

# Arboricultural Impact Assessment



**Prepared For**

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**Site Address**

Westconnex New M5  
Traffic Intersection  
Bourke Rd, MASCOT

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# 1 Introduction

## 1.1 Brief

This Arboricultural Impact Assessment (AIA) was prepared by [REDACTED] and was commissioned by [REDACTED] of CPB Contractors, Dragados and Samsung C&T Joint Venture (CDS-JV).

- The proposed works are part of the larger WestConnex New M5 project. The scope of work specifically for the discussed area is the installation of a drainage swale, footpath and underground utilities on Bourke Road, Mascot, directly in front of the Bunnings store. This coincides with a traffic intersection slightly to the north of this site.

The need for the change to the new intersection arrangement at Campbell Street/Bourke Road is provided within the approved *Minor Consistency Review New M5 (Intersection Changes)* report dated April 2017. An extract of the consistency review is provided within Appendix E.

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.

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.

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.

The purpose of this report is to assess the vigour and condition of the trees, and identify the potential impacts the proposed development may have on those trees to be retained in proximity to the works.

The author of this report holds an AQF Level 5 Diploma of Horticulture (Arboriculture) and has 25 years in the horticultural industry. 20 of these 25 years have been specifically within the field of arboriculture.

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.

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 - Overview & individual area as per Appendix K.

B63 (a)	a visual tree assessment with inputs from the design, landscape architect, construction team;	VTA noted in Appendix K & staff inputs as per Appendix D and onsite discussions.
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.	Section 2 Part 2.3-2.4 & Section 3 - Recommendations
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.

## 1.2 Methodology

In preparation for this report, ground-level, visual tree assessment (VTA) <sup>1</sup>, or limited VTA (e.g. where access was limited), were completed by the author of this report on 30<sup>th</sup> July 2018. Inspection details of these trees are provided in Appendix K —Schedule of Assessed Trees.

The tree heights were visually estimated, and unless otherwise noted in Appendix K, 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, and photographs of the site and trees were taken using an iPhone 6.

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.

Trees are dynamic, living things which can be subject to change without notice in certain circumstances.

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 survey detailing proposed works location. These plans are attached as Appendix H - Tree Location Map & Appendix I- Design Specifications around T5-T17;
- *Minor Consistency Review New M5 (Intersection Changes)* report dated April 2017. See Appendix E for extract.

<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.

### 1.3 Tree Preservation and Management Guidelines

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).

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 under the Biosecurity Act 2015 (this Act overrules Noxious Weed Act 1993).

## 2 Observations and Discussion

### 2.1 Summary of Assessed Trees

Seventeen (17) trees were assessed and included in this report. Details of these are included in the Schedule of Assessed Trees – Appendix K. Of these trees:

- all seventeen (17) are prescribed (i.e. 'considered a tree' under the DPE approval/conditions);
- fourteen (14) trees have high RVs (RV- see Appendix C) – T4-T17;
- two (2) trees have medium RVs – T2 and T3;
- one (1) tree has a low RV – T1.

### 2.2 Threatened Species

No species on the subject site are subject to threatened conservation status under Australian and/or State Government legislation (i.e. NSW Biodiversity Conservation Act 2016 and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999).

### 2.3 Proposed Removal of Prescribed Trees

Four (4) trees determined to have a 'High' Retention Value (RV- see Appendix C) of the seventeen (17) existing prescribed trees are proposed to be removed.

T5, T13, T16 and T17 will require ground level reductions within the SRZ (in excess of 100mm) for the construction of a surface drainage swale and are unable to be retained. Smaller ground level changes for these works can be modified in order to retain most of the trees, however these significant soil

level changes are unacceptable within the Tree Protection Zones (TPZ) of existing trees, lowering ground levels to the extent proposed will incur major root severance and render the trees unstable. Tree 17 is located within the benched swale and fill cannot be located hard against the stem without this tree eventually succumbing to root decay and failing.

The need for the change to the new intersection arrangement at Campbell Street/Bourke Road is provided in the approved *RMS Minor Consistency Review New M5 (Intersection Changes)* report dated April 2017. An extract of the consistency review report is provided in Appendix E. Realignment of the footpath and roadway has been considered during the planning phase, however, in order to provide the minimum lane and footpath widths, a realignment could not be accommodated in this location.

Replanting will be undertaken in accordance with the condition B63 of the Compliance Table.

## 2.4 Potential Impacts on Trees Proposed for Retention

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*. 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.

A summary of disturbance within the Structural Root Zone (SRZ) and estimated encroachment of the TPZ in relation to the installation of the comms bank only is provided in Table 2 below. Non-destructive digging will be used to trench within the structural root zone of Tree T6 in order to minimise impacts and retain these trees.

Proposed increases in ground levels must be carried out as specified within Section 3 – Recommendations to limit negative impacts to the trees being retained.

Reduction in ground levels will greatly increase the estimates in Table 2 below and is not supported. Written advice has been provided to me stating that the minor reductions in ground levels shown in Appendix I for Tree numbers –T6, T9, T12 and T15 can be altered to allow no ground level reductions to occur (Appendix D).

**Table 2** –Estimated notional encroachments into the SRZ and TPZ of prescribed trees proposed for retention. These figures are based on the notional SRZ and TPZ’s offsets of the trees as calculated under AS4970 and do not necessarily reflect the actual root zones of the trees; existing at or below ground structures, and site topography and soil hydrology will influence the presence, spread and direction of tree root growth.

Tree No.	Tree Common name	SRZ affected	TPZ area (m <sup>2</sup> )	TPZ encroachment (approx. m <sup>2</sup> )	TPZ encroachment (approx. %)
T1	Jacaranda	✗	7	0	0
T2	Tallowwood	✗	28	0	0
T3	Tallowwood	✗	55	0	0
T4	Chinese Elm	✗	35	0	0
T6	Broad-leaved Paperbark	✓	308	131.5	42.7
T7	Broad-leaved Paperbark	✗	152	44	28.9
T8	Broad-leaved Paperbark	✗	92	5.5	6
T9	Broad-leaved Paperbark	✗	180	28.5	15.8
T10	Broad-leaved Paperbark	✗	290	59.61	20.5
T11	Broad-leaved Paperbark	✗	272	45.7	16.9
T12	Broad-leaved Paperbark	✗	55	0	0
T14	Broad-leaved Paperbark	✗	191	28.4	14.9
T15	Broad-leaved Paperbark	✗	206	47.8	23

### **T1 - Jacaranda mimosifolia (Jacaranda)**

Tree is located outside project boundary and all works are proposed outside the calculated SRZ and TPZ for this specimen.

### **Tree 2 - Eucalyptus microcorys (Tallowwood)**

All works are proposed outside the calculated SRZ and TPZ for this specimen. The tree is located outside project boundary.

### **Tree 3 - Eucalyptus microcorys (Tallowwood)**

Tree is located outside project boundary and all works are proposed outside the calculated SRZ and TPZ for this specimen.

### **Tree 4 – Ulmus parvifolia (Chinese Elm)**

All works are proposed outside the calculated SRZ for this specimen that is located outside the project boundary.

Upgrading of the gutter is located just on the outer edge of the calculated TPZ. This is unlikely to have any impact on the health or vigour of this specimen in the long term.

### **Tree 6 – Melaleuca quinquenervia (Broad-leaved Paperbark)**

TPZ encroachment has been calculated as 42.7% for this specimen and is located within the SRZ. This is considered *major* encroachment under AS4970. It is possible this area has been excavated previously for the existing gas and power bank located further within the SRZ (i.e. closer to the tree stem). However, this cannot be known until excavation is carried out.

Non-destructive digging (NDD)/excavation (i.e. by hand tools only avoiding contact with roots or with a water laser set on the lowest pressure to ensure roots are not shredded) under direct AQF Level 5 Arboriculturist supervision along the required line for the comms bank will allow an assessment of the extent of root expansion in this area

Should the area be clear of roots then mechanical trenching is supportable, should roots be found then discussion with the project Arborist regarding non-destructive digging (NDD)/excavation is required.

Fill is proposed to the west of the tree stem in excess of 450mm in places, this will have a detrimental long-term impact should it not be carried out to allow continued adequate porosity and aeration to the roots below. Thus, strict adherence to the specifications set out in Appendix F and within the Recommendations - Section 3.2.5 of this report is required.

I have been provided written confirmation (see Appendix D) that the proposed cut to the east of the tree shown in Appendix I can be amended in the design to allow no ground level change.

### **Tree 7 – Melaleuca quinquenervia (Broad-leaved Paperbark)**

A calculated encroachment of 28.9% to the west of the tree stem under the Australian Standard 4970-2009 Protection of trees on development sites (“AS4970”) is considered *major* encroachment. However, the proposed works are outside the SRZ of this specimen and there are existing services located closer to the tree, likely to have disrupted root ingress into the area of works.



There are project time restraints and the limited availability of resources to utilise NDD for all site trees. However, should excavation reveal large diameter roots that, if severed, will affect tree stability and health, then NDD techniques will need to be employed.

Given the tolerance of this species to root disturbance, existing services locations, the ideal conditions for root growth the east of the tree stem within the mulched, unimpeded garden bed it is likely the tree will survive long term with a low to moderate level of decrease in vigour due to the proposed trenching.

Fill (up to 500mm in some sections) is proposed around the immediate base of the tree stem and within the eastern section of the TPZ. Stringent adherence to the fill specifications set out in Section 3.2.6 and Appendix F are necessary for the trees long term survival.

#### **Tree 8 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

The TPZ encroachment to the west of the stem has been calculated as 6% for this specimen. 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*. Minimal impacts on tree vitality are expected.

Ground level changes resulting in fill over 500mm within the TPZ are proposed to the west of the tree stem. Strict observance to the fill specifications set out in Section 3.2.7 and Appendix F are necessary for the trees long term survival.

#### **Tree 9 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

The TPZ encroachment to the west of the stem for the comms bank has been calculated as 15.8% for this specimen and is outside the calculated SRZ. Under AS4970 encroachments in excess than 10% of the Tree Protection Zone (TPZ) are considered to be *major* however given the tolerance of disturbance this species exhibits it is my opinion this level of encroachment will not adversely impact long term vitality.

Ground level changes resulting in fill over 500mm within the TPZ are proposed to the west of the tree stem and reduction in ground level at the tree stem has been proposed. Following discussion, it has been determined this proposed cut is not necessary and can be amended to provide no ground level reduction in this instance (see Appendix D).

Strict observance to the fill specifications set out in Section 3.2.8 and Appendix F are necessary for the trees long term survival.

#### **Tree 10 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

A 20.5% TPZ encroachment to the west of the stem has been calculated for this specimen but the proposed trenching works are located outside the SRZ. Power and gas utilities are located within the SRZ and previous, recent root disturbance for the installation of these is possible. This previous work is likely to have disrupted root growth into the proposed trenching location.

Although this encroachment is classed under AS4970 as *major*, in line with section 3.3.4 TPZ encroachment considerations (within AS4970), items such as the trees tolerance to root disturbance, previous works within the same area, the permanent footpath in this location – which would limit root growth to a degree, ample, optimal root growing conditions to the east of the tree stem (a mulched, undisturbed garden bed) and lack of slope all put a favourable outcome for tree long term survival.

Ground level changes resulting in fill up to 450mm within the TPZ are proposed to the west of the tree stem. Stringent adherence to the fill specifications set out in Section 3.2.9 and Appendix F are necessary for the trees long term survival.

**Tree 11 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

The calculated 16.9% encroachment to the west of the stem is classed as *major* encroachment under AS4970 however, as discussed previously, site conditions, species tolerance and the existing services will all reduce the impacts to this tree.

Ground level changes resulting in fill up to 450mm within the TPZ are proposed to the west of the tree stem. Stringent adherence to the fill specifications set out in Section 3.2.10 and Appendix F are required for long term survival of the tree.

**Tree 12 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

All works are proposed outside the calculated SRZ and TPZ for this specimen.

The proposed minor ground level reduction at the stem location has been waved as per discussions with the client detailed in Appendix D. Increasing ground levels outside the SRZ but within the calculated TPZ of just under 450mm is proposed and as such guidelines set out within Section 3.2.11 and Appendix F are required.

**Tree 14 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

The calculated 14.9% encroachment to the west of the stem is classed as *major* encroachment under AS4970 however, as discussed previously, site conditions, species tolerance and the existing services will all reduce the impacts to this tree.

Ground level changes resulting in fill in excess 500mm within the TPZ are proposed to the west of the tree stem. Stringent adherence to the fill specifications set out in Section 3.2.12 and Appendix F are required for long term survival of the tree.

**Tree 15 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

A 23% TPZ encroachment to the west of the stem has been calculated for this specimen but the proposed trenching works are located outside the SRZ. Power and gas utilities are located within the SRZ and previous, recent root disturbance for the installation of these is possible. This previous work is likely to have disrupted root growth into the proposed comms bank trenching location.

There are project time restraints and the limited availability of resources to utilise NDD for all site trees. However, should hand excavation reveal large diameter roots that, if severed, will affect tree stability and health, then NDD techniques will need to be employed.

As discussed previously, site conditions, species tolerance and the existing services will all reduce the impacts to this tree so in my opinion reduction in tree vigour should only be in low to moderate levels.

The proposed minor ground level reduction at the stem location has been waved as per discussions with the client detailed in Appendix D. Increasing ground levels over 500mm is proposed and as such guidelines set out within Section 3.2.13 and Appendix F are required for long term survival of the tree.

### 3 Recommendations

#### 3.1 Tree Removal

Four (4) trees require removal to accommodate the proposed works (T5, T13, T16 and T17). Replanting will be undertaken in accordance with the condition B63 of the Compliance Table.

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

All trees subject to fill within the TPZ (i.e T6-T12 & T14) shall have a 50mm base layer of coarse, gap grade stone (client has agreed to 63mm stone) placed when increase in levels are above 100mm from natural ground level.

If the agreed style of stone is not suitable or unattainable, a minimally gap-grade stone of 20mm is to be utilised.

Road base/crushed sandstone or other material containing a high percentage of fines is unacceptable.

The fill material shall only be consolidated with a non-vibrating roller to minimise compaction of the underlying soil.

The only approved soil approved for fill is an 80/20 sandy loam – 80% double washed sand and 20% natural wash soil.

No reduction in ground level has been supported within the TPZ of trees to be retained.

##### 3.2.1 Tree 1 – *Jacaranda mimosifolia* (Jacaranda)

- Any ground-level change within 2m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.
- Tree protection fencing is to be placed a minimum 1.5m from the tree stem where practicable and as per Tree Protection Measures Part 4.1 below, during works.

##### 3.2.2 Tree 2- *Eucalyptus microcorys* (Tallowwood)

- Any ground-level change within 3m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.
- Tree protection fencing is to be placed a minimum 2m from the tree stem where practicable and as per Tree Protection Measures Part 4.1 below, during works.

### **3.2.3 Tree 3- *Eucalyptus microcorys* (Tallowwood)**

- Any ground-level change within 4.5m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.
- Tree protection fencing is to be placed a minimum 2.5m from the tree stem where practicable and as per Tree Protection Measures Part 4.1 below, during works.

### **3.2.4 Tree 4 – *Ulmus parvifolia* (Chinese Elm)**

- Any ground-level change within 3.5m of the tree is to be directly supervised by an Arboriculturist with a minimum AQF5 in arboriculture.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.
- Tree protection fencing is to be placed a minimum 2m from the tree stem where practicable and as per Tree Protection Measures Part 4.1 below, during works.

### **3.2.5 Tree 6 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

- Tree protection fencing is to be placed a minimum 3.5m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Trench for the Comms bank shall be either hand dug in the first instance under direct supervision of an AQF Level 5 Arboriculturist to determine level of root ingress into area or a water laser utilised for excavation. Should water laser be used the water pressure is to be set to the lowest pressure and all works are to be supervised by a minimally AQF Level 5 Arboriculturist to ensure no roots are damaged.
- Reduction in ground level is not permitted within 10m of the tree stem.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.
- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### **3.2.6 Tree 7 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

- Tree protection fencing is to be placed a minimum 3m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Reduction in ground level is not permitted within 7m of the tree stem.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.
- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### **3.2.7 Tree 8 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

- Tree protection fencing is to be placed a minimum 3m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Reduction in ground level is not permitted within 5.5m of the tree stem.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.
- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### 3.2.8 Tree 9 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)

- Tree protection fencing is to be placed a minimum 3m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Reduction in ground level is not permitted within 7.5m of the tree stem.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.
- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### 3.2.9 Tree 10 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)

- Tree protection fencing is to be placed a minimum 3.5m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Reduction in ground level is not permitted within 10m of the tree stem.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.
- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.

- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### **3.2.10            Tree 11 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

- Tree protection fencing is to be placed a minimum 3m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Reduction in ground level is not permitted within 9.5m of the tree stem.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.
- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### **3.2.11            Tree 12 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

- Tree protection fencing is to be placed a minimum 3m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Reduction in ground level is not permitted within 4.5m of the tree stem.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.

- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### **3.2.12            Tree 14 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

- Tree protection fencing is to be placed a minimum 3m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Reduction in ground level is not permitted within 8m of the tree stem.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.
- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

### **3.2.13            Tree 15 – *Melaleuca quinquenervia* (Broad-leaved Paperbark)**

- Tree protection fencing is to be placed a minimum 3m from the tree stem and as per Tree Protection Measures Part 4.1 below, during works. Access required for works within the tree protection fencing shall be supervised by a minimally AQF Level 5 Arboriculturist.
- Reduction in ground level is not permitted within 8m of the tree stem.
- Trenching for Comms bank is to be directly overseen by a minimally AQF Level 5 Arboriculturist. Any roots found under 50mm are to be cut cleanly with a sharp axe or hand saw. Should roots in excess of 50mm be uncovered the project Arborist is to determine the long-term effect on the tree and provide directions accordingly.
- Fill within the TPZ shall be placed as per diagram within Appendix F. All soil placed within the TPZ shall be 80/20 sandy loam (80% double washed sand and 20% natural wash soil). In sections where fill is proposed in excess of 100mm above natural ground level, a 50mm base layer of coarse gap-graded aggregate (minimum 20mm gap-graded with no fines present) is



to be placed, then a layer of geotextile fabric prior to the 80/20 mix fill. Mulch (to AS4454-2012 specifications) can be placed above soil mix in a 50mm layer.

- The tree stem base is to be maintained with a 50mm gap between it and the fill. Large stones/rip rap (or gabion baskets filled with 63mm stone) are to be placed first to ensure a stable wall, then the fill behind it. Limestone cannot be utilised.
- Any pruning in excess of 10% of the total live canopy shall be directly discussed prior to works on site with a minimally AQF Level 5 Arboriculturist. All pruning is to be carried out by a minimally AQF Level 3 Arborist prior to works.

## **4 Tree Protection Measures**

### **4.1 Tree Protection Devices**

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**

- 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**

- 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.
- The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil.
- 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

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

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.

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

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

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

Report prepared by [REDACTED] – July/August & October/November, 2018 & January 2019



[REDACTED] s  
Consulting arboriculturist and horticulturist.  
Tree Surgery Certificate  
Advanced Certificate Urban Horticulture  
Diploma of Horticulture (Arboriculture) *Credit*  
Member of the International Society of Arboriculture (ISA)  
ISA Tree Risk Assessment Qualification (TRAQ) 2016

## 6 Appendices

### 6.1 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.

**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.

## 6.2 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

## 6.3 Appendix C - STARS - 1 of 2

### 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.

## 6.4 Appendix C - STARS - 2 of 2

### 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					
<u>Legend for Matrix Assessment</u>						
						
		<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.				
		<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.				
		<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.				
		<b>Priority for Removal</b> -These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.				

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)

## 6.5 Appendix D - Record of Meetings and Design Input

██████████ (Environmental Advisor), ██████████ (Environmental Advisor) and ██████████ (Project Engineer) attended the site inspection on 30/7/2018 with construction input.

No input from the Landscape Architect has been included as these works are not constrained by any urban design or landscaping requirements.

---

**From:** ██████████  
**Sent:** Tuesday, 22 January 2019 9:23 AM  
**To:** ██████████  
**Subject:** FW: Spec for Bourke Road Verge  
**Attachments:** R44 Earthworks.pdf, Gardeners Pavement design.pdf

Hi ██████████

See below from ██████████ which is hopefully self explanatory.

Are you able to make the change – I will call to discuss.

██████████

---

**From:** ██████████  
**Sent:** Monday, 21 January 2019 3:17 PM  
**To:** ██████████  
**Subject:** FW: Spec for Bourke Road Verge

Hey ██████████

[K:\EN Environment\EN02 Planning & Approvals\WORKING FOLDER\03 Plans\21 Tree Report\LRW\Bourke\Bourke intersection](#)

If you refer to pages 31, 44 and 51. Basically the guys mixed up the trees – T13 was marked to come out while T17 was marked retained. T17 is right within the verge and ██████████ proposed this design to retain the tree by creating an air gap between it (scroll down). The guys thought she was referring to T13. T13 was marked for removal as the swale cut into its root system – this cannot be avoided.

I've asked for justification from ██████████ about T17, see below.

Could you see whether ██████████ can handle the work load as we need this report done quite quickly (as always!).

██████████

---

**From:** ██████████  
**Sent:** Monday, 21 January 2019 11:17 AM  
**To:** ██████████  
**Subject:** RE: Spec for Bourke Road Verge

██████████

Please find R44 spec attached and the following reason listed below.

1. T17 unlike the other trees is located in the batter/verge and thus will make it unsafe for CDSJV to complete batter/verge works as shown as unsuitable removal will have to be taken out and suitable replacement material such as DGB will have to be placed to stabilise fill batter and meet compaction requirements. Refer to R44 clause 5.4 and 6.2

1

2. T17 is also in close proximity to new footpath location, from previous site walk the tree roots are likely running under future footpath and it was evident that tree root system had already started undermining local footpath and pavement as per R44 clause 3.2.2 CDSJV will have to remove up to 300mm of unsuitable material and replace with DGB20 as we will not meet CBR 4 requirement and compaction requirements for foundation.
3. Also still believe there was minor confusion with T17 and T13.

Regards,

[REDACTED]  
Project Engineer



201 Coward Street, Mascot, NSW, 2020,

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



[REDACTED]

---

**From:** [REDACTED]  
**Sent:** Friday, 2 November 2018 9:35 AM  
**To:** [REDACTED]  
**Subject:** FW: Bourke Rd (Bunnings) tree report

Hey [REDACTED] – construction have advised they can accommodate placement of fill as per your suggestions below so you can either recommend a fill design or we can just use 63mm stone as per [REDACTED] response. The areas requiring a cut are not as straightforward – where the cut is minor the design can likely be modified around the tree but the deeper cuts will probably have to be maintained for drainage purposes eg T13 and T16. Are you able to make recommendations based on this advice?

Use of NDD through the SRZ's of the 3 trees is okay.

Regards

[REDACTED]

---

**From:** [REDACTED]  
**Sent:** Monday, 29 October 2018 4:59 PM  
**To:** [REDACTED]  
[REDACTED]  
**Subject:** RE: Bourke Rd (Bunnings) tree report

[REDACTED]

Response in red below:

- fill cannot come in contact with the tree stem/trunk, a 50mm gap would be required – rip rap or a circle of large stones around trees with this gap would be best to ensure ample air movement; - **Can't see an issue with this, if Chantelle has a typical detail I can as design team to revise to suit or else we can fill in with -63mm**
- fill type will need to be specified, basically it needs to be a friable material to allow air to existing roots below (a very sandy mix -and increases over 150mm will first require a layer of 20-50mm gap graded material placed). – **Shouldn't be an issue, once again can use -63mm stone**

Regards,

[REDACTED]  
Project Engineer

**From:** [REDACTED]  
**Sent:** Monday, 29 October 2018 4:41 PM  
**To:** [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** FW: Bourke Rd (Bunnings) tree report

[REDACTED]  
Our arborist has reviewed the additional drawings for the trees on Bourke Rd and has a few questions – see below.

[REDACTED] can you confirm whether the measures below can be implemented regarding filling/cutting around the trees?

[REDACTED] can we use non-destructive digging for the trench past these 3 trees?

---

**From:** [REDACTED]  
**Sent:** Monday, 29 October 2018 4:28 PM  
**To:** [REDACTED]  
**Subject:** RE: Bourke Rd (Bunnings) tree report

Hi [REDACTED]

Thanks for that information.

For tree retention to be viable I will need to specify how fill is placed around the trees (in the instances where fill is proposed);

- fill cannot come in contact with the tree stem/trunk, a 50mm gap would be required – rip rap or a circle of large stones around trees with this gap would be best to ensure ample air movement;
- fill type will need to be specified, basically it needs to be a friable material to allow air to existing roots below (a very sandy mix -and increases over 150mm will first require a layer of 20-50mm gap graded material placed).

In relation to lowering ground levels, in some instances the levels are as small as 30mm, then up to 147mm (still relatively minor)...is this diagrammatic only? Is just inside the boundary in all instances and its not achievable to lower the actual tree stem so does the ground around it really require this minor level change?

I will need to specify NDD for T5, T6 and T17 as comms is in SRZ.

Kind Regards,

[REDACTED]  
**Consulting arboriculturist and horticulturist**

## 2 Proposed activity

### 2.1 Need for the design changes

The Approved Project included upgrades to the local road network in Alexandria and Mascot to cater for the St Peters interchange. The creation of a new signalised intersection was approved to integrate the new Campbell Road extension into the local road network. Upgrades were also approved to the intersection of Bourke Road and Gardeners Road, located immediately south of the new intersection, which included the restriction of right turn movements into properties by vehicles travelling north along Bourke Road. Vehicles exiting onto Bourke Road from developments at 520-530 Gardeners Road, 200 Bourke Rd and 506-518 Gardeners Road would also be restricted from right-turn movements to travel north along Bourke Road.

Further assessment has identified that the future operational level of service of the approved new intersection and the Bourke Road / Gardeners Road intersection would be below the desired service level. Discussions with landowners also raised concerns that the approved upgrades would restrict property access to developments at 520-530 Gardeners Road and 506-518 Gardeners Road. This restriction may have flow-on effects that alter customer behaviour at 520-530 Gardeners Road.

Consequently, changes to both intersections are proposed to improve the performance of both intersections, and to improve access to the identified properties. A description of the approved intersections and proposed changes is provided in the following section. A consistency assessment would assess the elements of the intersections that deviate from the designs as approved.

### 2.2 Description of proposed design changes

#### 2.2.1 Campbell Road extension / Bourke Road intersection

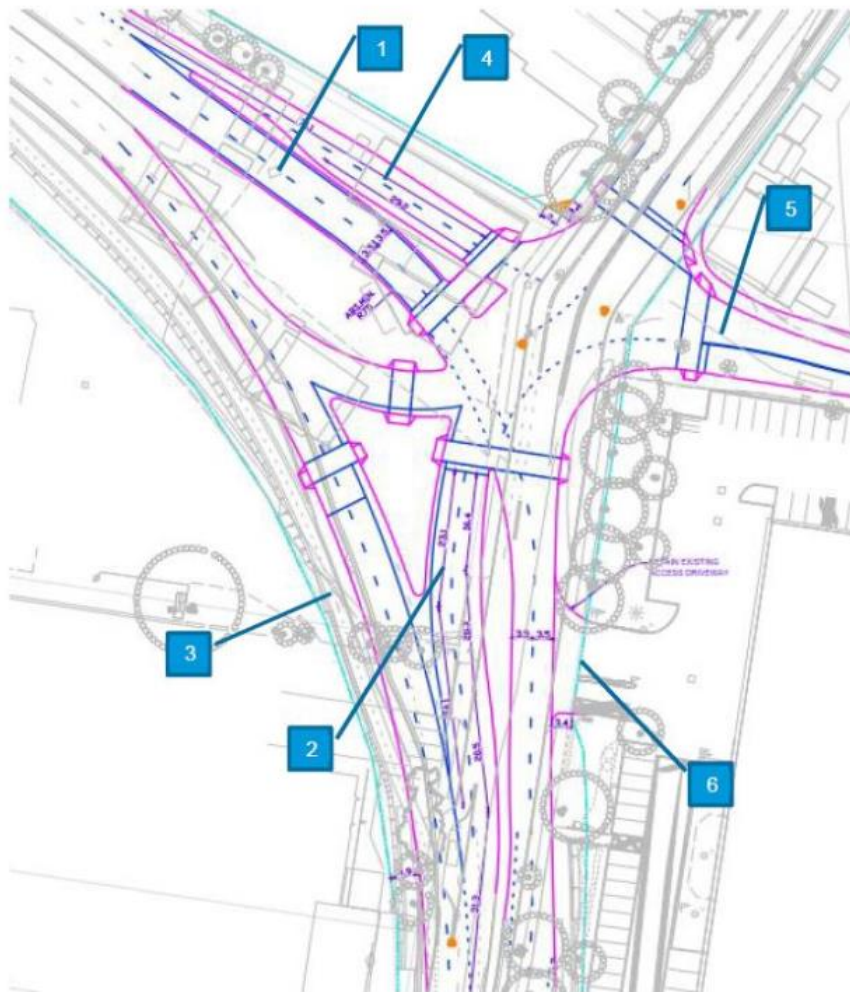
The proposed design changes would improve the level of service of the Campbell Road extension / Bourke Road intersection and incorporate signalised access to the access easement for 506-518 Gardeners Road via Bourke Road. The intersection subject to the proposed design changes would become a four-legged intersection and include the following provisions:

- Campbell Road eastbound: two southbound through lanes onto Bourke Road (south), one eastbound through lane into the access easement for 506-518 Gardeners Road, one left-turn lane onto Bourke Road (north)
- Bourke Road northbound: two through lanes onto the Campbell Road extension, two right-turn lane onto Bourke Road (north)
- Bourke Road southbound: one left-turn lane onto Bourke Road (south), one right-turn lane onto the Campbell Road extension. Lane provisions on Bourke Road southbound at the Bourke Road / Gardeners Road intersection would remain as per the Approved Project.

The cycleway on the western side of Bourke Road would be designed as a shared path rather than separate bicycle lanes to the south and west of the proposed intersection to maximise available road space. Signalised pedestrian crossings would be provided across the four legs of the intersection as shown in Figure 2-1. Two traffic islands (see Figure 2-1) would be incorporated to facilitate safe pedestrian movements across the intersection. Cyclists travelling north along Bourke Road who wish to connect to continue along Bourke Road (north) would need to dismount and utilise the pedestrian crossings and islands.

Access to 520-530 Gardeners Road from Bourke Road would remain as left-in and left-out only movements as per the Approved Project. In addition to the property acquisitions required for the Approved Project, the proposed design change would require the following acquisitions shown in Figure 2-2:

- 77-79 Bourke Road: 15 square metres
- 200 Bourke Road: 380 square metres
- 520-530 Gardeners Road: 30 square metres
- Bourke Road verge (City of Sydney Council): 165 square metres.

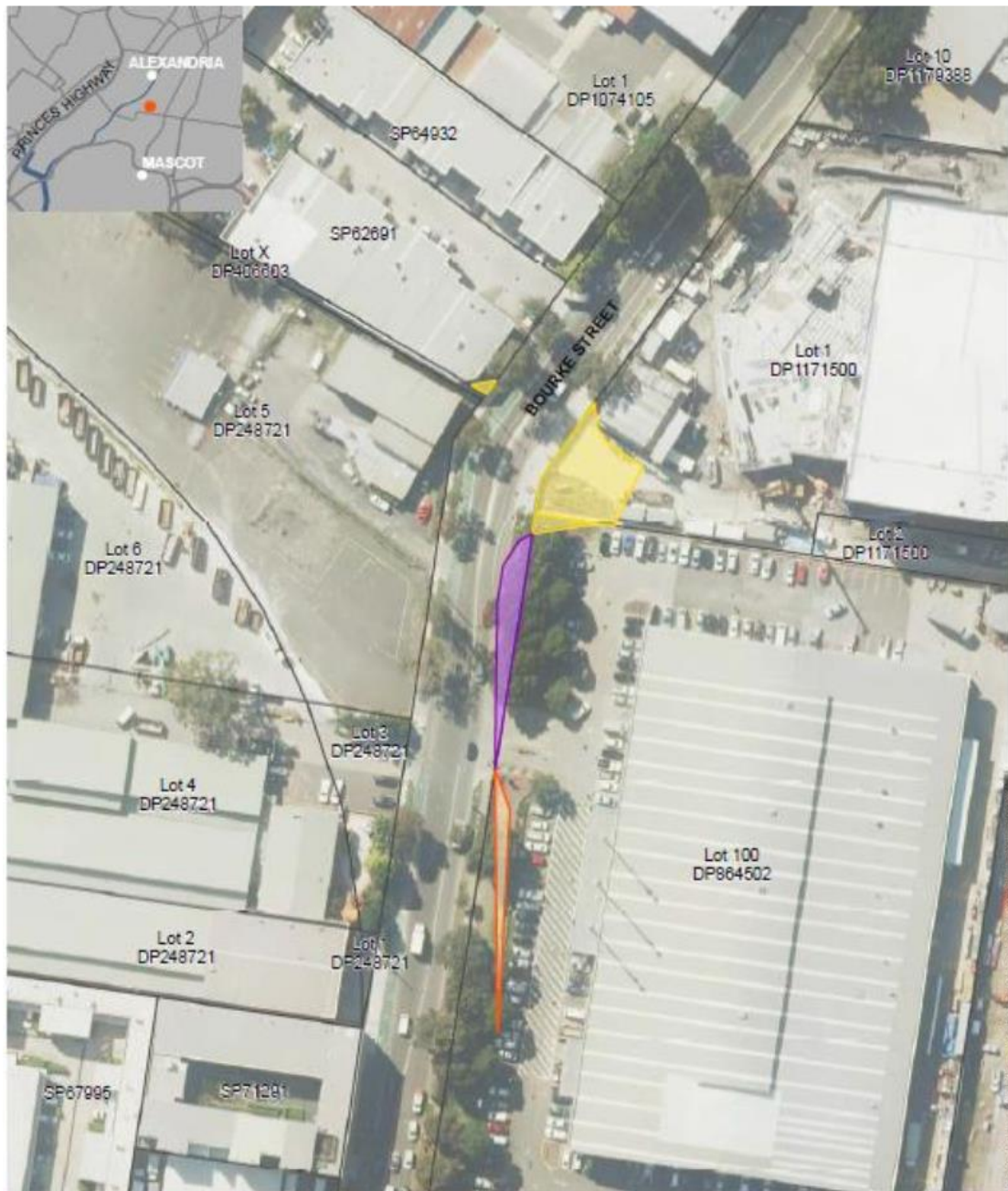


**Legend:**

1. Two through lane southbound lanes on the Campbell Street extension approach to the intersection
2. Provision of dual right turn lanes at the southern approach on Bourke Road. This involves modifications to the western and eastern kerbside of Bourke Road.
3. Redesign of separate cycle lane and pedestrian footpath to a shared path along Bourke Road to provide additional road space for the dual right turn lanes and two through lanes on Bourke Road northbound.
4. 'Slip lane' access southbound to the access easement off the Campbell Street extension and signalised.
5. Access easement signalised.
6. Left-in left-out access into 520-530 Gardeners Road.

**Figure 2-1 Proposed Campbell Road extension / Bourke Road intersection design**

Source: 2197007B-ITP-MEM-Layout and Performance Investigation-RevB 20170104.docx (PB WSP,2017)

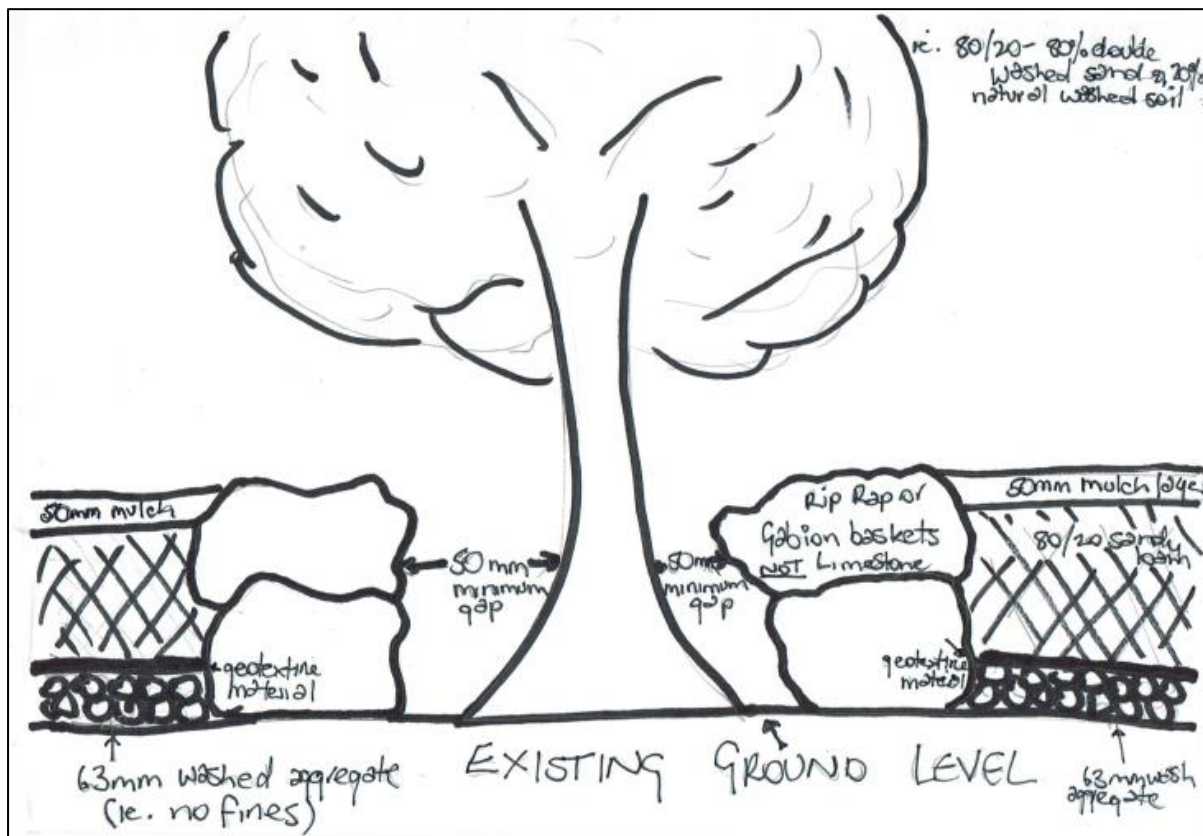


- Legend**
- Previously identified acquisition no longer required
  - Land to be acquired and transferred to a third party
  - Additional acquisition for road purposes
  - Lot boundary



**Figure 2-2 Additional property acquisition requirements for the proposed Campbell Road extension / Bourke Road intersection design**

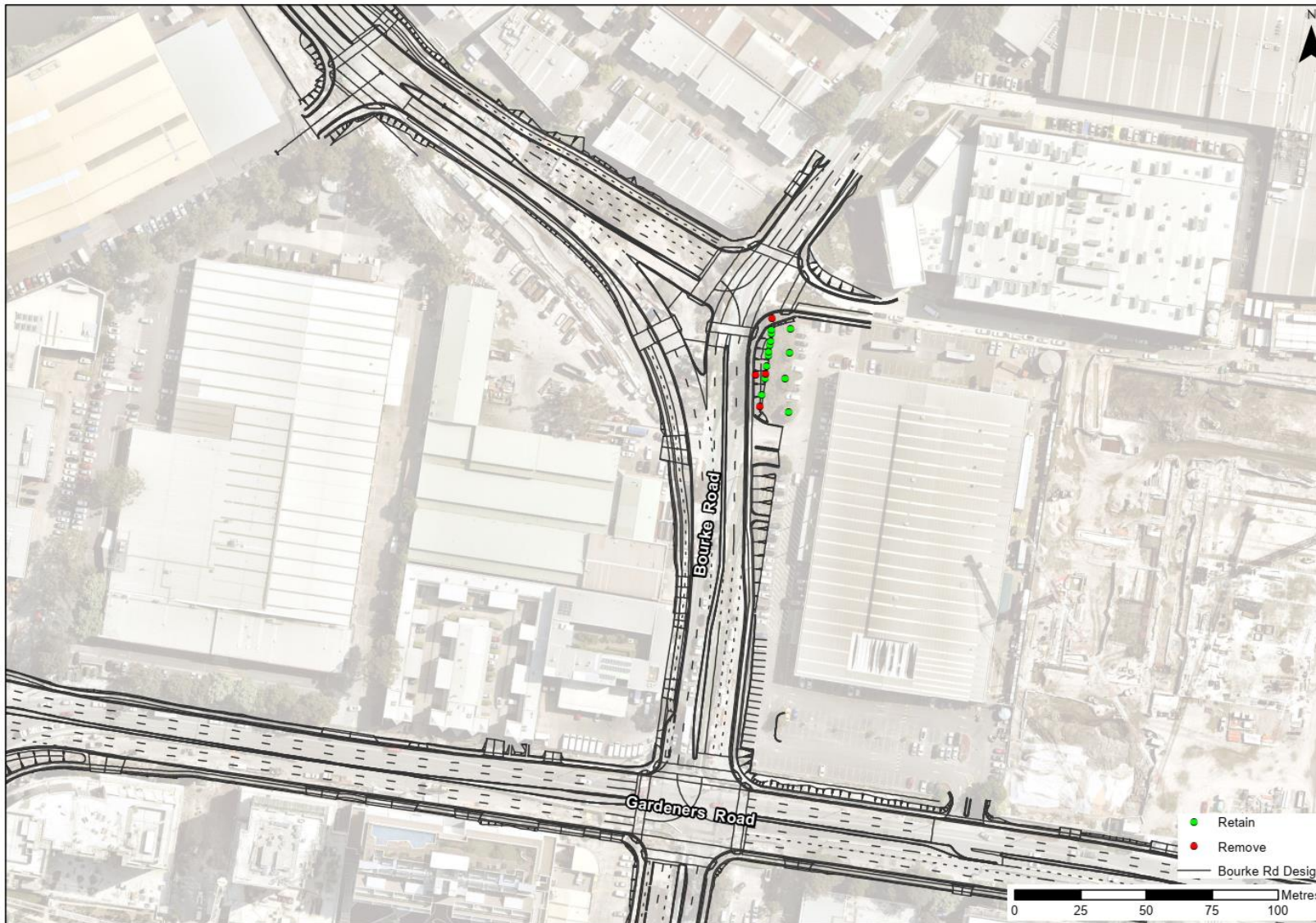
6.7 Appendix F - Specification for Fill around Trees to be Retained



**NOTE** – The 50mm gap between the fill and the tree stem is to be from the base of the stem – the widest part of the stem.

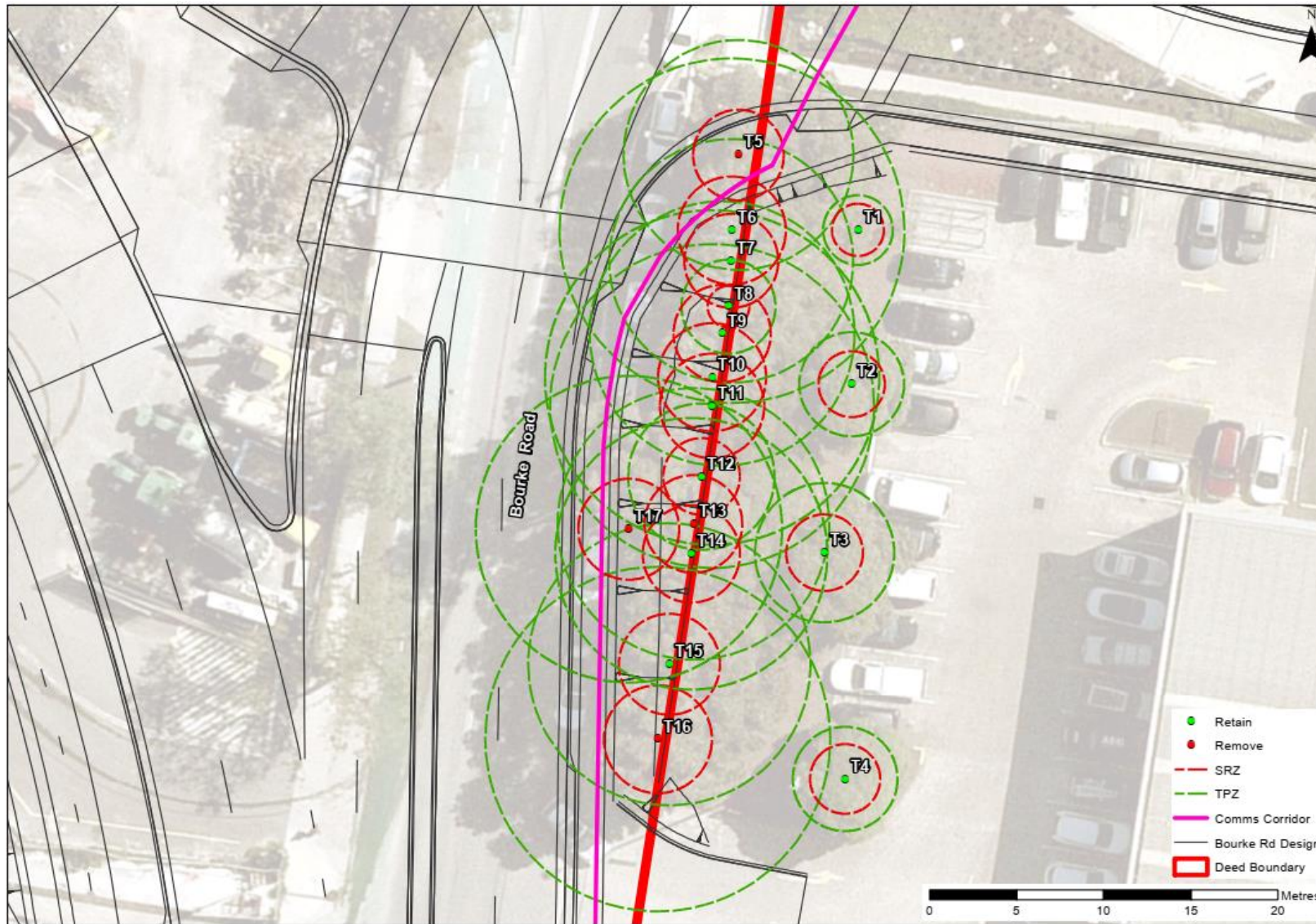


## 6.8 Appendix G - Site Overview Map





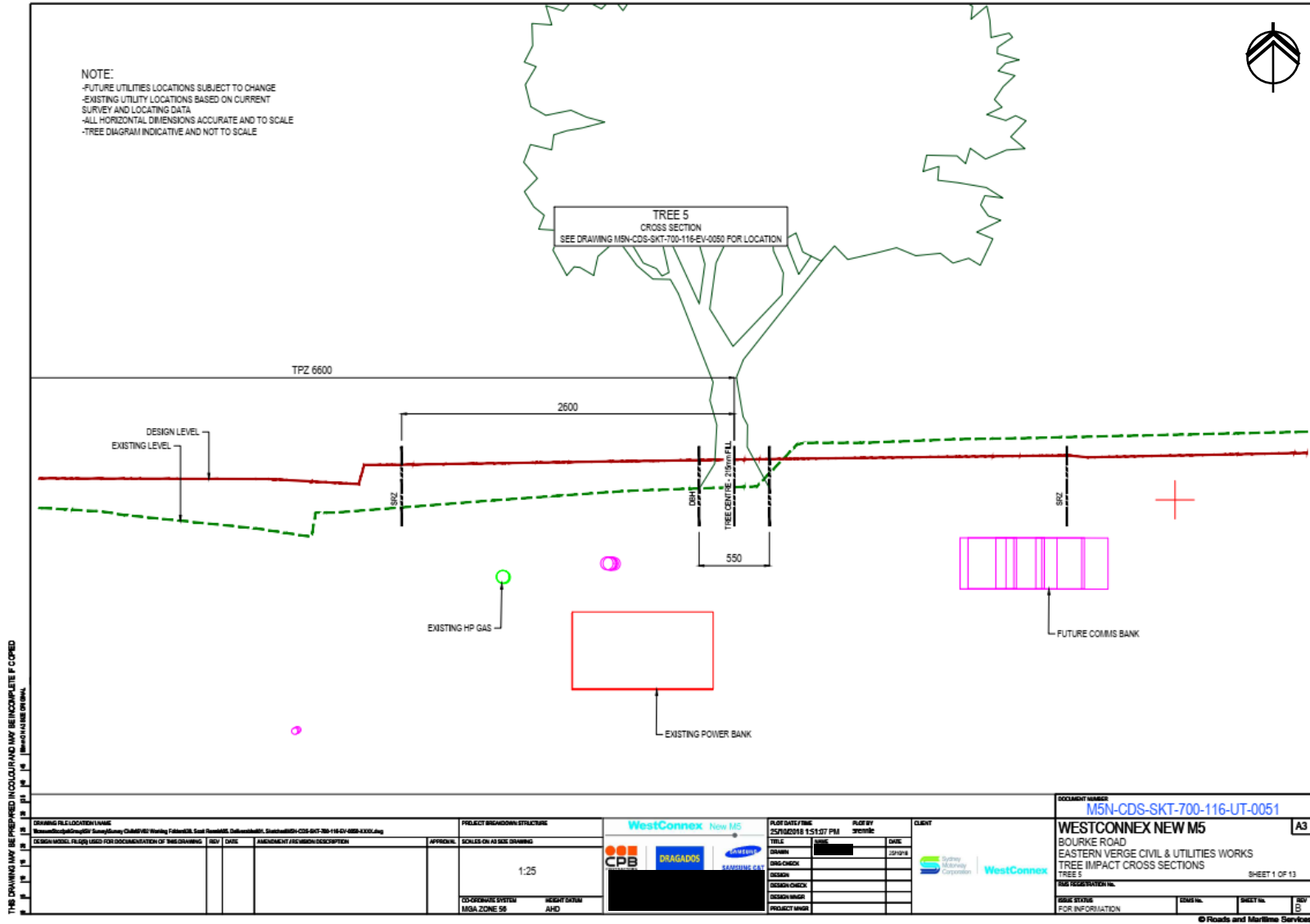
### 6.9 Appendix H - Tree Location Maps







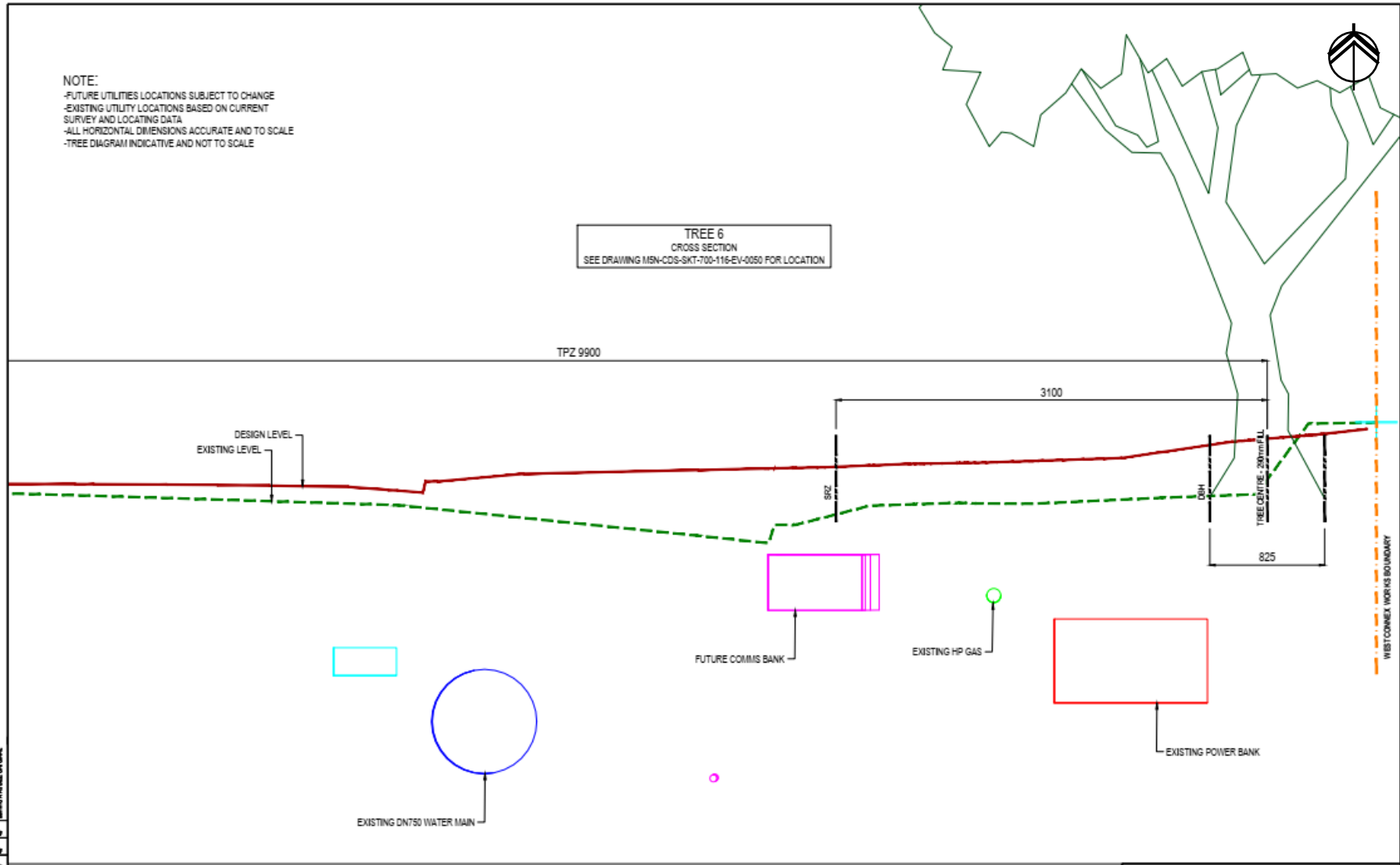
6.10 Appendix I - Design Specifications around Trees 5-17





NOTE:  
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 -TREE DIAGRAM INDICATIVE AND NOT TO SCALE

TREE 6  
 CROSS SECTION  
 SEE DRAWING MSN-CDS-SKT-700-116-EV-0050 FOR LOCATION



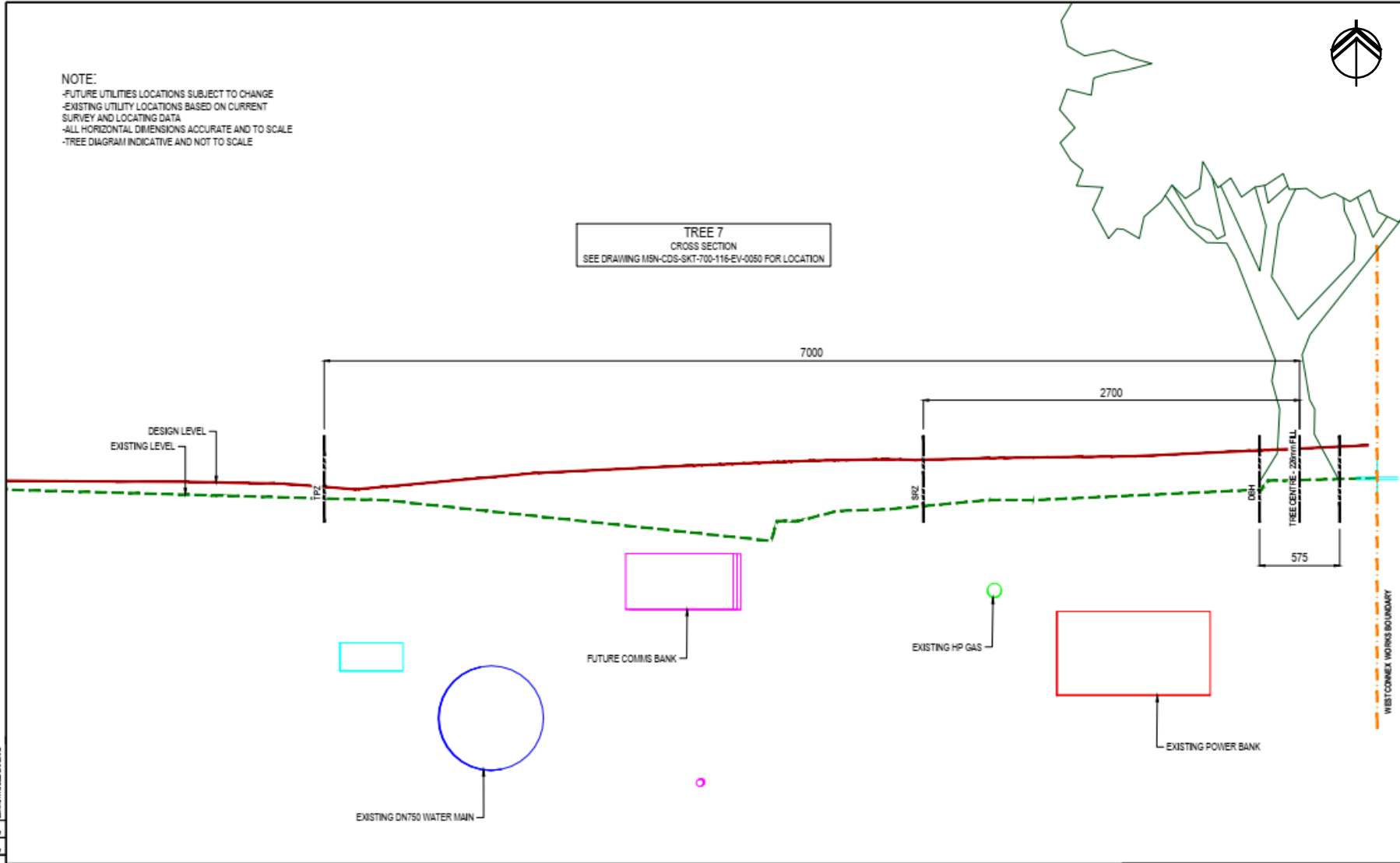
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TREE 7  
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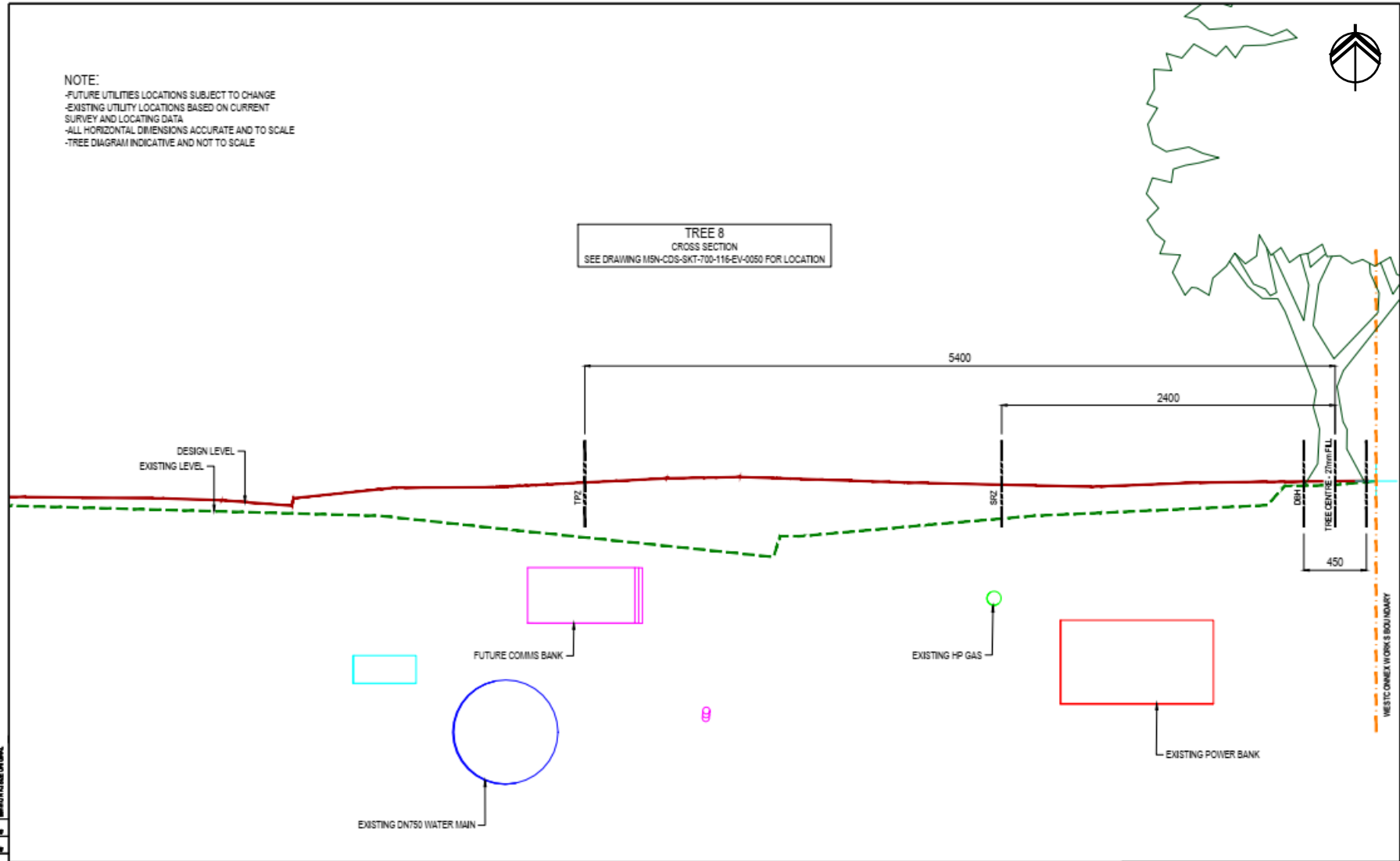


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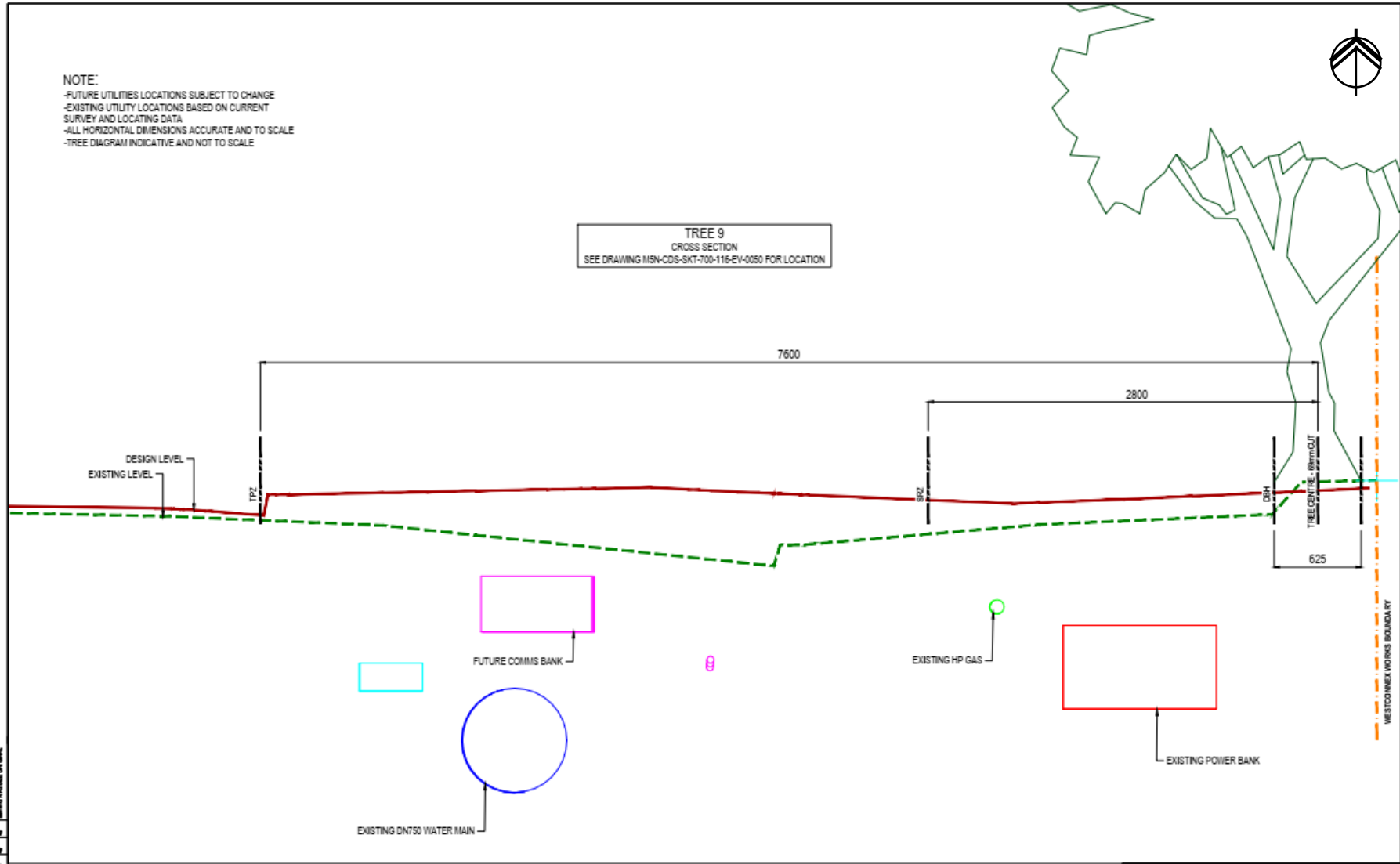
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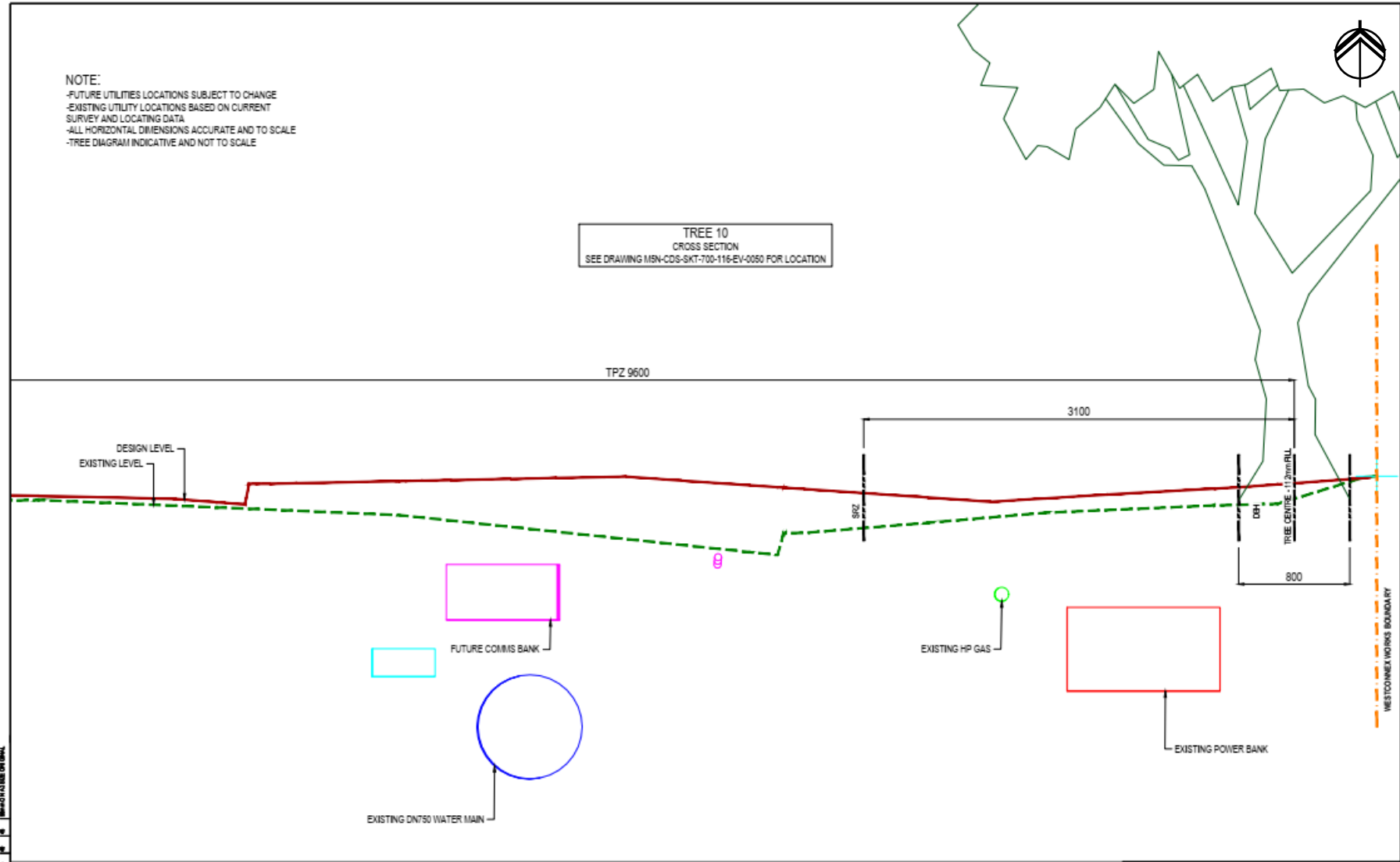
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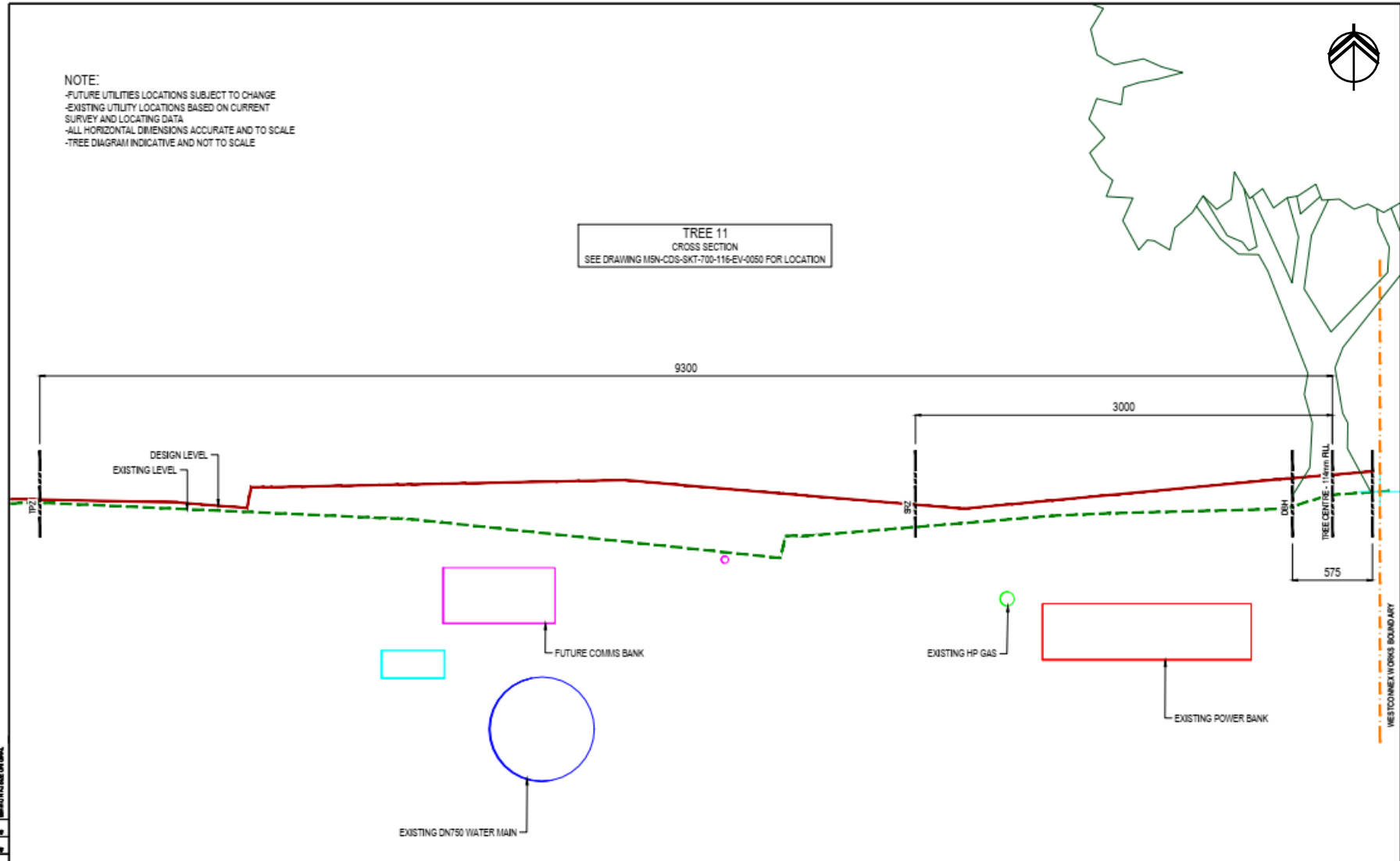
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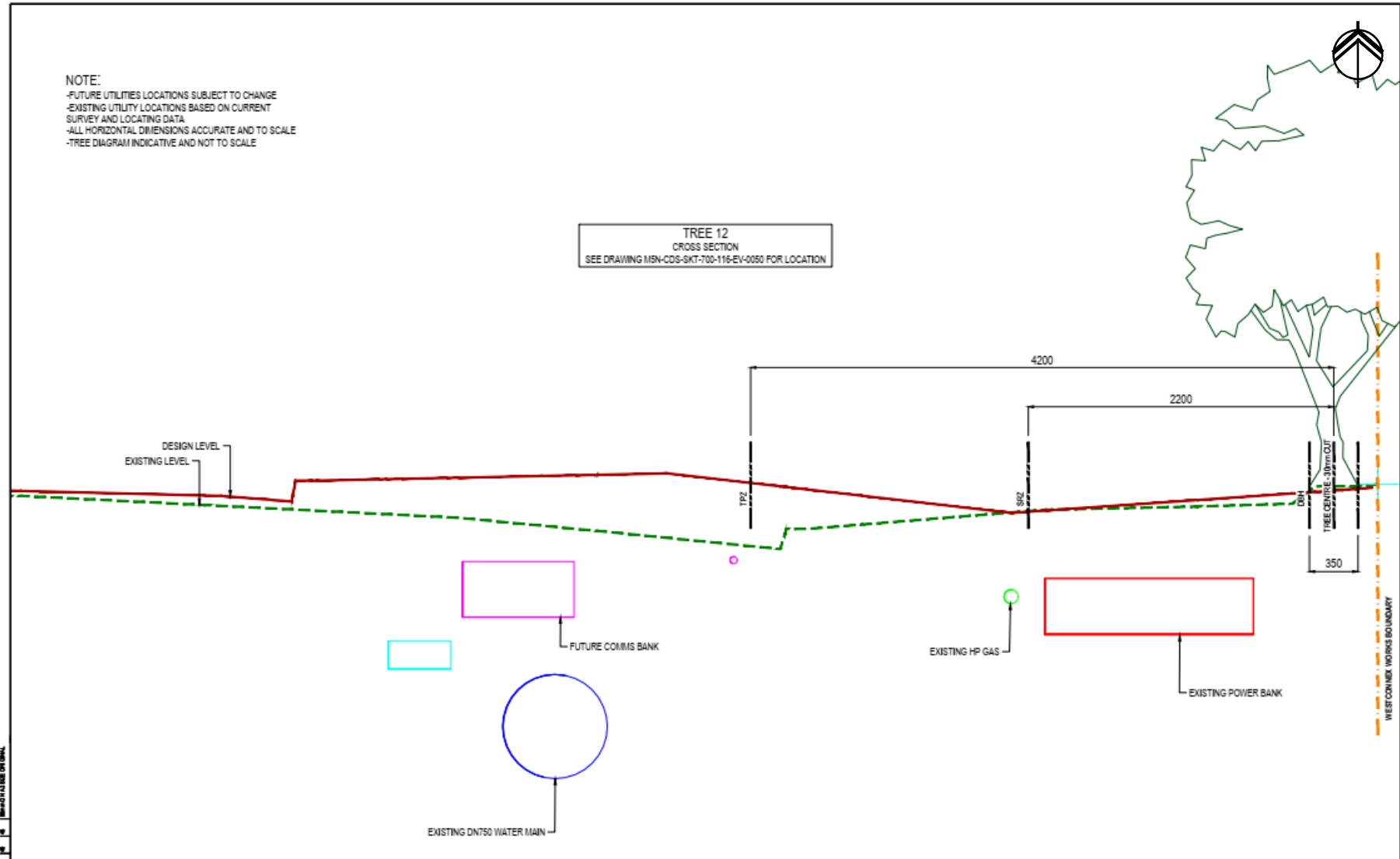
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TREE 12  
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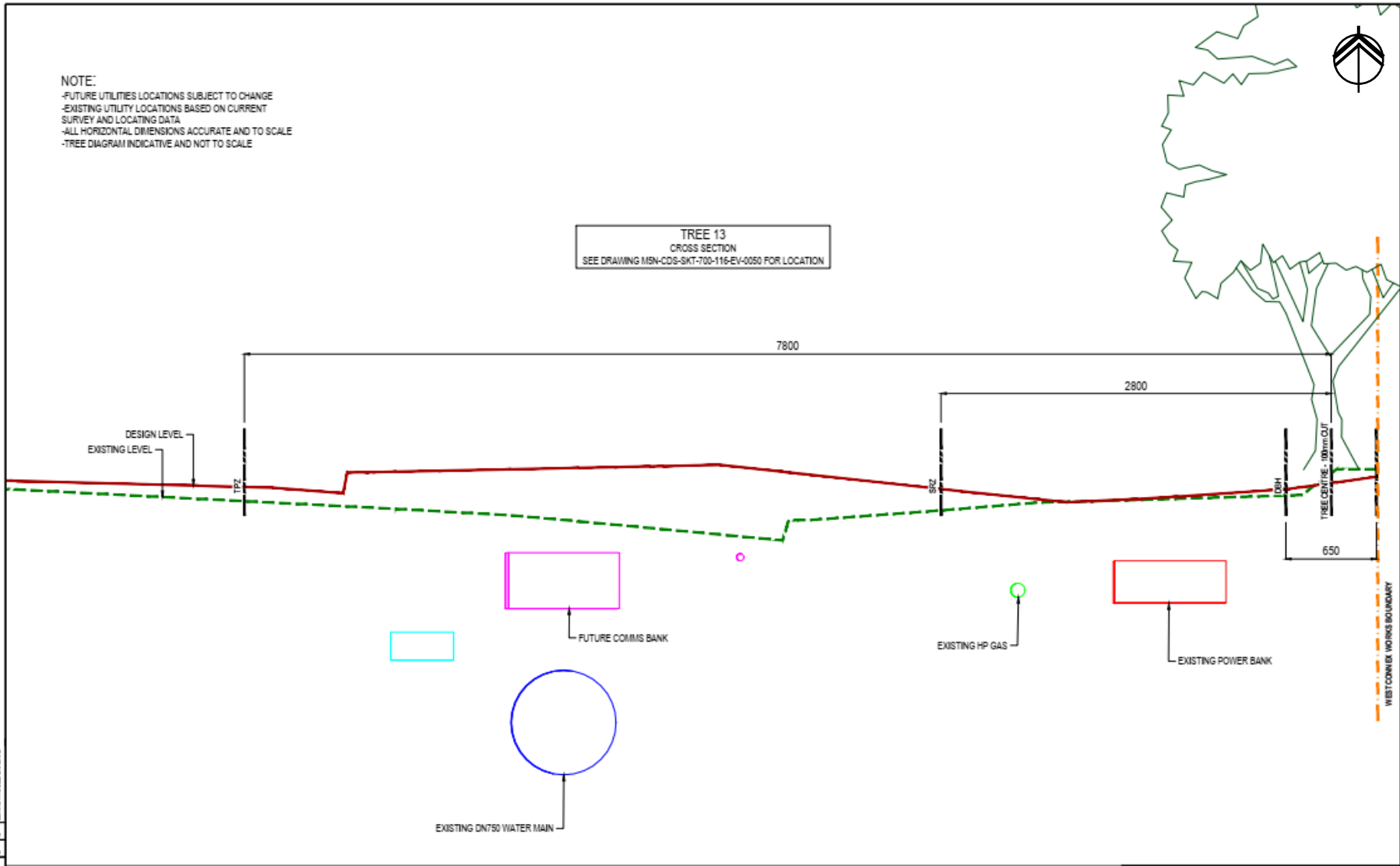




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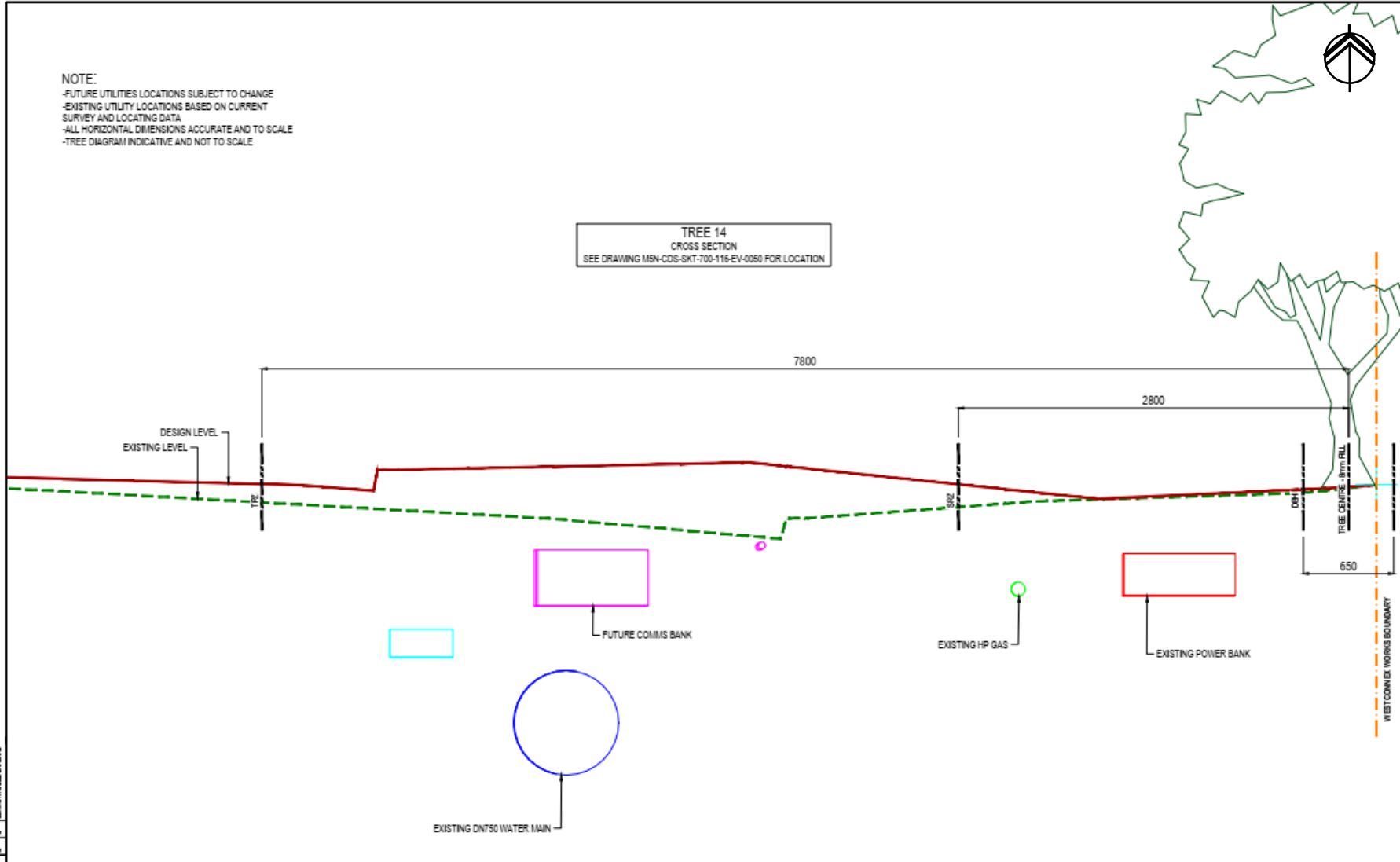
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					MSA_ZONE 08	DESIGN		TREE IMPACT CROSS SECTIONS			
					HEIGHT DATUM AHD	DESIGN CHECK		TREE 13			
						PROJECT MGR		SHEET 9 OF 13			
ISSUE STATUS FOR INFORMATION		ISSUE No.	SHEET No.		REV B		© Roads and Maritime Services				



NOTE:  
 -FUTURE UTILITIES LOCATIONS SUBJECT TO CHANGE  
 -EXISTING UTILITY LOCATIONS BASED ON CURRENT SURVEY AND LOCATING DATA  
 -ALL HORIZONTAL DIMENSIONS ACCURATE AND TO SCALE  
 -TREE DIAGRAM INDICATIVE AND NOT TO SCALE

TREE 14  
 CROSS SECTION  
 SEE DRAWING MSN-CDS-SKT-700-116-EV-0050 FOR LOCATION



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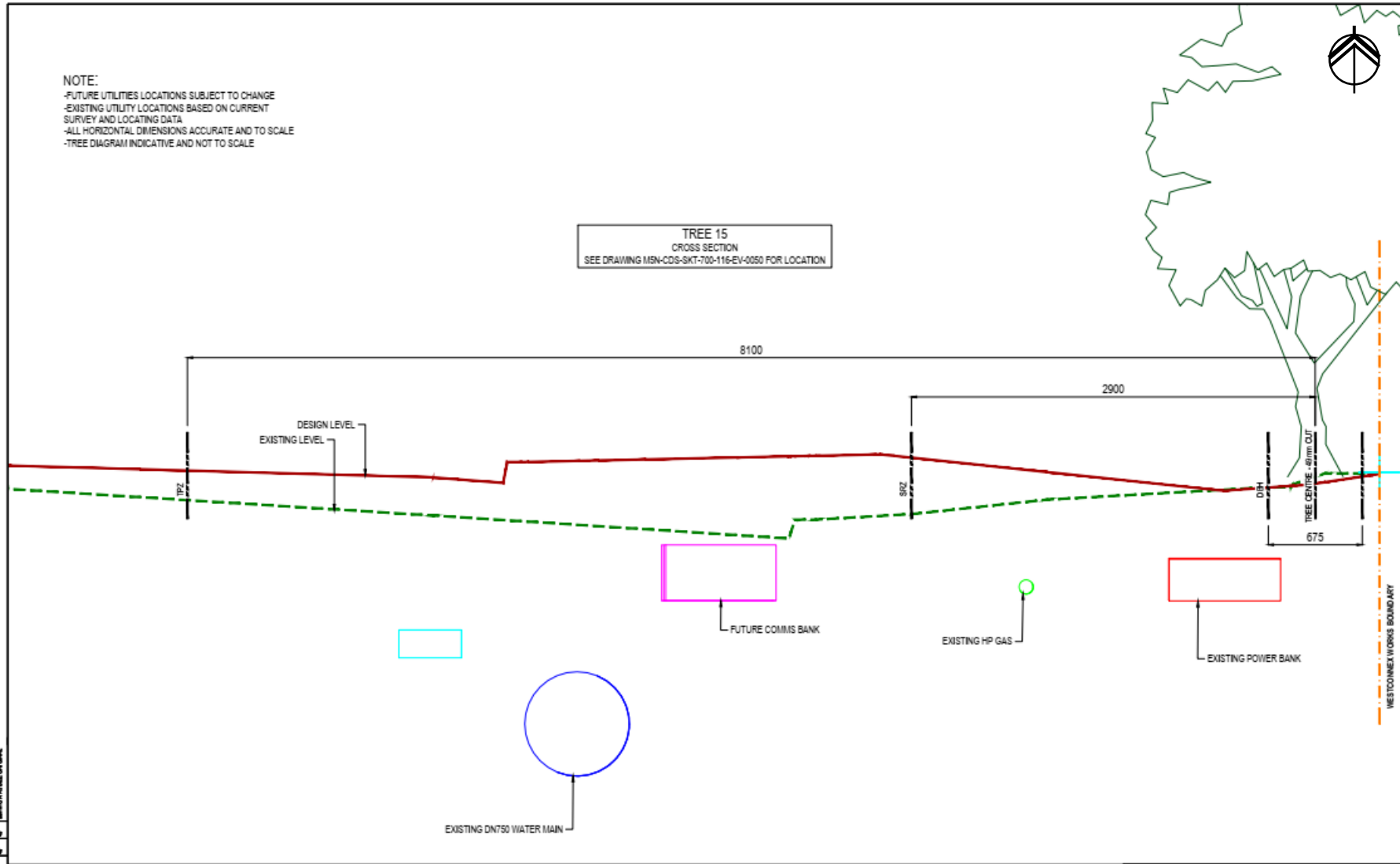
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								DESIGN				SUB INFORMATION No. DATE STATUS FOR INFORMATION			
								DESIGN CHECK				SENS No. SHEET No. REV No.			
								DESIGN MGR				© Roads and Maritime Services			
								PROJECT MGR							



**NOTE:**

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- TREE DIAGRAM INDICATIVE AND NOT TO SCALE

**TREE 15**  
 CROSS SECTION  
 SEE DRAWING MSN-CDS-SKT-700-116-EV-0050 FOR LOCATION



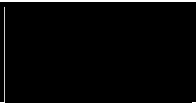
THIS DRAWING MAY BE REPRODUCED IN COLOUR AND MAY BE INCOMPLETE IF COPIED FROM A HARD COPY OR FROM A WEBSITE.

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MSA ZONE 56	AHD

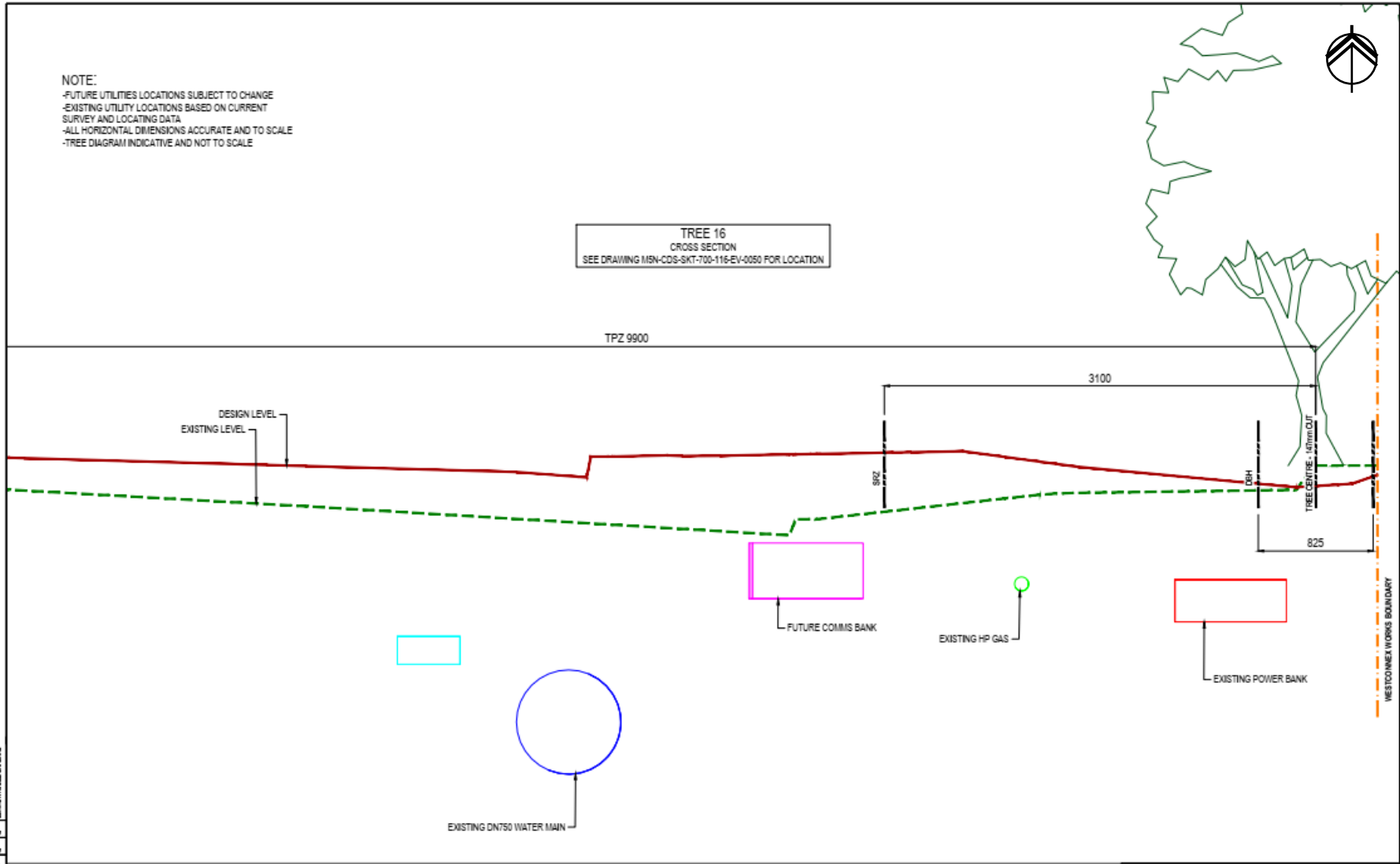

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SHEET 11 OF 13		
<b>RISK STATUS</b> FOR INFORMATION	<b>DATE</b>	<b>REV</b> B



NOTE:  
 -FUTURE UTILITIES LOCATIONS SUBJECT TO CHANGE  
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 -ALL HORIZONTAL DIMENSIONS ACCURATE AND TO SCALE  
 -TREE DIAGRAM INDICATIVE AND NOT TO SCALE

TREE 16  
 CROSS SECTION  
 SEE DRAWING MSN-CDS-SKT-700-116-EV-0050 FOR LOCATION

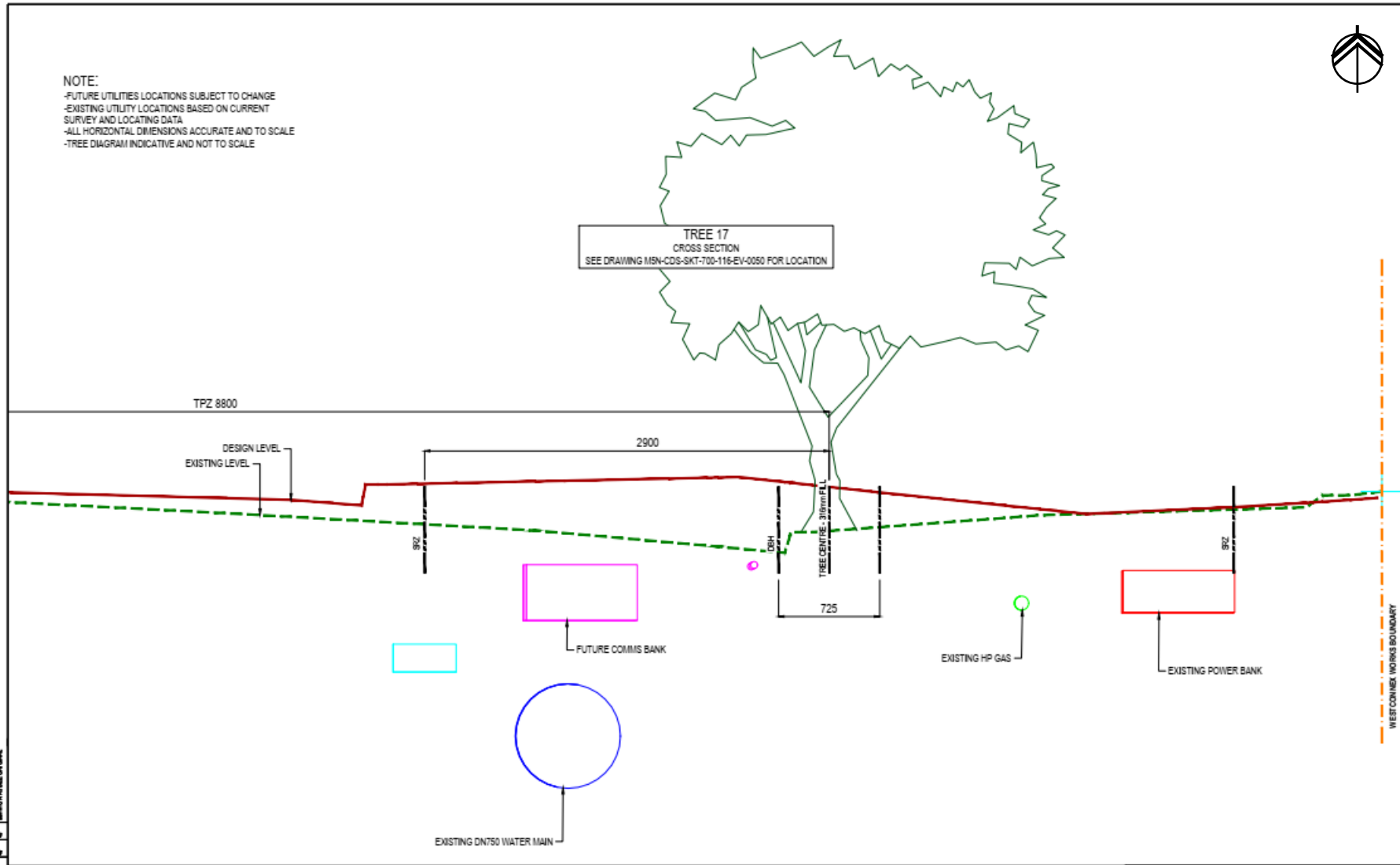


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				1:25				Bourke Road EASTERN VERGE CIVIL & UTILITIES WORKS TREE IMPACT CROSS SECTIONS			
				COORDINATE SYSTEM MSA ZONE 58				TREE 16 SHEET 12 OF 13			
				HEIGHT SYSTEM AHD				TMS REGISTRATION No.			
				DRAWN BY				DATE			
				CHECKED BY				DATE			
				DESIGN CHECK				DATE			
				DESIGN MGR				DATE			
				PROJECT MGR				DATE			
				FOR INFORMATION				SHEET No. REV B			



NOTE:  
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 -ALL HORIZONTAL DIMENSIONS ACCURATE AND TO SCALE  
 -TREE DIAGRAM INDICATIVE AND NOT TO SCALE



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DRAWING FILE LOCATION NAME NewM5\BourkeRoad\Drawings\Civil\UT\BourkeRoad\M5\Drawings\Tree\Tree17\Tree17-Cross-Section-UT-0063.dwg		PROJECT BREAKDOWN STRUCTURE		WestConnex New M5		PLOT DATE/TIME 25/02/2018 1:51:20 PM		PLOT BY JACOB		CLIENT Sydney Metropolitan Corporation	
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					MSA ZONE 58				DESIGN		
					HEIGHT EXEMPT				DESIGN CHECK		
					AHD				DESIGN MGR		
									PROJECT MGR		

DOCUMENT NUMBER M5N-CDS-SKT-700-116-UT-0063			
<b>WESTCONNEX NEW M5</b>			
BOURKE ROAD			
EASTERN VERGE CIVIL & UTILITIES WORKS			
TREE IMPACT CROSS SECTIONS			
TREE 17			SHEET 13 OF 13
ISSUE STATUS FOR INFORMATION			
ISSUE No.	DATE	SHEET No.	REV
			B



## 6.11 Appendix J - Site Photographs



Plate 1 – Arrow notes T5 that requires removal due to proposed ground level reduction within the SRZ to the east of the tree stem.



Plate 2 – Note the extensive unimpeded area to the east of the trees being retained that will remain unaffected and is likely to contain the majority of the healthy root systems.

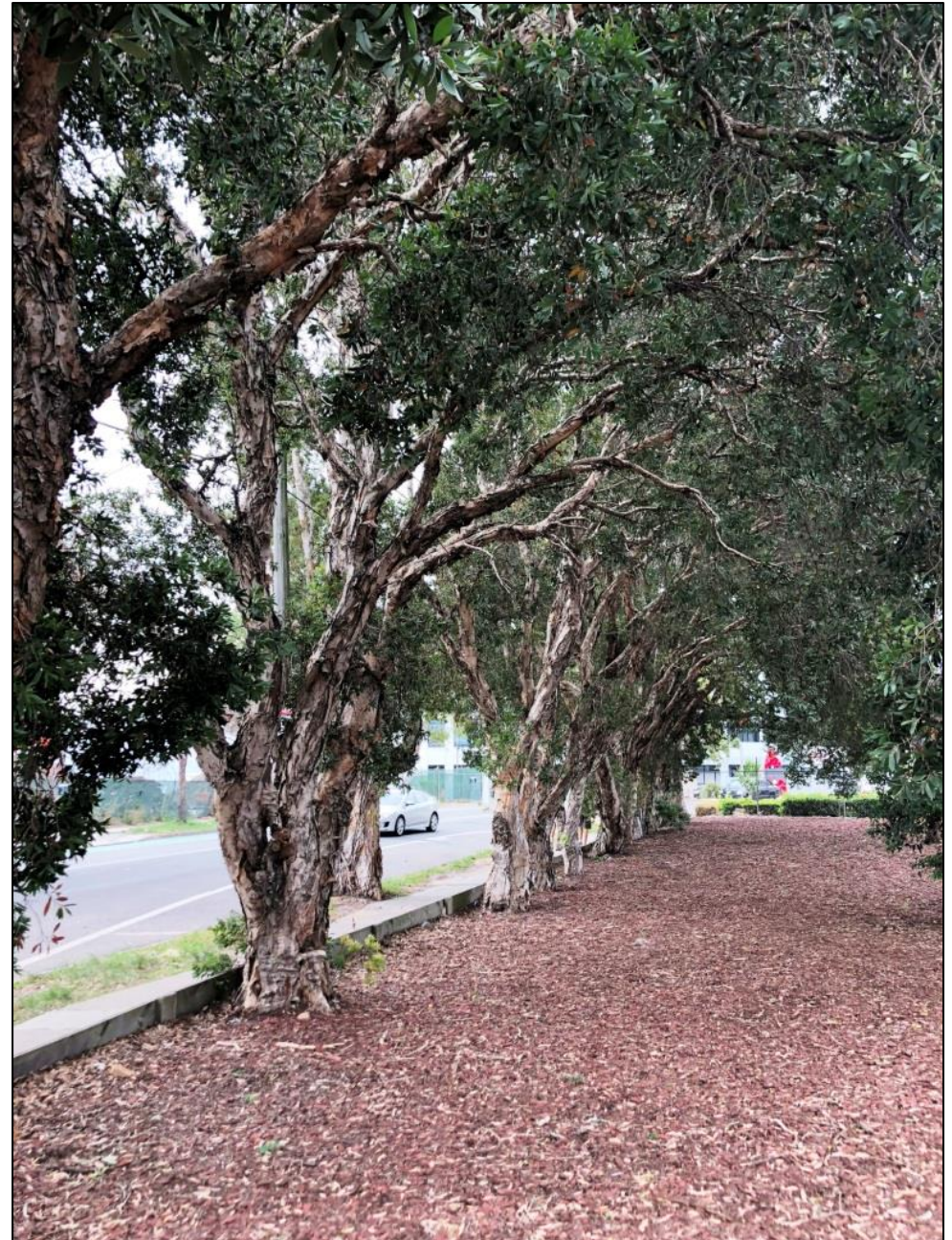




Plate 3 – Arrow notes T16 that requires removal due to proposed ground level reduction within the SRZ to the east of the tree stem.





Plate 4 – Arrow notes T4. This tree can be retained.



Plate 5 – Row of Broadleaved Paperbarks can be seen (T5-T17). Red arrow notes T17, located beside curb instead of within private property boundary. Photograph courtesy of Google maps street view. Marked up by [REDACTED] 20/8/2018.



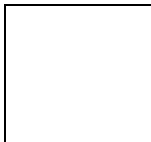
6.12 Appendix K - Schedule of Assessed Trees - M5 Site inspection 30 July 2018.

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)
T1	<i>Jacaranda mimosifolia</i> Jacaranda	4.5	4	100	EM	G	F	Introduced exotic species. Poor form with twisted stem and decay pockets at the base of stem.	3A	L	L	1.5	2	7
T2	<i>Eucalyptus microcorys</i> Tallowwood	8.5	8	250	EM-M	G	F	Introduced native species. Co-dominant stems @ 2.3m AGL, with slight inclusion. Twiggy deadwood.	2B	M	M	1.9	3	28
T3	<i>Eucalyptus microcorys</i> Tallowwood	8.5	12	350	M	G	G-F	Introduced native species. Twiggy deadwood, suckering at base of stem.	2A	M	M	2.2	4.2	55
T4	<i>Ulmus parvifolia</i> Chinese Elm	5.5	8	@1m AGL 275	M	G	G	Introduced exotic species. Low, broad dome shape to canopy.	1A	M	H	2	3.3	35
T5	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	550	M	G	G	Locally native species. Co-dominant @ 2.5m AGL. No special problems noted at time of assessment.	1A	M	H	2.6	6.6	137
T6	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 825	M	G	G	Locally native species. Co-dominant @ 0.4m AGL. No special problems noted at time of assessment.	1A	M	H	3.1	9.9	308
T7	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 575	M	G	G	Locally native species. Stem has broken over footpath, stub remains. Multiple stems @ 0.8m AGL.	1A	M	H	2.7	7	152
T8	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	@ 1m AGL 450	M	G	G	Locally native species. Co-dominant @ 1.2m AGL. No special problems noted at time of assessment.	1A	M	H	2.4	5.4	92
T9	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 625	M	G	G	Locally native species. Co-dominant @ 0.4m AGL. No special problems noted at time of assessment.	1A	M	H	2.8	7.6	180



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)
T10	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 800	M	G	G	Locally native species. Secondary stem @ 0.4m AGL. No special problems noted at time of assessment.	1A	M	H	3.1	9.6	290
T11	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 500 / 575	M	G	G	Locally native species. Two stems sharing a root crown. No special problems noted at time of assessment.	1A	M	H	3	9.3	272
T12	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 350	M	G	G	Locally native species. Suppressed by T11, secondary stem @ 0.5m AGL.	1A	M	H	2.2	4.2	55
T13	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 650	M	G	G	Locally native species. Multiple stems @ 1m AGL. No special problems noted at time of assessment.	1A	M	H	2.8	7.8	191
T14	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 650	M	G	G	Locally native species. Co-dominant @ 0.3m AGL. No special problems noted at time of assessment.	1A	M	H	2.8	7.8	191
T15	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 675	M	G	G	Locally native species. Trifurcate @ 1m AGL. No special problems noted at time of assessment.	1A	M	H	2.9	8.1	206
T16	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	8.5	11	AB 825	M	G	G	Locally native species. Co-dominant @ 1m AGL. No special problems noted at time of assessment.	1A	M	H	3.1	9.9	308
T17	<i>Melaleuca quinquenervia</i> Broad-leaved Paperbark	10	11	725	M	G	F	Locally native species. Multiple stems @ 2.3m AGL. Located directly under powerlines, 100% epicormic growth that has matured and established.	1A	M	H	2.9	8.8	241

**KEY**



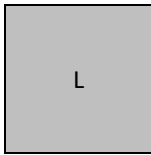
Tree to be retained.



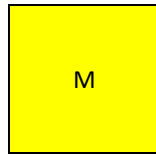
Not classed as 'a tree' under DPE conditions (see Part 1.3).



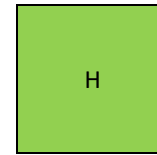
Tree proposed to be removed.



Low Retention Value-These trees are not considered important for retention.



Medium Retention Value-These trees may be retained & protected.



High Retention Value -These trees are considered important for retention and should be retained and protected.

\* 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.