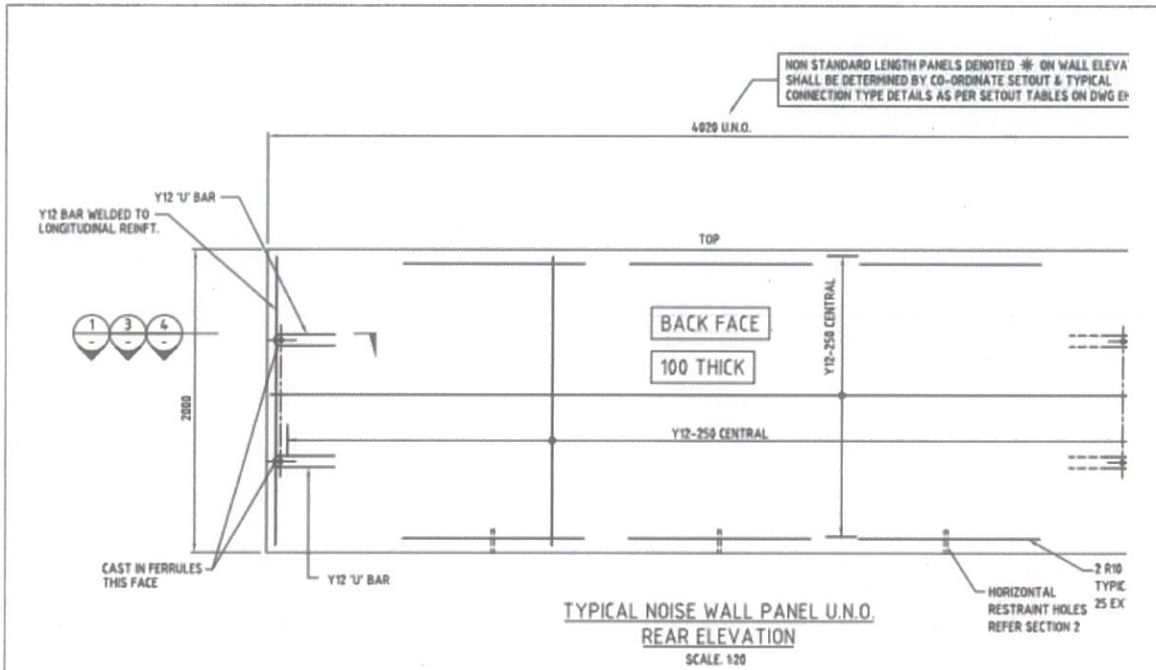
You are right on your comment.

The Noise Wall Posts are spacing 4.0 m and has Precast concrete Panels in between. The HDG steel conducts need brackets every 1.50 m and those brackets cannot be attached to the Precast Concrete Panels due to those panels are not design for that.

Elevation Noise wall







I remain at your disposal for any further information you might need.

Regards,

Surface Works -Civil West



Level 1, 30 Garema Circuit, Kingsgrove, NSW, Australia  
 T +61293813709 M 0436 123 991  
 E  
 www.westconnex.com.au



From :  
 Sent: Friday, 8 November 2019 2:35 PM  
 To:  
 Subject: B63 Marsh St - Tree Report

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Hi

Thankyou again for meeting me out on site today.  
I had a question about mounting the ITS on the noise wall. Juan I remember you justifying why this was not feasible but I can't remember why. I think it had something to do with the measurement of the support beams? Could you please remind me of those measurements.  
I think it might have been every 1.5 m was required but the current noise wall was 3 m?

Cheers,

**| Environmental Assessment Officer – Infrastructure Management**

**NSW Department of Planning, Industry & Environment**

320 Pitt Street, Sydney NSW 2000  
GPO Box 39, Sydney NSW 2001

E:



**Planning,  
Industry &  
Environment**



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*I respectfully acknowledge the traditional owners and custodians of the land I live and work on, and pay respect to all Elders past and present.*

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**From:**  
**Sent:** Tuesday, 12 June 2018 12:15 PM  
**To:**  
**Cc:**  
**Subject:** RE: Toll gantry design

Hi!

As requested, please refer to my green words shown below for your details to create the document. Please also note that the gantries at Bexley, Princes Highway, Marsh Street and South of Marsh Street are not finalised. All design constraints as mentioned below for those toll gantries are for your information only. Let me know if you have any questions.

Regards,

**From:**  
**Sent:** Friday, 8 June 2018 4:21 PM  
**To:**  
**Cc:**  
**Subject:** [EXTERNAL] Toll gantry design

Hi!

As discussed, we are seeking approval to remove trees associated with installation of the tolling gantries and associated infrastructure and require design advice in regards to the options assessed.

Are you able to advise for each of the proposed sites below, the relevant design constraints and whether there is opportunity to modify the locations to avoid the need for removal of trees:

#### King Georges Road

- potential to move any of the gantries further east to avoid the trees within the median strips and inside of the noise walls?

AJIV: This alternative design was considered in detail design stage, however this alternative proposal is not possible to make those tolling points work. Please refer to the constraints shown below for your information.

Tolling gantry at EB entry ramp (TP46B):

- 1) The tolling gantry will block the visibility from drivers to the directional sign mount on the Cooloongatta Road Bridge.
- 2) Tolling camera (scanner) will miss out to charge any vehicles drive through the wide shoulder. It will affect the KPI of this tolling point.
- 3) No enough spacing to construct the column footing and maintenance access path at the northern side of this gantry. It will impact to the existing structures (noise wall and retaining wall).

Tolling gantry at Main carriageways (TP46A&C):

- 1) Tolling camera (scanner) will miss out to charge any vehicles drive through the emergency bays in both direction of carriageways. It will affect the KPI of this tolling point.
- 2) The tolling gantry will be located too close to the new directional sign at the nearside of M5 Eastbound Carriageway. It will not achieve the sign legibility distance.

Tolling gantry at WB exit ramp (TP46D):

- 1) The area at the southern side of this tolling gantry is too narrow. There is no enough spacing to construct the column footing and maintenance access path. It will also impact to the existing noise wall structure.

#### Kingsgrove

- potential to move gantry (eg. 15 m eastward or westward) to avoid the group of trees north of the motorway near Arinya St?

AJJV: This alternative design was considered in detail design stage, however this alternative proposal is not possible to make this tolling point work. Please refer to the constraints shown below for your information.

- 1) The tolling gantry will block the existing directional sign on the nearside of M5 Eastbound Carriageway, also the sign legibility distance will not be achieved for the existing VMS sign at the nearside of M5 Eastbound Carriageway if move this gantry 15m further east.
- 2) If move this gantry 15m further west, it will too close to the existing variable speed signage structure. It will within the detection envelop of the tolling camera, that will affect the KPI of this tolling point.
- 3) In addition, the footing at the northern side of gantry will impact to the existing shared path. It will block the pathway to go in the path under the bridge if move this gantry 15m further west.

#### Bexley

- potential to move either of the gantries eastward to avoid trees in median strip and reduce length of ITS (and therefore length of clearing required)?

AJJV: This alternative design has been considered, however it is not possible to make this tolling point work. Please refer to the constraints shown below for your information.

- 1) The footing will clash with the existing 4 conduits under the M5 Eastbound Carriageway.
- 2) It will be too close to the existing directional sign at the offside of M5 Eastbound Carriageway. It will within the detection envelop of the tolling camera, that will affect the KPI of this tolling point.

- potential to run ITS along footpath in order to avoid clearing trees?

AJJV: Agreed. The design will be revised.

#### Princes Highway

- potential to move gantry (eg. 10 m east) and/or widen gantry so that footings fall clear of the trees either side of the ramp?

AJJV: This alternative design has been considered, however it is not possible to make this tolling point work. Please refer to the constraints shown below for your information.

- 1) This gantry cannot move 10m east further because there has a diverging lane behind the gantry. The tolling camera (scanner) will miss out to charge the vehicles when these vehicles start to turn into this diverging lane. It will affect the KPI of this tolling point.
- 2) The footing at the southern side of gantry can't extend outside the existing trees area because the footing will be build outside our owned property.

#### Marsh Street

- potential to move tolling points inside the tunnel?

AJJV: We have considered this alternative for a few time. However, the tolling points (TP42B and TP42D) cannot moved inside the tunnel. Please refer to the constraints shown below for your information.

- 1) It will not achieved the minimum vertical clearance 7.1m as requested from Kapsch for the tolling camera (scanner).
- 2) Here has a maintenance issue, because there have no maintenance access to go to these gantries if gantries installed in tunnels.

- Off-ramp gantry: potential to move technical shelter further northward or eastward to avoid trees?

AJJV: The technical Shelter can't move to the eastern side because it will install outside our property. Move the technical Shelter to northern side is not acceptable as well, because it will clash with the existing MCC facilities.

#### M5 Motorway, south of Marsh St

- Potential to move gantries further south to avoid trees in median strips?

AJV: The tolling gantry can't move further east because it will clash with the existing variable speed sign structure. Also a gantry footing will clash with the existing light pole at the northern side of this gantry.

Attached are some marked up aerials with the design relative to the affected trees for reference.

Kind Regards



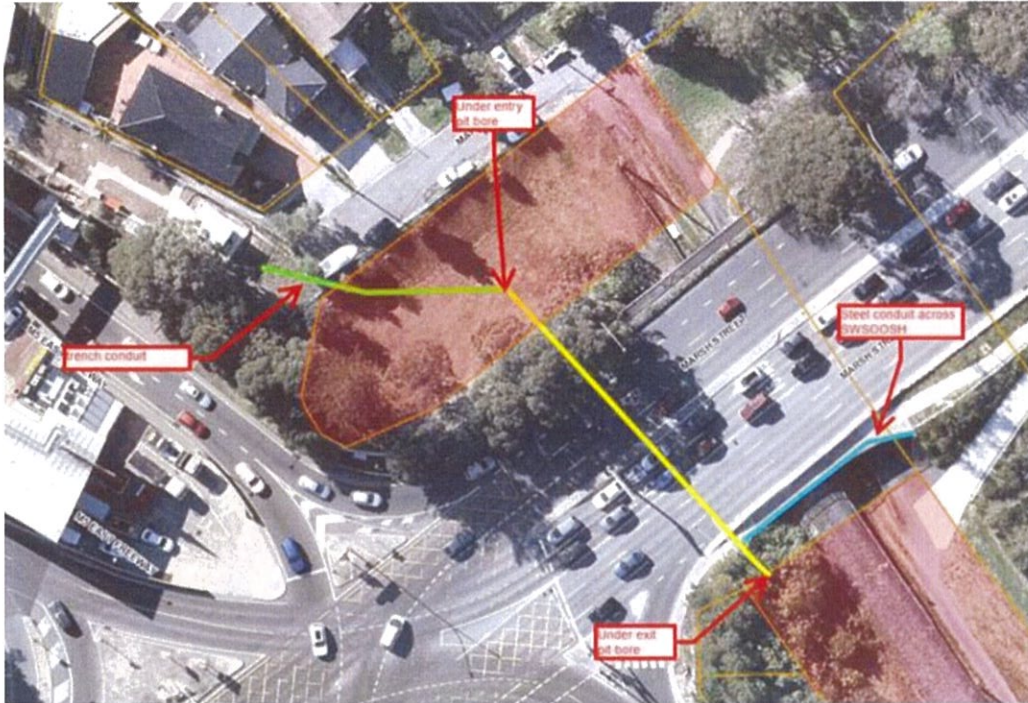
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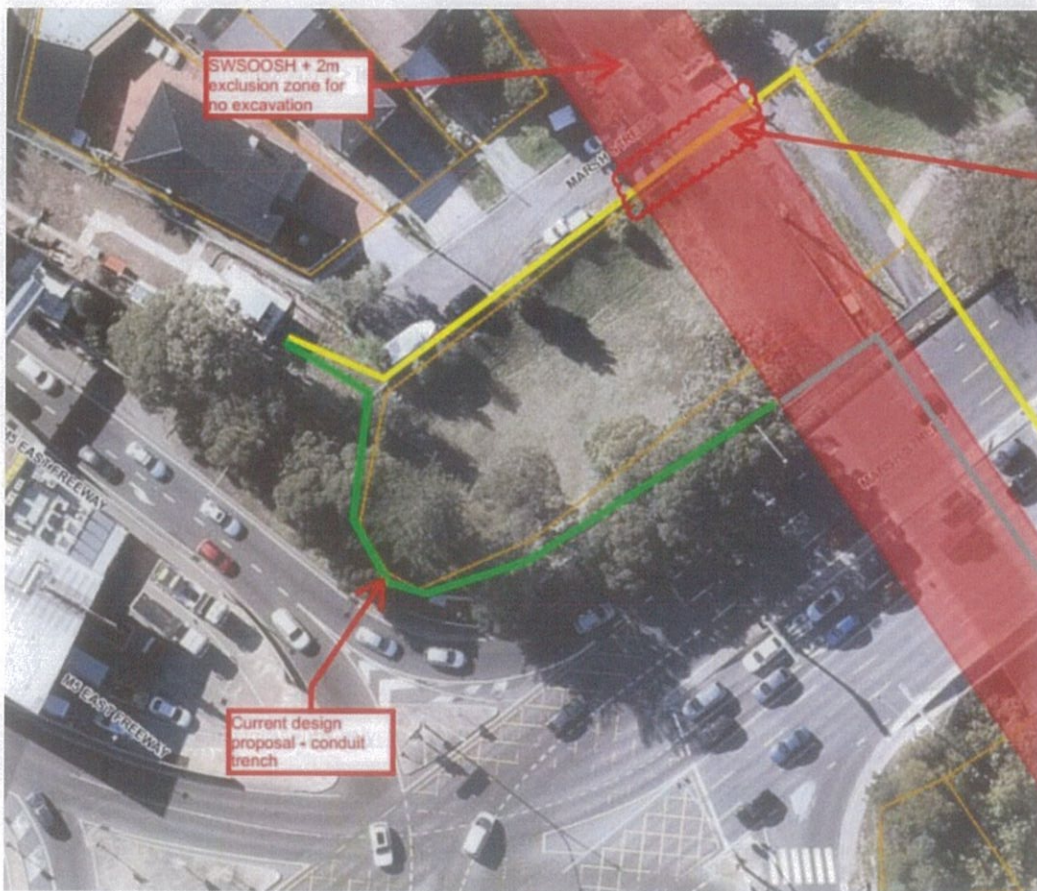
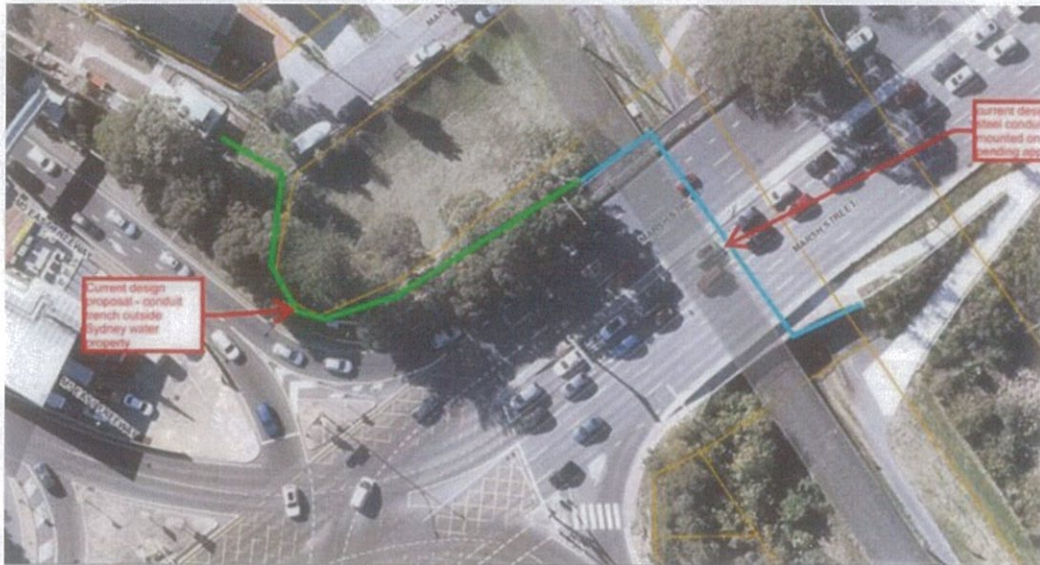
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**From:**  
**Sent:** Tuesday, 1 October 2019 5:36 PM  
**To:**  
**Cc:**  
**Subject:** RE: Tree Report Comments

Original design was to have under bore as per below, SMC advised the adjacent land belongs to Sydney water and SMC/RMS will not be able to gain land acquisition for the required under bore and trenching works. SMC requested an alternate design to mount steel conduit on the bridge capping beam.



Alternate design below





1. there is a 2m buffer zone parallel to the SWSOOSH, which mean we will not be able to trench alongside or across the SWSOOSH. If we were to excavate a trench (in yellow) we would be inside the exclusion zone.
2. Mounting on the Wall – Note the conventional way of installing conduits is to trench them underground wherever possible unless any obstruction (ie SWSOOSH). Design assessment will be required to mount 6 steel conduits along with RMS approval. Support for steel conduit required every 1.5m which means support will be required on the noise wall concrete panels. This will impact the loading on the wall which it is not designed for along with future maintenance hence this option has not been investigated.

WestConnex New M5



Level 6, Building B, 197-201 Coward Street, Mascot, NSW, Australia

[www.westconnex.com.au](http://www.westconnex.com.au)

**From:**  
**Sent:** Tuesday, 24 September 2019 4:02 PM  
**To:** f  
**Subject:** RE: Tree Report Comments

When we have our ducks in a row, I will communicate this all to  
Just trying to avoid going back and forward with

**From:** f  
**Sent:** Tuesday, 24 September 2019 3:31 PM  
**To:** f  
**Subject:** RE: Tree Report Comments

Hi

My email below was in regards to the Marsh street site just to clarify. Please reply with answers below.

I understand that there is a design change for one of the sites? Can you provide me with those details and also when you have organised to assess the changes?

Thanks,

**From:**  
**Sent:** Tuesday, 24 September 2019 7:57 AM  
**To:**  
**Subject:** RE: Tree Report Comments

Hi :

Yes – I've read those two emails but they don't provide the information that DPE are looking for. Can you please review my emails below in particular in regards to:

- why we can't trench the opposite direction around the Sydney Water easement ,and
- why mounting on the noise barrier is not possible.

Thanks

---

**From:**  
**Sent:** Thursday, 19 September 2019 3:31 AM  
**To:**  
**Subject:** RE: Tree Report Comments

see attached two email should answer all you queries.



Level 6, Building B, 197-201 Coward Street, Mascot, NSW, Australia  
T  
E  
[www.westconnex.com.au](http://www.westconnex.com.au)

---

**From:**  
**Sent:** Wednesday, 18 September 2019 4:37 PM  
**To:** F  
**Subject:** RE: Tree Report Comments

Just a follow up – can you add any more detail to the “Options Assessment”?

#### 1.2.1. Marsh Street Interchange

Options were considered to avoid or eliminate the impact to trees in this area:

1. Underbore from Sydney Water easement to south eastern side of Marsh Street: Due to the location of the Southern and Western Suburbs Ocean Outfall Sewer (SWOOS) within the proposed underbore area (Sydney Water Asset) this methodology was not deemed feasible.
2. Trenching across the Sydney Water easement: Trenching works cannot be conducted through the area due to limited ground cover over the SWOOS.
3. Trench to the north east of the easement and along Marsh Street (Cul-De-Sac to the north of easement): This option was considered but deemed not possible as the outfall channel flows in that direction towards Cooks River.
4. Secure the ITS along the noise barrier: was also considered but.....
5. Trench along the current M5 noise wall (South west of the Sydney Water easement): This option has been considered to most appropriate.

#### 1.2.2. Princes Highway - ITS

Options have been considered to reduce the number of trees to be impacted in this area:

1. Fix ITS cable to the noise barrier: It was proposed to have the ITS cable fixed to the noise barrier which runs to the north of the current M5 exit. This would eliminate the need to remove trees for trenching. This is subject to approval from Ventia and RMS.
2. Trench along the current M5 noise barrier:

Also it might be a good to have \_\_\_\_\_ come out again to ensure she has surveyed all the trees. Her report said that it was hard to see as it was dark so some may have been missed.. probs not a great thing to say!

– know you are on nights so you should have plenty of time to get back to me ASAP 😊 Thanks!

**From:**  
**Sent:** Wednesday, 18 September 2019 11:44 AM  
**To:**  
**Cc:**  
**Subject:** Tree Report Comments

Hi

We received comments back from RMS about the Tree Report for ITS along Marsh Street and Princes Highway. We also had a meeting with DPE yesterday and they are interested in seeing how we considered all options.

1. Why did we leave the Princes Highway, Marsh Street and M5 East Cooks River tunnel till now? Was it waiting for final design?
2. Changes to the underbore methodology at Marsh Street was only just discovered now as Sydney Water refused us entry to the easement? Is this where the Southern and Western Suburbs Ocean Outfall Sewer is?
  - a. Can we mount the ITS on the noise barrier like we are doing at Princes Highway?
  - b. Can we trench to the north east instead and miss the trees to the south west?
  - c. Please refer to the attached drawing mark-up
3. Why did the technical shelter access change? Removed the requirement to have three lots of land? I know this is a positive as we can now mount the ITS on the noise barrier but consideration needs to be provided.
4. Will we have \_\_\_\_\_ go out to site again and assess the additional trees at the Princes Highway tech shelter?

Any details that can be provided would be great so we can respond to RMS and get it submitted for DPE approval ASAP!

Let me know if you need anything clarified.

Thanks,



Level 7, Building B, 197-201 Coward Street, Mascot, NSW, Australia  
M  
E  
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Appendix E - M5 East Planting Schedule for Marsh Street



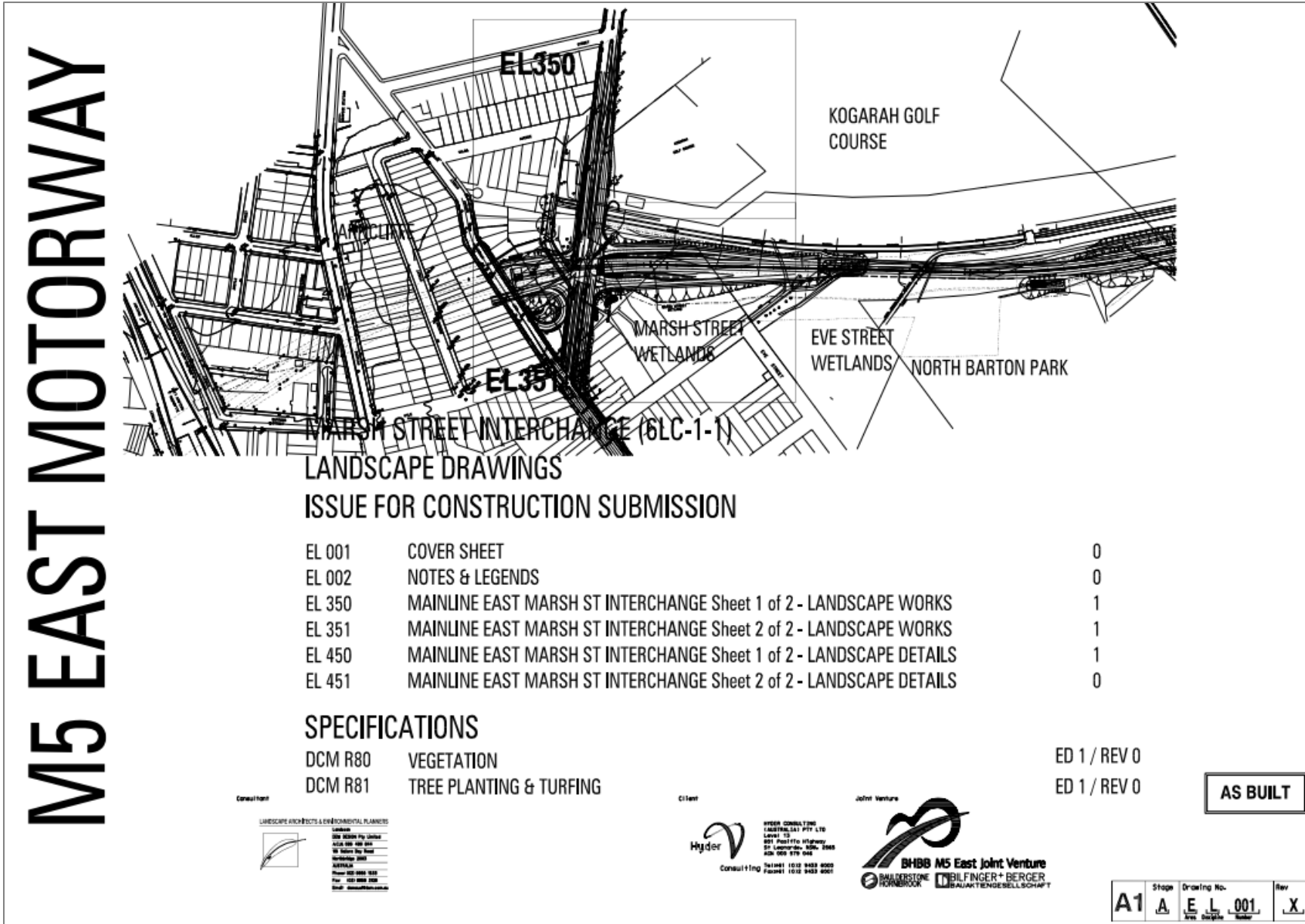


Figure 1 – M5 East Planting Schedule excerpt.

# M5 EAST MOTORWAY

THESE LEGENDS ARE TO BE READ  
IN CONJUNCTION WITH THE PLANS

## TREE PLANTING LEGEND

	TRAsm05-09	Acmena smithii
	TRBin05-09	Banksia integrifolia
	TRCan05-09	Cupaniopsis anarcardoides
	TRCre05-09	Eleocharis reticulatus
	TRCfe05-09	Glachidion ferdinandi
	TRMqu05-09	Melaleuca quinquinervia
	TRSpa05-09	Syzygium paniculatum
	TREbo05-09	Eucalyptus botryoides

## LEGEND

	MX0050	MARSH STREET RAMPS
	MX0051	TIDAL CHANNEL
	MX0052	SALT MARSH AREAS
	MX0053	WATER QUALITY CONTROL PONDS
	MX0054	
	MX0055	FROG HABITAT/ FROG CROSSING
	MX0056	SWOOS/7 WETLAND EDGE
	MX0057	WETLAND EDGE

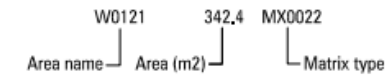
## GUIDE TO PLANTING LABELS & AREA SCHEDULE

### PLANT LABELS (on drawing)

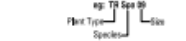


Drawings are to be used in conjunction with **Plant Schedule & Schedule of Areas** (separate document)  
Refer to Schedule of Areas for the quantity, size & species of plants within each area  
Area Names: denote location as: W/E/West, C/S Central & E/East

### SCHEDULE OF AREAS (separate document)



### PLANT CODE KEY



PLANT TYPE	SIZE CODE		
TR Tree	01	10x30	01 25L
SH Shrub	02	10x30	08 25L
GC Groundcover	03	Grass	09 75L
GR Grasses	04	2.2L	10 100L
MG Meadow Grasses	05	SL	11 200L
HC Herbs	06	75L	12 400L
WP Water Plant			13 Specimen

**NOTE**  
ALL MATRIX TYPES DO NOT HAVE DETAILED LAYOUTS  
BE SINGLE SPECIES, TURF. THE CONTRACTOR IS  
TO SITUATE THE PLANTS EVENLY AT THE REQUIRED  
SPACING CALCULATED BY DIVIDING THE  
AREA DRAWN WITH THE QUANTITY OF PLANTS

### PLANT SCHEDULE

This provides a total quantity for plants to the design lot.

**AS BUILT**

Consultant

LANDSCAPE ARCHITECTS & ENVIRONMENTAL PLANNERS

NEW DESIGN Pty Limited  
1/22, 100-104 104  
100 Collins St West  
Melbourne 3003  
AUSTRIA  
Phone: 03 9396 1515  
Fax: 03 9396 228  
Email: design@newdesign.com.au

Client

HYDER CONSULTING  
(AUSTRALIA) PTY LTD  
Level 13  
501 Princes Highway  
300 Lonsdale, VIC 3180  
A/CN 929 979 990

Consulting Tel: 03 9432 8000  
Fax: 03 9432 9000

Joint Venture

**BHBB M5 East Joint Venture**

BAUERSTONE HORN BROOK BILFINGER + BERGER  
BAUAKTIENGESELLSCHAFT

Stage	Drawing No.	Rev
A1	E.L.002	X

Figure 2 – M5 East Planting Schedule excerpt.

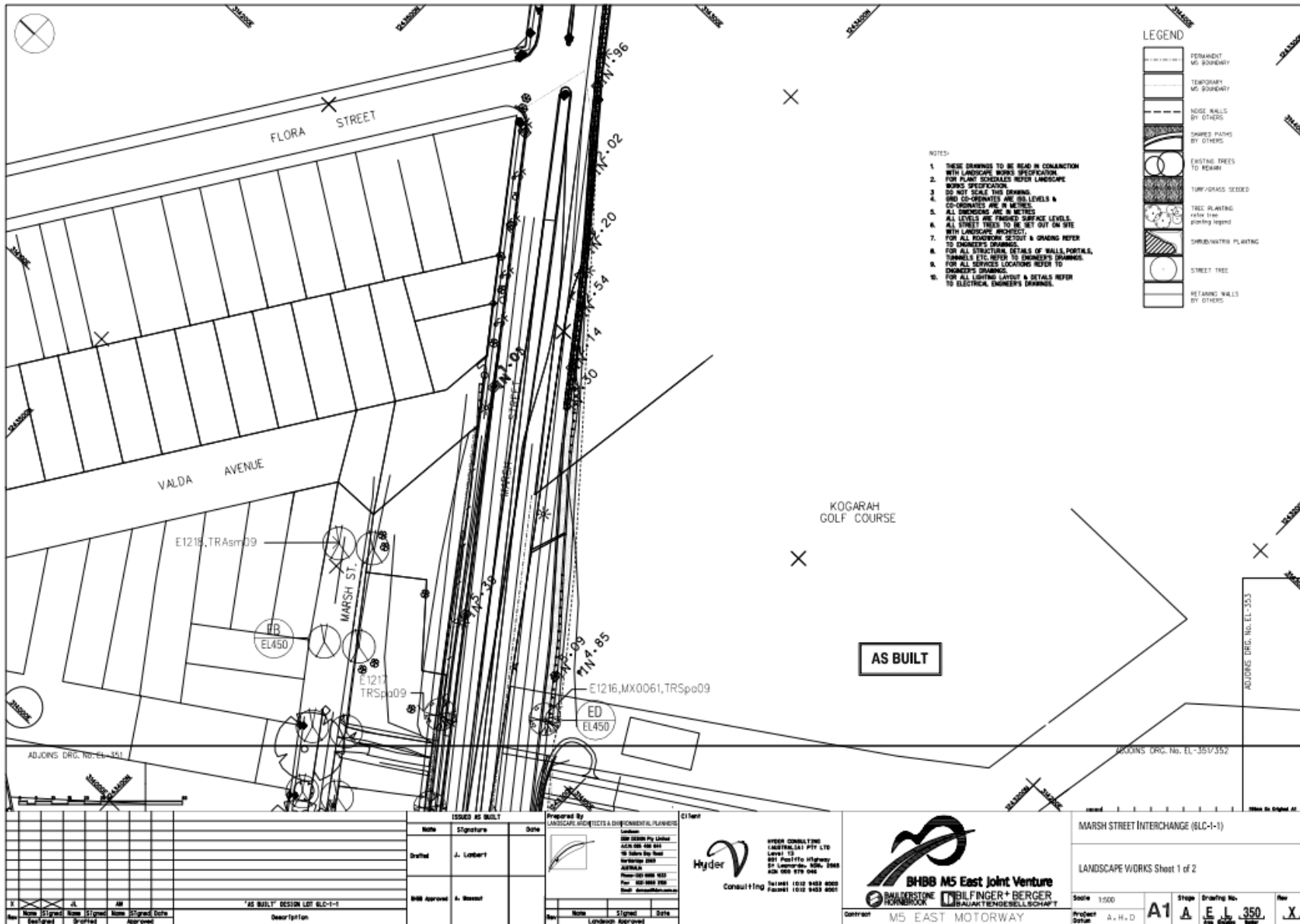


Figure 3 – M5 East Planting Schedule excerpt.

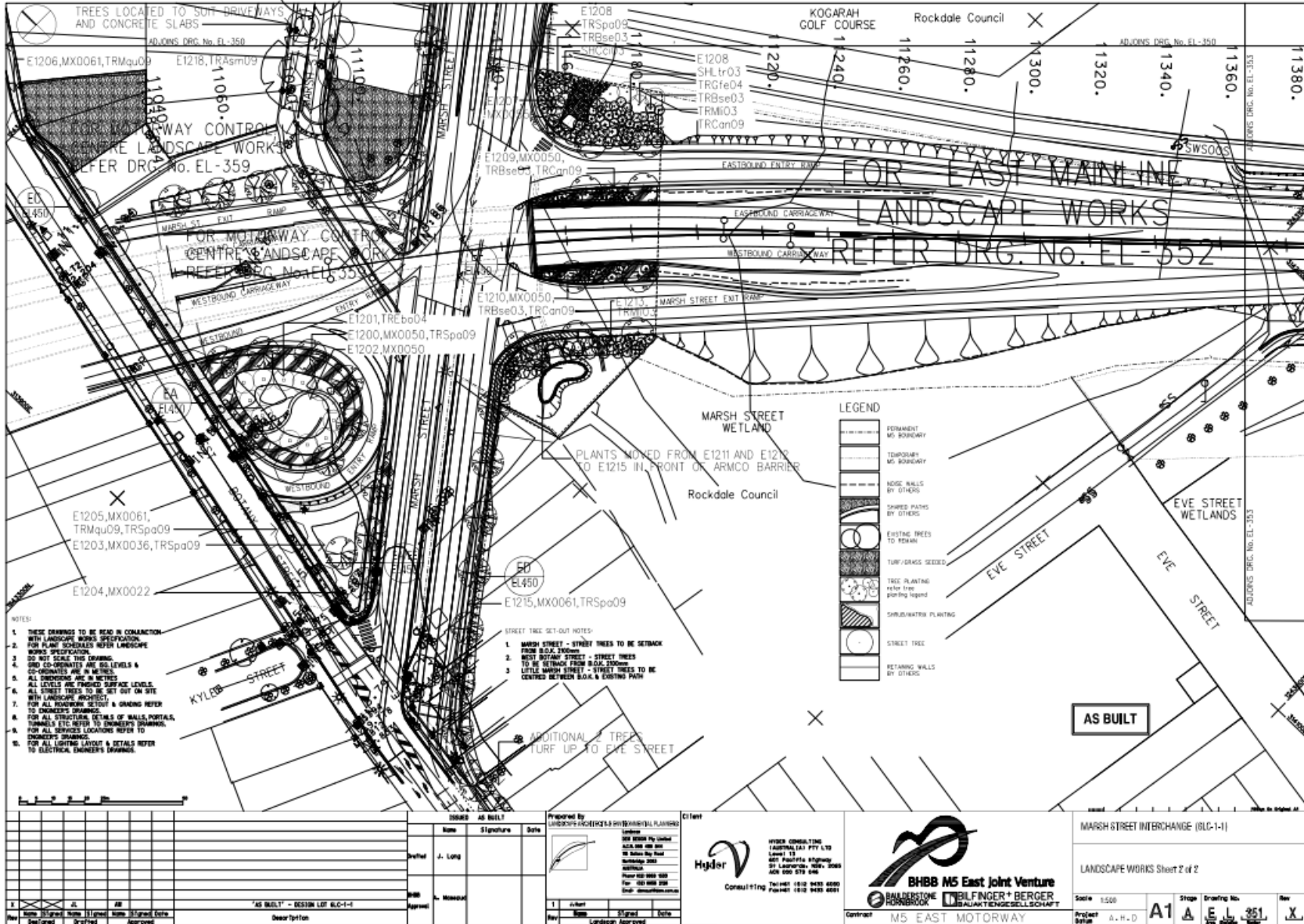


Figure 4 – M5 East Planting Schedule excerpt.



## Appendix F - Site Overview Map



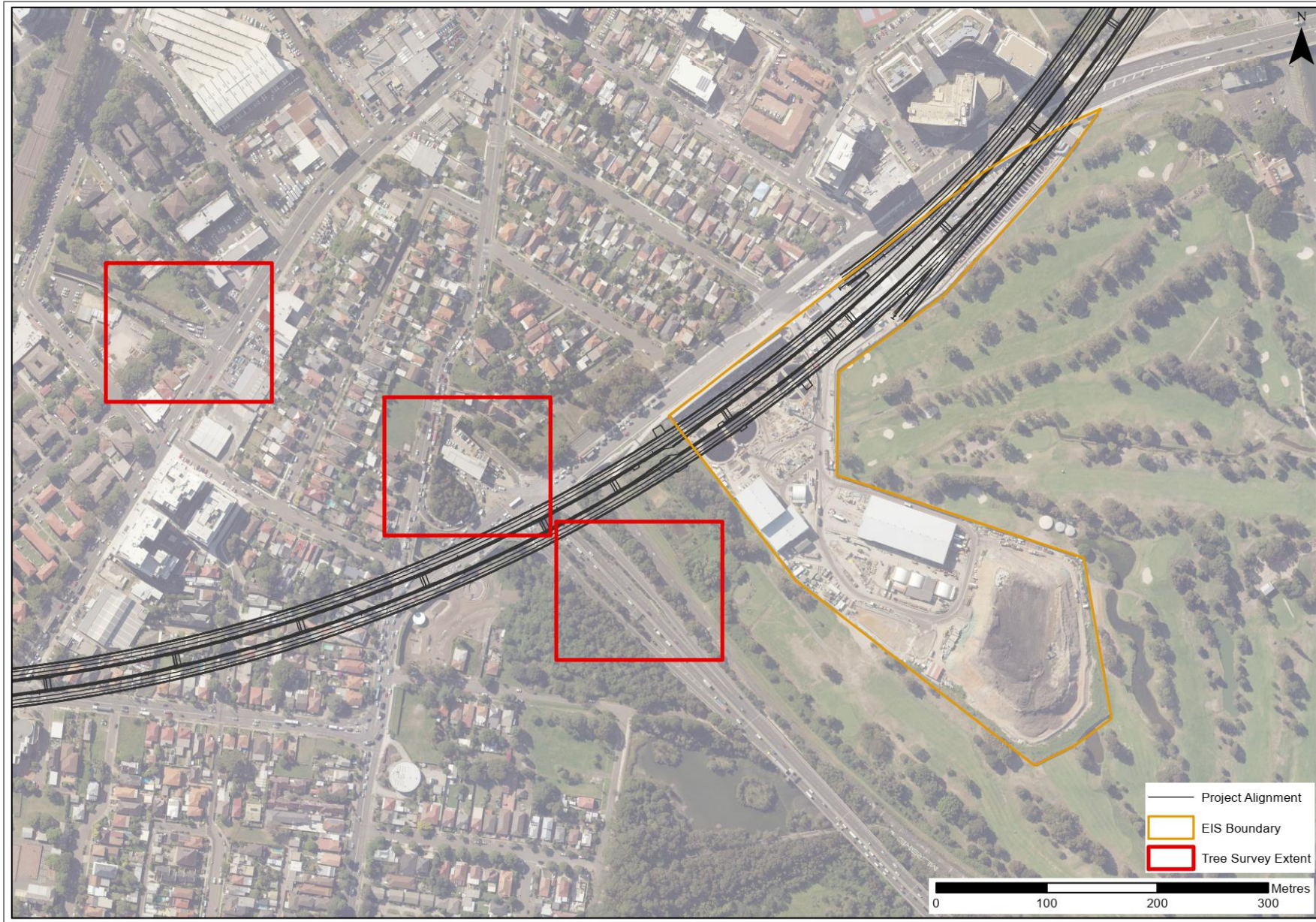


Figure 5 – Site Overview.

## Appendix G - Proposed Design



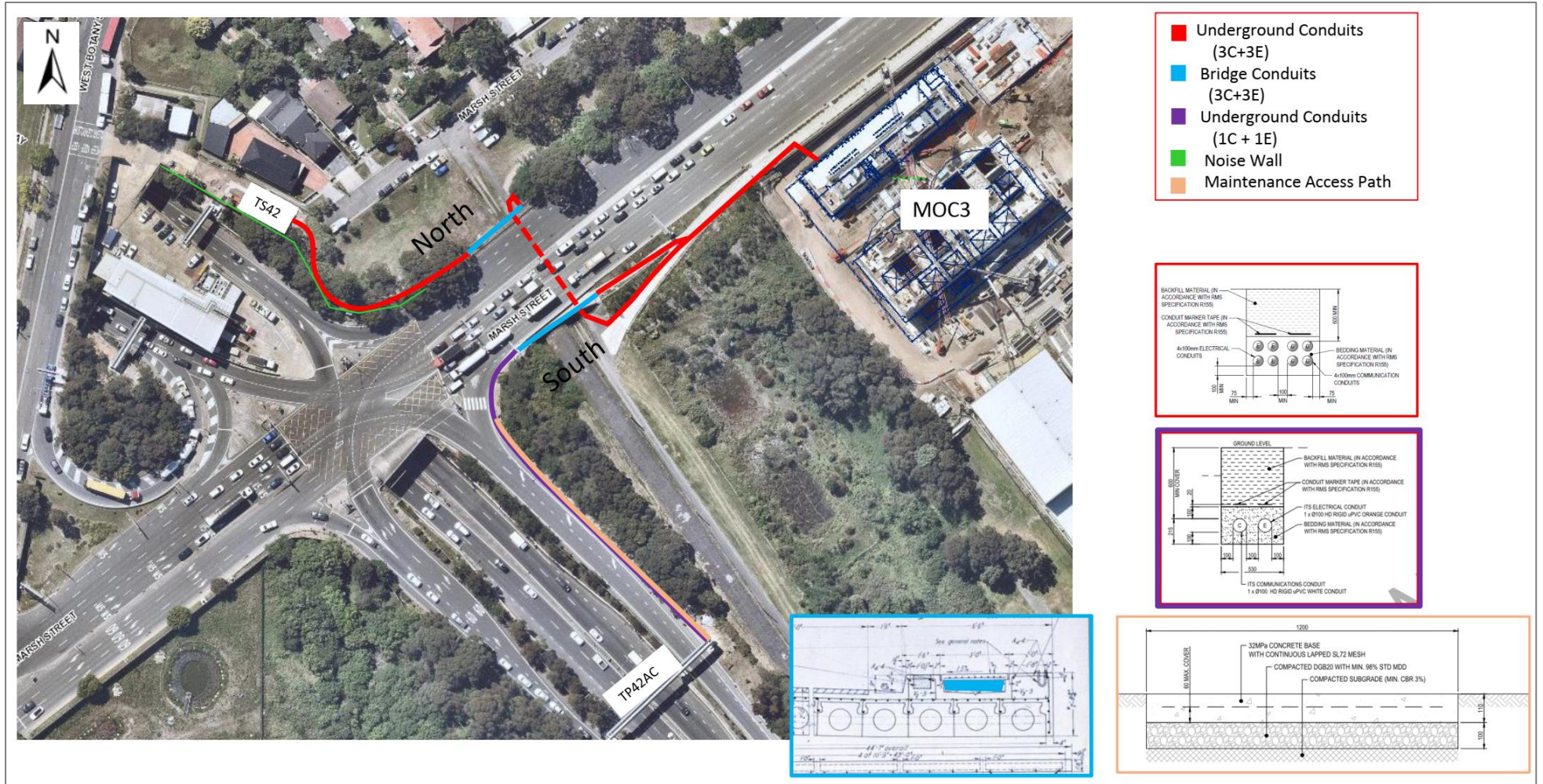


Figure 6 – Proposed conduit and access path locations. Existing noise wall location.

## Appendix H - Tree Location Maps





Figure 7 – Princes Highway interchange. Scaled aerial mapping marked up by [red dotted circles] Red dotted circles denote SRZ, TPZ noted with green hashed circle.

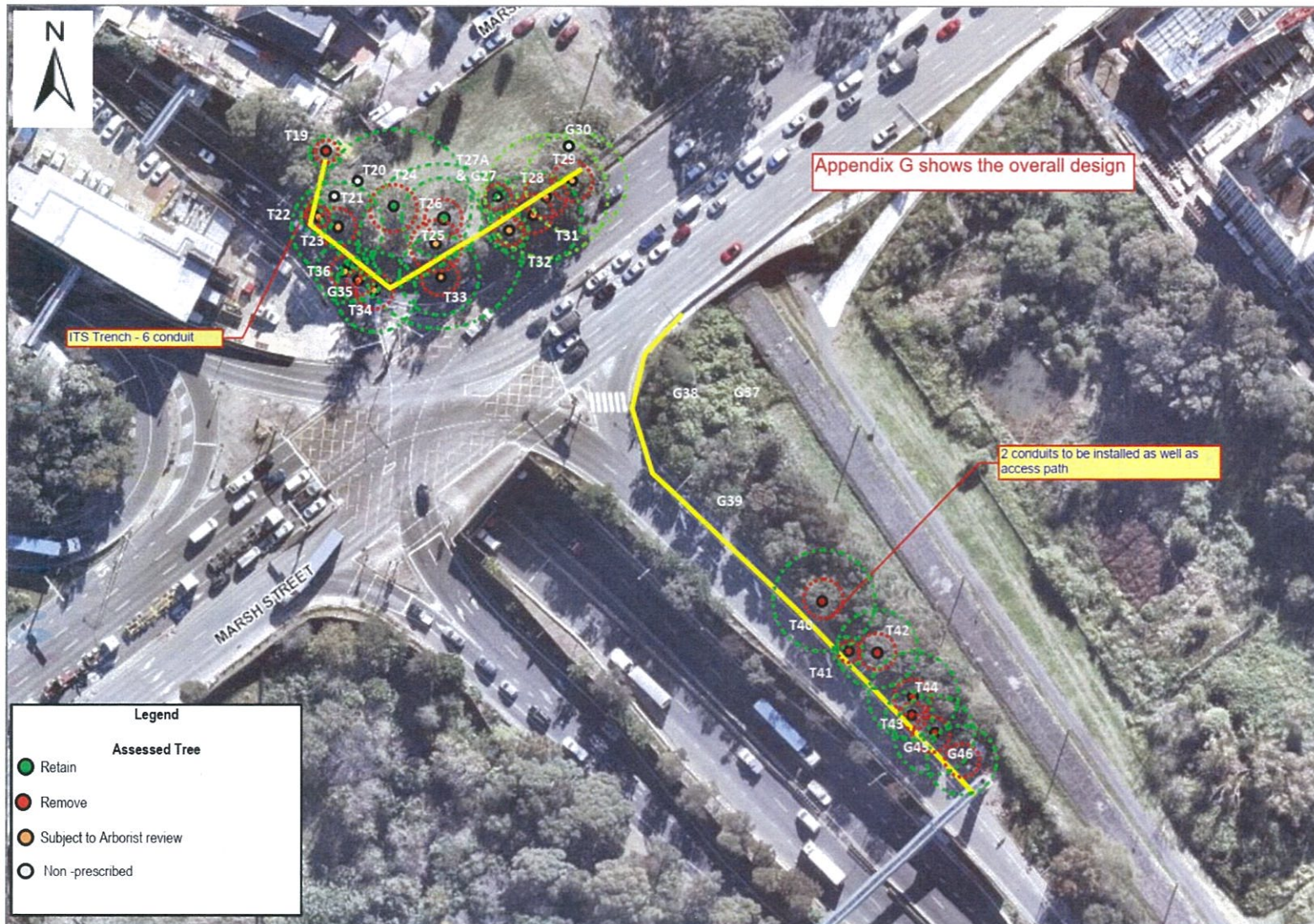


Figure 8 – Marsh St interchange. Scaled aerial mapping marked up by [redacted]. Red dotted circles denote SRZ, TPZ noted with green hashed circle.

## Appendix I - Photographs







Plate 1- Google Maps Street View capture of T24 Norfolk Island Pine. This tree is a significant tree in good health and condition.



Plate 2 – Google Maps Street View noting a section of G39. A planted row of established Tuckaroo.



Plate 3 –Trees 28 & T29 are highly visible and in good health leading to a high Retention Value (RV).



Plate 4 – Google Maps Street View  
noting T32 & T33

## Appendix J - Schedule of Assessed Trees

M5 Site inspection 21 August 2018.

Numbers in brackets relate to previous report – Tolling Gantries, Rev 5 updated September 2018



Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)
<b>Princes Highway</b>														
<b>T1</b>	<i>Ficus benjamina</i> <b>Benjamin's Fig</b>	6	6	AB 400	M	G	G	Introduced exotic species. Multiple Stems @ 0.1m AGL.	2C	M	M	2.3	4.8	72
<b>T2</b> (T98)	<i>Phoenix canariensis</i> <b>Canary Island Date Palm</b>	4.5	8	600	EM	G	G	Introduced exotic species. No true/clear stem. Frond tips displaying wind damage.	5A	L	L	N/A	5	78
<b>T3</b> (T97)	<i>Phoenix canariensis</i> <b>Canary Island Date Palm</b>	3	8	400	EM	F	P	Introduced exotic species. Palm has been recently set fire to. One live frond remains, palm recovering and vigorous.	5A	L	L	N/A	5	78
<b>G4</b> (G97A)	<i>Eucalyptus microcorys</i> <b>Tallowwood X 2</b>	8-9	6-8	200- 225	EM	F	F-P	Introduced native species. Located hard against sound wall.	2A	M	M	1.9	2.7	23
<b>G5</b>	<i>Melaleuca (nee Callistemon) viminalis</i> <b>Weeping Bottlebrush X 12</b>	3-4.5	4-6	150- 200	EM- M	F-P	P	Introduced native species. Located hard against sound wall. Previously exposed to fire, only epicormic growth live.	5A	L	L	1.8	2.4	18
<b>T6</b>	<i>Phoenix canariensis</i> <b>Canary Island Date Palm</b>	4.5	5	600	EM	F-G	P	Introduced exotic species. Subject to recent fire exposure, main (centre) fronds live and vigorous.	5A	L	L	N/A	3.5	39
<b>T7</b>	<i>Melaleuca (nee Callistemon) viminalis</i> <b>Weeping Bottlebrush</b>	-	-	-	-	-	-	Dead.	4A	L	L	-	-	-
<b>T8</b>	<i>Eucalyptus microcorys</i> <b>Tallowwood</b>	10	6	150	EM	G	F	Introduced native species. Recently exposed to fire, lower foliage dead, new epicormic growth is vigorous.	2A	M	M	1.5	2	10
<b>T9</b>	<i>Eucalyptus microcorys</i> <b>Tallowwood</b>	10	6	150	EM	G	G	Introduced native species. No special problems noted at time of assessment.	2A	M	M	1.5	2	10

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)
G10	<i>Melaleuca</i> sp. X 4	4	4	Up to 150	M	G	G	Native species. No special problems noted at time of assessment.	5A	L	L	1.5	2	10
T11	<i>Phoenix canariensis</i> Canary Island Date Palm	4.5	8	600	Y-EM	G	G	Introduced exotic species. No special problems noted at time of assessment.	5A	L	L	N/A	5	78
T12	<i>Eucalyptus microcorys</i> Tallowwood	10	6	150	EM	G	G-F	Introduced native species. Base of stem growing through canopy of T11.	2A	M	M	1.5	2	10
T13	<i>Eucalyptus microcorys</i> Tallowwood	10	6	150	EM	G	F-P	Introduced native species. Deep cracks into cambium.	3A	M	M	1.5	2	10
T14	<i>Eucalyptus microcorys</i> Tallowwood	11	8	200/ 300/ 300	M	G	G	Introduced native species. Trifurcate at ground level.	2A	M	M	2.5	5.8	104
T15	<i>Phoenix canariensis</i> Canary Island Date Palm	4	6	450	Y-EM	G	G	Introduced exotic species. No special problems noted at time of assessment.	5A	L	L	N/A	4	50
T16	<i>Eucalyptus microcorys</i> Tallowwood	12	8	300	M	G	G	Introduced native species. Lopped limbs over sound wall.	2A	M	M	2.0	3.6	41
T17	<i>Eucalyptus microcorys</i> Tallowwood	14	9	550	M	G	G	Introduced native species. No special problems noted at time of assessment.	1A	M	H	2.6	6.6	137
T18	<i>Angophora costata</i> Sydney Red Gum	4	3	AB 200	Y	G	G-F	Locally native species. Multiple stems @ ground level.	5A	M	M	1.7	2.4	18
<b>Marsh Street Interchange</b>														
T19 (T65)	<i>Acacia podalyriifolia</i> QLD Silver Wattle	3	6	150	M	G	G	Introduced native species, naturalised. Strong lean to north due to surround tree suppression, low to ground.	5A	L	L	1.5	2	10
T20	<i>Olea europaea</i> subsp. <i>europaea</i> Feral/European Olive	4.5	6	225	M	G	G-F	Introduced exotic species. This species is a declared weed under the Biosecurity Act 2015.	4E	L	L	-	-	-

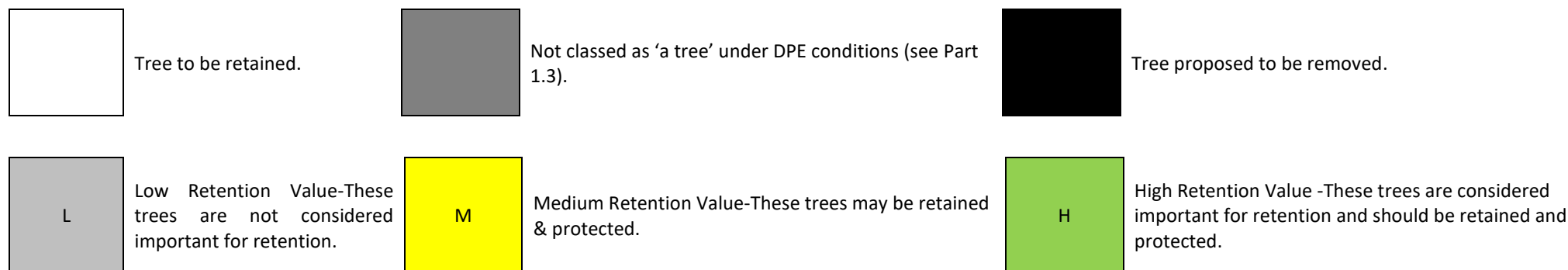
Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)
T21	<i>Olea europaea</i> subsp. <i>europaea</i> <b>Feral/European Olive</b>	4	6	AB 175	EM-M	G	G	Introduced exotic species. This species is a declared weed under the Biosecurity Act 2015.	4E	L	L	-	-	-
T22	<i>Morus</i> sp. <b>Mulberry</b>	4	2	150	EM	G	F	Introduced exotic species. Lopped and only suckering growth remains.	4E	L	L	1.5	2	10
T23	<i>Eucalyptus</i> sp. (poss <i>E. resinifera</i> ?) <b>Red Mahogany?</b>	14	10	450	M	G	G-F	Native species, likely locally native species. Deadwood to 40mm present, epicormic growth in lower canopy.	1A	H	H	2.4	5.4	92
T24	<i>Araucaria heterophylla</i> <b>Norfolk Island Pine</b>	22	8	725	M	G	G	Introduced native species. No special problems noted at time of assessment.	1A	H	H	2.9	8.8	241
T25	<i>Eucalyptus</i> sp. (poss <i>E. globulus</i> subsp. <i>bicostata</i> ) <b>Southern Blue Gum?</b>	14	14	AB 800	M	F	P	Native species. Large dead section over sound-wall/roadway. Mainly epicormic growth. Secondary stem @ .5m AGL.	3A	M	L	3.1	9.6	290
T26	<i>Eucalyptus resinifera</i> ? <b>Red Mahogany</b>	12	6	400	M	F	P	Native species, likely locally native species. High percentage of deadwood and epicormic growth noted	3A	M	L	2.3	4.8	72
T27A	<i>Olea europaea</i> subsp. <i>europaea</i> <b>Feral/European Olive</b>	8	6	100	EM	G	G	Olive is a declared weed under the Biosecurity Act 2015.	2C	L	L	1.7	2.4	18
G27	<i>Acacia saligna</i> <b>Golden Wreath Wattle</b> <i>Eucalyptus</i> sp. <b>Gum X 1</b>	8	6	75-200	M	G	G	Introduced native species, known to have a weed-like habit. No special problems noted at time of assessment. The small Gum has a 75mm diameter stem.	2C	L	L	1.7	2.4	18
T28	<i>Eucalyptus resinifera</i> ? <b>Red Mahogany</b>	16	14	600	M	G	G-F	Native species, likely locally native species. High percentage of large diameter deadwood noted, sprawling specimen.	1A	M	H	2.7	7.2	163
T29	<i>Eucalyptus</i> sp. <b>Gum</b>	16	14	*500	M	G	F	Native species. Tree surrounded by tall, dense weeds, unable to access stem.	1A?	M	H	2.5	6.0	113



Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)
G30	Group of weeds and low lying vegetation under 1m in height.	1	-	-	-	-	-	Weeds and vegetation less than 1m in height.	5A	L	L	-	-	-
T31	<i>Eucalyptus resinifera?</i> <b>Red Mahogany?</b>	12	14	125/ 300/ 300	M	G	G-F	Native species, likely locally native species. Trifurcate @ ground level. High percentage of epicormic growth.	2A	M	M	2.4	5.4	92
T32	<i>Syzygium paniculatum?</i> <b>Magenta Cherry</b>	8	6	200	EM	G	G	Introduced native species. No special problems noted at time of assessment.	2A	H	H	1.7	2.4	18
T33	<i>Syzygium paniculatum?</i> <b>Magenta Cherry</b>	9	8	400	M	G	G	Introduced native species. Sooty mould present at time of inspection.	2A	H	H	2.3	4.8	72
T34	<i>Melaleuca alternifolia</i> <b>Narrow-Leaved Paperbark</b>	11	10	200/ 200/ 300	M	G	G	Introduced native species. Trifurcate from root crown (below ground level).	2A	M	M	2.3	4.8	72
G35	<i>Syzygium paniculatum?</i> <b>Magenta Cherry x 1</b> <i>Melaleuca alternifolia</i> <b>Narrow-Leaved P'bark x 4</b>	11	6-10	200- 225	EM- M	G	G	Introduced native species. No special problems noted at time of assessment. Located within 1m of sound wall.	2A	M	M	1.8	2.7	23
T36	<i>Eucalyptus microcorys</i> <b>Tallowwood</b>	14	10	300	EM	G	G	Introduced native species. 800mm from sound wall.	2A	M	M	2.0	3.6	41
G37	<i>Tecoma stans</i> <b>Yellow Bells</b> <i>Ricinus communis</i> <b>Castor Oil Plant</b> <i>Lantana camara</i> <b>Lantana</b>	-	-	-	-	-	-	All species are declared weeds under the Biosecurity Act 2015.	4E	L	L	-	-	-

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)
G38	<i>Tecoma stans</i> <b>Yellow Bells</b> <i>Ricinus communis</i> <b>Castor Oil Plan</b>	-	-	-	-	-	-	All species are declared weeds under the Biosecurity Act 2015.	4E	L	L	-	-	-
G39	<i>Cupaniopsis anacardioides</i> <b>Tuckaroo x 7</b> <i>Banksia integrifolia</i> <b>Coast Banksia x 2</b> <i>Melaleuca bracteata</i> <b>Black Tea-Tree x 1</b>	8-10	6-8	200-225	M	G	G	Locally native species. No special problems noted at time of assessment.	1A	M	H	1.8	2.7	23
T40	<i>Acacia</i> sp. <b>Wattle</b>	12	10	500	M	G	G-F	Native species. No special problems noted at time of assessment.	3A	M	L	2.5	6.0	113
T41	<i>Banksia integrifolia</i> <b>Coast Banksia</b>	4.5	3	AB 150	EM	G	G	Locally native species. No special problems noted at time of assessment.	5A	M	L	1.5	2	10
T42	<i>Eucalyptus botryoides</i> <b>Bangalay</b>	12	14	400	M	G	G-F	Locally native species. Large diameter, shallow roots evident.	1A	M	H	2.3	4.8	72
T43	<i>Banksia integrifolia</i> <b>Coast Banksia</b>	9	6	AB 250	M	G	G	Locally native species. No special problems noted at time of assessment.	1A	M	H	1.9	3.0	28
T44	<i>Eucalyptus botryoides</i> <b>Bangalay</b>	10	12	450	M	G	G	Locally native species. Large diameter, shallow roots evident.	1A	M	H	2.4	5.4	92
G45	<i>Eucalyptus botryoides</i> <b>Bangalay</b>	10	12	400	M	G	G	Locally native species. Shallow roots evident.	1A	M	H	2.3	4.8	72
G46	<i>Casuarina glauca</i> <b>Swamp She-Oak</b> <i>Eucalyptus botryoides</i> <b>Bangalay x 1</b>	10-12	4-10	350	Y-M	G	G	Locally native species. No special problems noted at time of assessment.	1A	M	H	2.2	4.2	55

## KEY



\* DBH is visually estimated (usually adjoining trees or those that are hard to access). AB – above *buttress roots*. AGL - above ground level.

\*\* Determined by the largest number found (i.e. broadest branch spread or highest DBH) within a tree group to ensure ample tree protection zone.

**H** refers to the approximate height of a tree in metres, from base of stem to top of tree crown.

**Sp** refers to the approximate and average spread in metres of branches/canopy (the 'crown') of a tree.

**DBH** refers to the approximate diameter of tree stem at breast height i.e. 1.4 metres above ground (unless otherwise noted) and expressed in millimetres.

**Age** refer to Appendix A -Terms and Definitions for more detail.

**V** refers to the tree's vigour (health) Refer to Appendix A -Terms and Definitions for more detail.

**C** refers to the tree's structural condition. Refer to Appendix A -Terms and Definitions for more detail.

**ULE** refers to the estimated *Useful Life Expectancy* of a tree. Refer to Appendices A and B for details.

**TSR** The *Tree Significance Rating* considers the importance of the tree as a result of its prominence in the landscape and its amenity value, from the point of view of public benefit. Refer to Appendix C – Significance of a Tree Assessment Rating for more detail.

**RV** Refers to the retention value of a tree, based on the tree's ULE *and* Tree Significance. Refer to Appendix C – Significance of a Tree Assessment Rating for more detail.

**SRZ** Structural Root Zone (SRZ) refers to the critical area required to maintain stability of the tree. Refer to Appendix A -Terms and Definitions for more detail.

**TPZ** Tree Protection Zone (TPZ) refers to the *tree protection zones* for trees to be retained. Refer to Appendix A -Terms and Definitions for more detail.

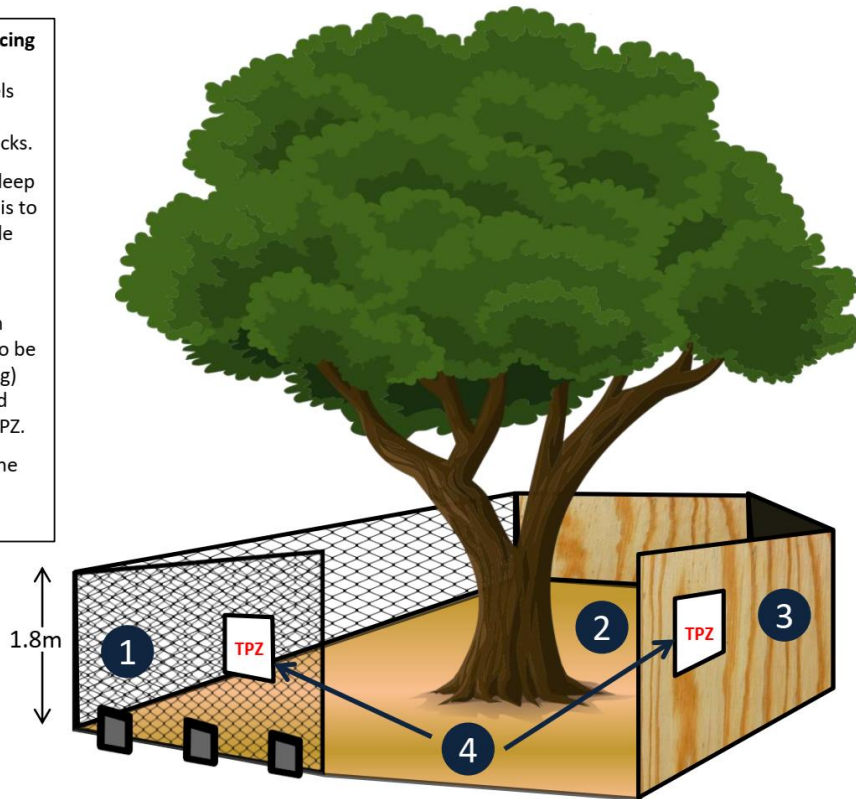
## Appendix J – Tree Protection Devices



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**Figure 1 – Tree Protection Zone Fencing Key**

1. 1.8m high chain wire mesh panels with appropriate feet such as concrete or water filled base blocks.
2. Inside TPZ fencing, 75-100mm deep layer of suitable, organic mulch is to be installed. No excavation, grade change, construction activity or material storage is permitted.
3. Alternate fencing option of 1.8m plywood/wooden panels can also be used, (with above ground bracing) to ensure prevention of soil build up/building materials entering TPZ.
4. Appropriate Tree Protection Zone signage must be displayed – see Figure 2.



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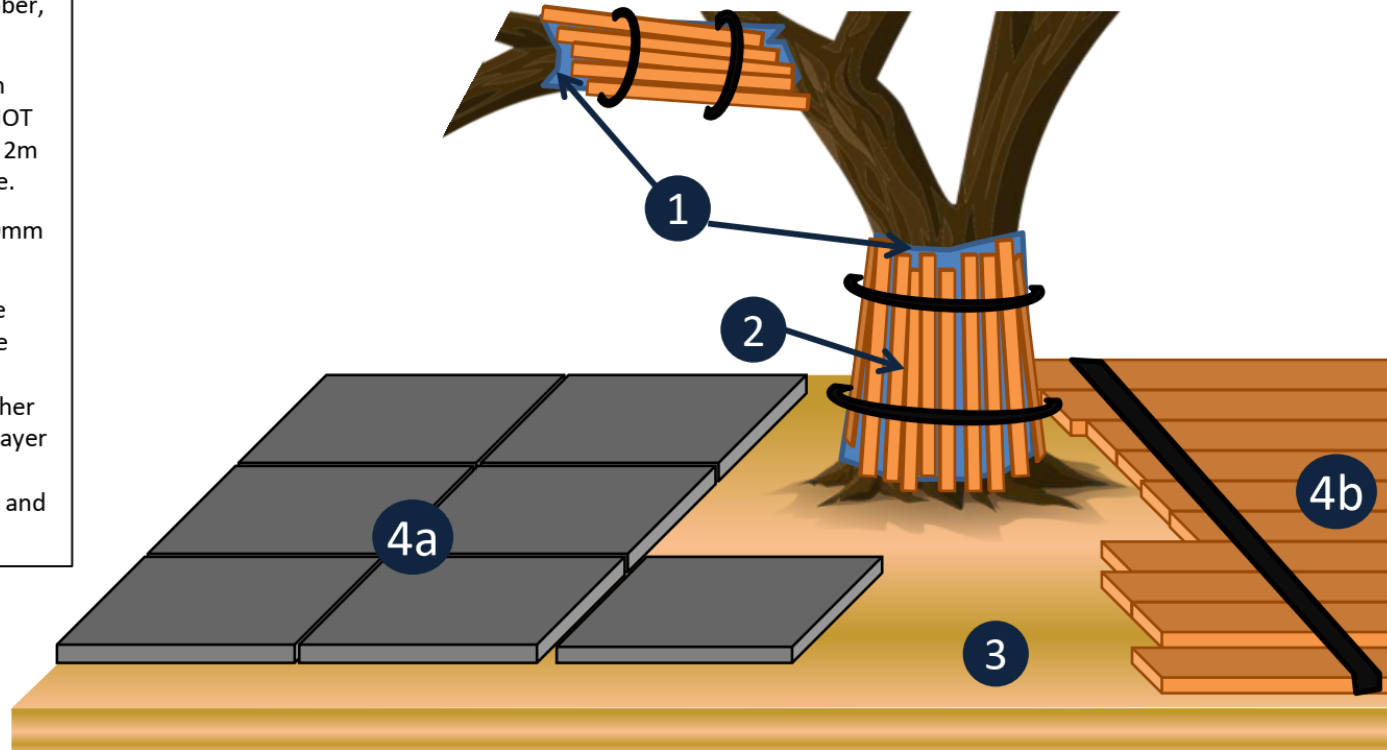


**Figure 2**  
Suitable Tree Protection Zone Signage

**Figure 3 - Stem, Branch & Ground protection measures**

**Key**

1. Padding (such as geotextile membrane, natural hessian, rubber, or carpet to protect bark).
2. Battens/boards for branch/stem protection, strapped together NOT nailed into bark/tree. Minimum 2m in height on stem where feasible.
3. Ground protection base 75-100mm of fit for purpose mulch.
4. If machinery is required to move within the TPZ then steel rumble boards (4a) or wide, timber sheeting/boards thrashed together (4b) is to be placed over mulch layer (preferably with geotextile base layer), this to spread the weight and minimise soil compaction



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