

Arboricultural Impact Assessment



Prepared For

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Site Address

Wolli Creek – near Beverly Grove Park
KINGSGROVE NSW 2205

Prepared by

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Introduction

1.1 Brief

This Arboricultural Impact Assessment (AIA) was prepared by [REDACTED] and was commissioned by CPB Dragados Samsung Joint Venture (CDB-JV).

“The site” is described as Wollie Creek (see Appendix D), or near Beverly Grove Park, Kingsgrove, New South Wales. Areas further along the creek are not discussed within this report as these are covered in previous reports not by this author.

The subject site is within Road and Maritime Service owned land. The subject site location is as below Figure 1.

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

- earthworks and construction activities in relation to the installation of Rip Rap;
- safe vehicle entry, standing for works and exit;
- earthworks and construction activities in relation to the installation of a headwall.

This report gives recommendations for tree retention or removal, and provides guidelines for tree protection and maintenance.

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 23 years in the horticultural industry. 18 of these 23 years have been specifically within the field of arboriculture with roles varying from tree climber within private contracting companies, Council Tree Management Officer at several local Councils and working with independent consultants, prior to the start up of [REDACTED].

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).

Condition	Requirement	Addressed in:
B63	The SSI must be designed to retain as many trees as possible and provide a net increase in the number of replacement trees. 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 – Individual area as per Figure 2.
B63(a)	a visual tree assessment with inputs from the design, landscape architect, construction team;	VTA noted in Appendix E. Staff inputs as per onsite discussions Section 1.2
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.	See Figure 2, onsite discussion (Section 1.2) and Section 2.3.
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, and storage of materials and protection of public utilities.	Section 2 Part 2.4-2.5 & Section 4 and 5.
	In the event that trees are to be removed, then replacement trees are to be planted within, or in close proximity to, the SSI boundary, including along Euston Road where feasible and reasonable. The location of the trees must be determined in consultation with the relevant council(s). The replacement trees are to have a minimum pot size of 75 litres. 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.	Consistent with earlier approved Tree Reports replanting will be detailed in the Urban Design & Landscape Plan in consultation with the relevant Council

Table 1 –Condition of Approval B63 Compliance Table



Figure 1 – Red stars denotes site locations, Aerial Map courtesy of Google Mapping 2017.

1.2 Methodology

In preparation for this report, ground-level, visual tree assessments (VTA), or limited VTA (e.g. where access was limited), were completed by the author of this report on 29th March 2017. Inspection details of these trees are provided in Appendix E —Schedule of Assessed Trees.

The tree heights were visually estimated, unless otherwise noted in Appendix E, 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.

An onsite meeting was attended by the author of this report (██████████), ██████████ (CDS-JV Construction Team, Environment Manager, West) and ██████████ ██████████ (CDS-JV Environmental Approvals Coordinator) on the 29th March 2017. The subject works do not include permanent landscaping, (due to the specific nature of the installation) and therefore, input from a landscape architect was not required.

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);
- Aurecon Jacobs New M5 Joint Venture; Western Interchange and Portals Drainage Remaining Plan – Document Number M5N-AJV-DPK-200-300-DR-2215, RMS Registration number DS2016/002596, Sheet 15 of 16, Revision 00, dated 13 March 2017;

1.3 Tree Preservation and Management Guidelines

The proposed works form part of the approved WestConnex New M5 State Significant Infrastructure Project (SSI 6788). Clause 5.9 of the Hurstville Local Environment Plan 2012 (HLEP), therefore does not apply.

What constitutes a 'tree' as per planning approval is any tree that:

- is equal to or greater than three 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 Noxious Weeds Act 1993.

Observations and Discussion

2.1 Summary of Assessed Trees

Four (4) tree groups (G1, G2, G3 & G4) and two (2) individual trees (T5 & T6) were assessed and included in this report (see Figure 2 below). Details of these are included in the Schedule of Assessed Trees – Appendix E, the tree location plan is as below. Of these trees:

- four (4) trees/tree groups are prescribed (i.e. considered a 'tree' under the planning approval) trees—Group 1, Group 2, Trees 5 & 6; and
- two (2) are non-prescribed trees (i.e. exempt from authority approval to remove or prune due to being noxious weed species), - Group 3 and Group 4

Of the trees/tree groups the following Retention Value (RV- see Appendix C) was ascribed to each:

- three (3) trees/tree groups have Medium RVs – Group 1, Trees 5 and 6;
- three (3) tree groups have Low RVs - Group 2, Group 3 & Group 4.



Figure 2 – Marked up Aerial. Red blocked areas indicate trees/groups proposed for removal. Green dots indicate trees to be retained. Red line indicates permanent boundary.

2.2 Threatened Species

No assessed tree is classed as Vulnerable or Endangered under the NSW Threatened Species Conservation Act 1995 or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

2.3 Proposed Removal of Trees

Non-prescribed trees-

Group 3 and 4 (*Erythrina crista-galli* Cockscombe Coral Tree) are healthy but they are a declared noxious weed species and have been attributed a *Low* Retention Value (RV – see Appendix C).

Group 3 requires removal for the installation of rip rap (rock or other material used to armour the stream bed to protect against scour and erosion).

Group 4 is required to be removed to allow the construction of the Headwall within the current design proposal.

Prescribed trees –

Group 1 and Group 2 are reasonably young specimens and necessitate removal to allow rip rap installation. Construction machinery require safe passage and standing area along this steep bank beside Wollie Creek to carry out the proposed rip rap installation, affecting trees along this area.

Group 1 (*Eucalyptus tereticornis* Forest Red Gum) are required to be removed to allow rip rap installation. Difficult access (slope and existing creek) will require heavy vehicle movement well within the defined Structural Root Zones (SRZ), this cannot be supported under Australian Standard 4970-2009 Protection of trees on development sites (“AS4970”).

Although this group has been attributed a *Medium* Retention Value (RV – see Appendix C) they are early mature specimens, most likely having grown quickly in the abundant water and nutrient supply from the existing creek and drainage area and readily replaceable in the future.

Group 2 (*Casuarina* sp. She-oak) have been attributed a *Low* Retention Value given some of the trees have partially failed, mostly in flash flooding conditions. These are smaller specimens (average height of 6m) and inconspicuous.

The 1500mm diameter drainage line is required to connect to Wollie Creek to provide adequate drainage for the local area. Given that the entire length of creek is vegetated in this area, any options for relocation of the outlet would still require trees to be removed. The proposed site is within the project boundary and minimises the total number of prescribed trees to be removed.

Tree No.	Common Name	Reason	RV
G1	Forest Red Gum x 8	Installation of rip rap and construction vehicle movement.	M
G2	She-oak x 19	Installation of rip rap and construction vehicle movement.	L

Table 2 - Prescribed trees proposed to be removed to facilitate works.

2.4 Proposed Tree Retention

The following trees are proposed/recommended to be retained:

- Tree 5 – *Casuarina* sp.(She-oak);
- Tree 6 - *Casuarina* sp. (She-oak).

2.5 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.

Encroachments within the Structural Root Zone (SRZ), and extent of encroachments into the TPZ's of protected trees to be retained are summarised in Table 3, below.

Tree No.	Tree Common name	Tree located on site	SRZ affected	TPZ area (m ²)	TPZ encroachment (approx. m ²)	TPZ encroachment (approx. %)
5	She-oak	✓	✗	72	0	0
6	She-oak	✓	✗	92	0	0

Table 3 – Estimated encroachments into the SRZ and TPZ of trees proposed for retention. Please note site-specific constraints will heavily influence the presence of roots in a particular 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 5 & 6- *Casuarina* sp. (She-oak)

Under the current proposal these trees will be well clear of works. However given machinery accessing this area, extra care has been taken to ensure these trees are protected.

Tree 5 has a radial notional Tree Protection Zone of 4.8m, Tree 6 has a radial distance of 5.4m, and branch spread does not extend out of the radial TPZ distance so no pruning will be required.

These two (2) trees should remain unaffected from the proposed works.

Recommendations

3.1 Tree Removal

Two (2) tree groups of *prescribed* trees (G1 & G2) are required to be removed to accommodate the proposed works. Replanting will be undertaken in accordance with the condition B63 of the Compliance Table.

Group 3 and Group 4 consist entirely of declared noxious weeds, all will be removed to accommodate works.

Tree removal work shall be carried out by minimally qualified AQF Level 2 Arborists in compliance with the NSW Workcover Code of Practice for the Amenity Tree Industry, these contractors shall be advised of trees in close proximity being retained and instructed to avoid damage to such.

Stumps to be removed within the TPZ of trees to be retained, shall be removed in a manner that avoids damaging or disturbing roots.

Tree Protection Measures

4.1 Minimising Impacts on Trees to be Retained

Tree 5 – Casuarina sp. (She-Oak)

- Any ground-level change within 5m of the tree is to be directly supervised by an arboriculturist with a minimum AQF5 in arboriculture or equivalent.
- Tree protection devices are to be placed as advised by the project arboriculturist and prior to any site works commencing.
- Stem protection is required should construction works occur within the TPZ, this shall be padding placed against the stem and battens strapped together over this padding (not fixed in any way into the tree stem). A minimum height of 2m is recommended.
- Refer to Sections 4.2 – 5.3 for additional recommendations that may require adoption during works. The project arboriculturist must advise on all aspects of tree protection prior to and during works.

Tree 6 - Casuarina sp. (She-Oak)

- Any ground-level change within 5.5m of the tree is to be directly supervised by an arboriculturist with a minimum AQF5 in arboriculture or equivalent.
- Tree protection devices are to be placed as advised by the project arboriculturist and prior to any site works commencing.
- Stem protection is required should construction works occur within the TPZ, this shall be padding placed against the stem and battens strapped together over this padding (not fixed in any way into the tree stem). A minimum height of 2m is recommended.
- Refer to Sections 4.2 – 5.3 for additional recommendations that may require adoption during works. The project arboriculturist must advise on all aspects of tree protection prior to and during works.

4.2 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.

4.3 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.

4.4 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 roadbase 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.

4.5 Fencing and Walls within the SRZ and TPZ of Retained Trees.

- Where fencing and/or masonry walls are to be constructed along site boundaries, they must provide for the presence of any living woody tree roots greater than 50mm diameter.
- Hand digging must occur within the SRZ of trees to be retained.
- For masonry walls or fences it may be acceptable to replace continuous concrete strip footings with suspended in-fill panels (e.g. steel or timber pickets, lattice etc) fixed to pillars.

4.6 Pavements

- Where possible pavements should be avoided within the TPZ of trees to be retained.
- Proposed paved areas within the TPZ of trees to be retained are to be placed above grade to minimise excavations within the root zone, avoiding root severance and damage.

4.7 Landscaping within Tree Root Zones.

- The level of introduced planting media into any proposed landscaped areas within the TPZ is not to be greater than 75mm depth, and be of a coarse, sandy material to avoid development of soil layers that may impede water infiltration.
- Container size of proposed plants within the SRZ of trees should be determined prior to purchase of plants. This is to identify planting locations and container size of plants at the time of planting. Otherwise, any proposed landscaping within the SRZ must consist of tubestock only. This is required to ensure that damage to tree roots is avoided.
- Mattocks and similar digging instruments must not be used within the TPZ of the trees. Planting holes should be dug carefully by hand with a garden trowel, or similar small tool.
- Where possible, do not plant canopy trees beneath, or within 6 - 8m of, overhead power lines.

4.8 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.

Post Construction Tree Care Measures

5.1 Mulching

The removal of mulch after construction to remove any contaminants and its replacement with a good quality mulch and addition of 10% organic matter will improve beneficial soil micro-organisms, retain moisture and improve aeration and water infiltration.

5.2 Irrigation

An arboriculturist should determine whether irrigation should be carried out during extended periods of drought.

5.3 Pest Management

Monitoring is required, as trees under stress are more prone to insect attack

5.4 Hazard Management

Monitoring, management and routine re-assessment of the trees by a qualified arboriculturist is required for adequate long-term safety of residents.

References

Credit to [REDACTED] of 'Urban Forestry Australia' for general report layout and several areas of text.

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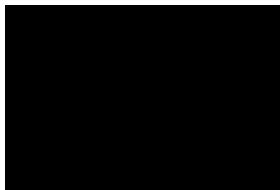
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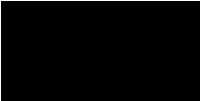
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6.1 Appendix A - Terms and Definitions

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.

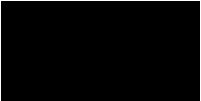
Inclusion stem/bark: the pattern of development at branch or stem junctions where bark is turned inward rather than pushed out. This fault is located at the point where the stems/branches meet. This is normally a genetic fault and potentially a weak point of attachment as the bark obstructs healthy tissue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

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.

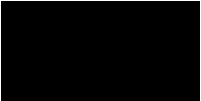
Visual Tree Assessment (VTA): a procedure of defect analysis developed by Mattheck and Breloer (1994) that uses the growth response and form of trees to detect defects.



6.2 Appendix B - ULE Guide

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 – Significance of a Tree Assessment Rating System (IACA 2010)©

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.

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>						
		Priority for Retention (High) -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.				
		Consider for Retention (Medium) -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.				
		Consider for Removal (Low) -These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.				
		Priority for Removal -These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.				

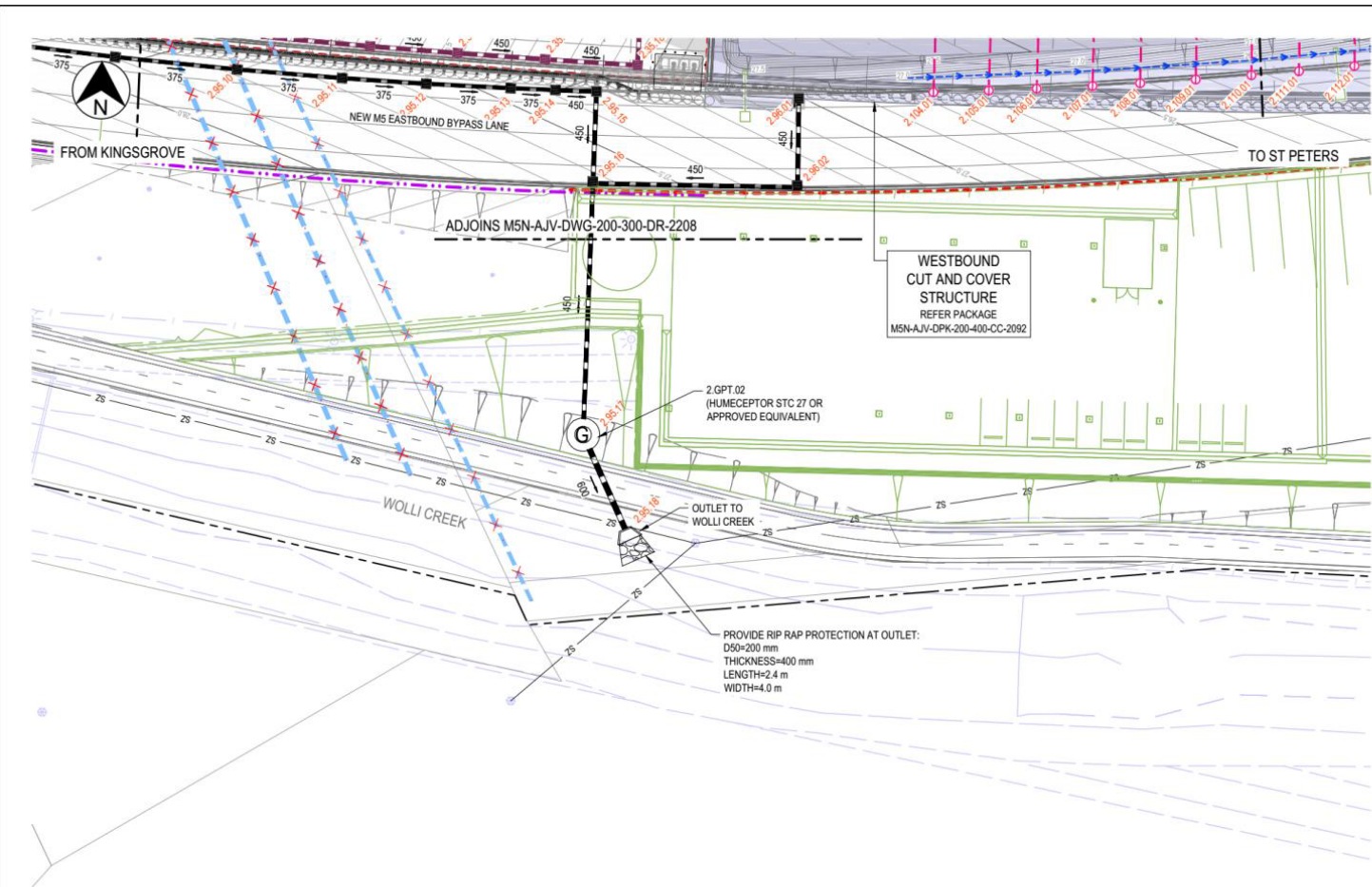


Table 1 - Tree Retention Value - Priority Matrix.

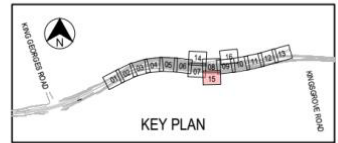
IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au



6.4 Appendix D - Western Interchange and Portals Drainage Remaining Plan



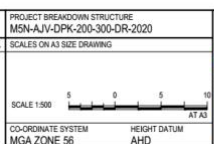
- LEGEND**
- PERMANENT WORKS BOUNDARY
 - TEMPORARY WORKS BOUNDARY
 - RETAINING WALL
 - NOISE WALL
 - EXISTING & PROPOSED MERGED CONTOURS
 - KING GEORGE ROAD UPGRADE (BY OTHERS) BRIDGES
 - CUT AND COVER STRUCTURE
 - ROAD LIGHTING (REFER PACKAGE UL-2035)
 - ITS GANTRY (REFER PACKAGE IT-2045)
- EXISTING**
- EXISTING PAVEMENT
 - EXISTING STORMWATER PIPE TO BE REMOVED / ABANDONED
 - EXISTING STORMWATER PIPE (TO REMAIN U.N.O.)
 - EXISTING STORMWATER PIT (TO REMAIN U.N.O.)
 - EXISTING HEADWALL
 - EXISTING STORMWATER PIT (TO BE COVERED) (REFER MSN-AJV-DWG-200-300-DR-2065)
- PROPOSED**
- SURFACE STORMWATER PIPE
 - SLOT DRAIN IN FLEXIBLE PAVEMENT
 - SLOT DRAIN IN CONCRETE PAVEMENT
 - GRATED DRAIN
 - EARLY WORKS TRANSVERSE DRAINAGE PIPE & PIT (REFER PACKAGE DR-2015)
 - TROUGH PIT & PIPE (REFER PACKAGES ST- 2095 & 2100)
 - CUT AND COVER SCUPPER (REFER PACKAGES CC-2085 & 2092)
 - STORMWATER HEADWALL
 - STORMWATER PIT (REFER PIT SCHEDULE)
 - BURIED JUNCTION PIT
 - SLOT/GRATED DRAIN BEND FOR SETOUT ONLY
 - GROSS POLLUTANT TRAP
 - STORMWATER PIT LABEL
 - OPEN CONCRETE CHANNEL
 - GRASS LINED CHANNEL
 - BIO FILTRATION SWALE DRAIN
 - HALF PIPE DRAIN



ACCEPTED FOR CONSTRUCTION

DRAWING FILE LOCATION / NAME C:\ps_work\stym\m5nzc_prod\02144\MSN-AJV-DWG-200-300-DR-221-2216.dwg									
DESIGN MODEL FILES USED FOR DOCUMENTATION OF THIS DRAWING MSN-AJV-MCD-200-300-DR-2007_00_120a MSN-AJV-MCD-200-300-DR-WESTERN DRAINAGE_00.TXT	<table border="1"> <tr> <th>REV</th> <th>DATE</th> <th>AMENDMENT / REVISION DESCRIPTION</th> <th>APPROVAL</th> </tr> <tr> <td>00</td> <td>13.03.2017</td> <td>ISSUED FOR CONSTRUCTION</td> <td>M.P.</td> </tr> </table>	REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL	00	13.03.2017	ISSUED FOR CONSTRUCTION	M.P.
REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL						
00	13.03.2017	ISSUED FOR CONSTRUCTION	M.P.						

PROJECT BREAKDOWN STRUCTURE MSN-AJV-DPK-200-300-DR-2020	
SCALES ON A3 SIZE DRAWING	
SCALE 1:500	AT A3
CO-ORDINATE SYSTEM MGA ZONE 56	HEIGHT DATUM AHD



WestConnex New M5	PLOT DATE / TIME 16/03/2017 3:33:36 PM	PLOT BY sbyme
CPB	TITLE	NAME
WSPACERBOX	DRAWN	10.02.2017
SANSUNG CUT	DRG CHECK	10.02.2017
Older A300 sites	DESIGN	10.02.2017
HASSELL	DESIGN CHECK	10.02.2017
	ZONE MANAGER	10.02.2017
	DESIGN MANAGER	10.02.2017

CLIENT	DOCUMENT NUMBER M5N-AJV-DWG-200-300-DR-2215
	WESTCONNEX NEW M5 WESTERN INTERCHANGE AND PORTALS DRAINAGE REMAINING PLAN
	SHEET 15 OF 16

RMS REGISTRATION No. DS2016/002596	ISSUE STATUS ISSUED FOR CONSTRUCTION	EDMS No.	SHEET No. DR-2215	REV 00
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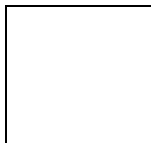


6.5 Appendix E - Schedule of Assessed Trees



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)
G1	<i>Eucalyptus tereticornis</i> x 8 Forest Red Gum	Av 8	12	** 250	EM	G	G	Locally native species. Clear stems to 5m. No special problems noted at time of assessment. Limited access due to dense undergrowth and creek.	2A	M	M	1.9	3.0	28
G2	<i>Casuarina</i> sp. x 19 Swamp & River She-Oak	Av 6	10	** 200	EM	G	F	Native species. Most specimens multi-stemmed. Two specimens have partially failed. Limited access due to dense undergrowth and creek.	3A	M	L	1.7	2.4	18
G3	<i>Erythrina crista-galli</i> x 7 Cockscombe Coral Tree	5-6	12	**300	M	G	G	Introduced exotic species. Declared noxious weed. All specimens multi-stemmed at ground level. No special problems noted at time of assessment. Limited access due to dense undergrowth and creek.	4E	L	L	-	-	-
G4	<i>Erythrina crista-galli</i> x 10 Cockscombe Coral Tree	5-6	10	350	M	G	G	Introduced exotic species. Declared noxious weed. No special problems noted at time of assessment. Within inaccessible area at time of assessment, steep slope, heavy weed infestation, safety fence blocking access.	4E	L	L	-	-	-
5	<i>Casuarina</i> sp. She-oak	7	8	*400	M	G	G	Native species. Secondary stem @ approximately 4m AGL. Within inaccessible area at time of assessment, steep slope, heavy weed infestation, safety fence blocking access.	2A	M	M	2.3	4.8	72
6	<i>Casuarina</i> sp. She-oak	7.5	7	*450	M	G	G	Native species. Within inaccessible area at time of assessment, steep slope, heavy weed infestation, safety fence blocking access.	2A	M	M	2.4	5.4	92

KEY



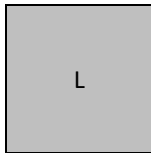
Tree to be retained.



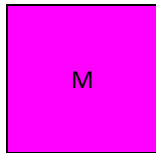
Dead/noxious weed – not classed as ‘a tree’ under DPE conditions.



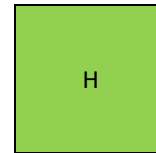
Tree proposed to be removed.



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/Height 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.

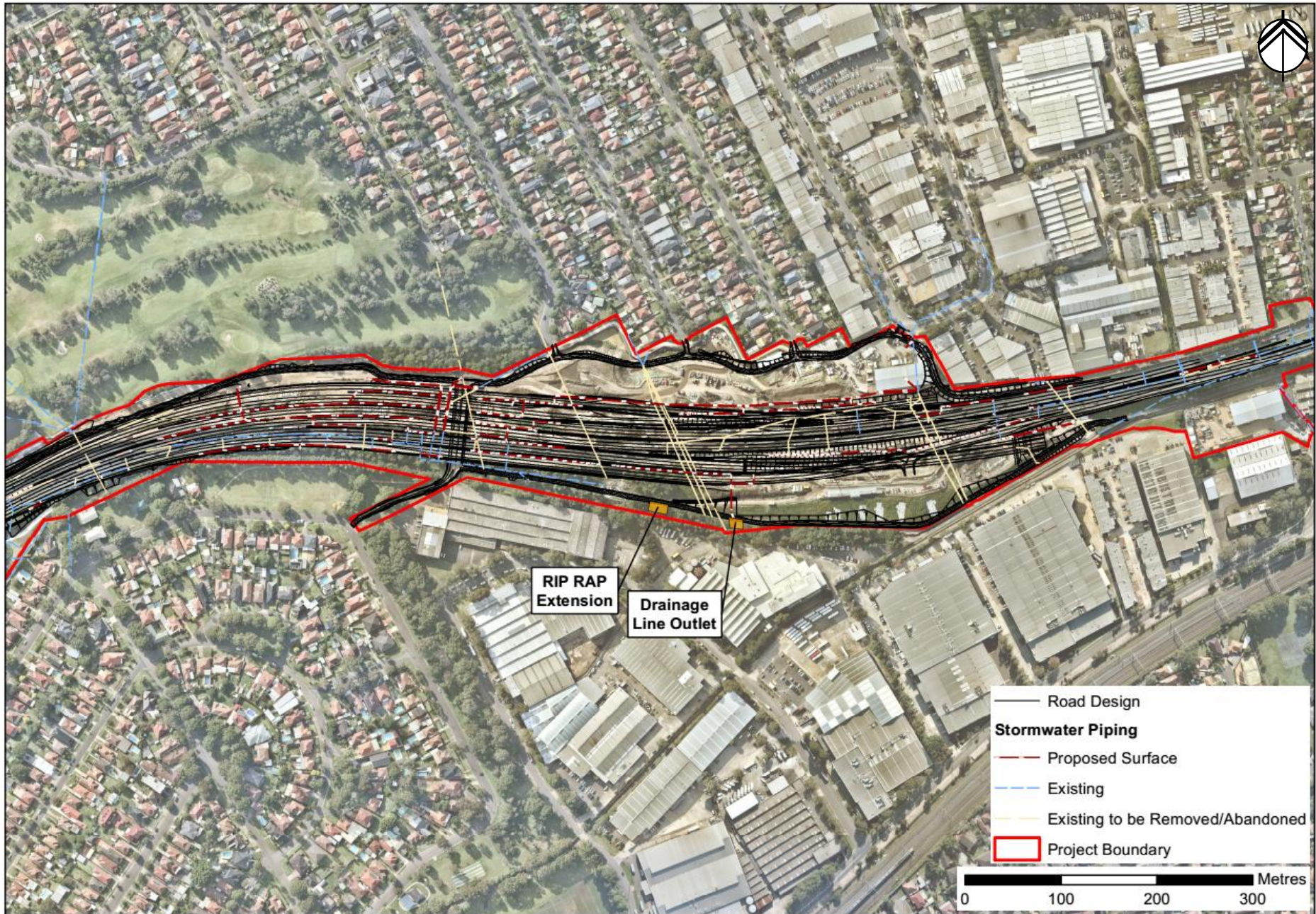


6.6 Appendix F- Aerial Plan with Proposed Works Locations





6.7 Appendix G - Overview Site Map





6.8 Appendix H - Photographs



Photo 1 – Group 1, *Eucalyptus tereticornis* mainly located on upper area of creek bank.

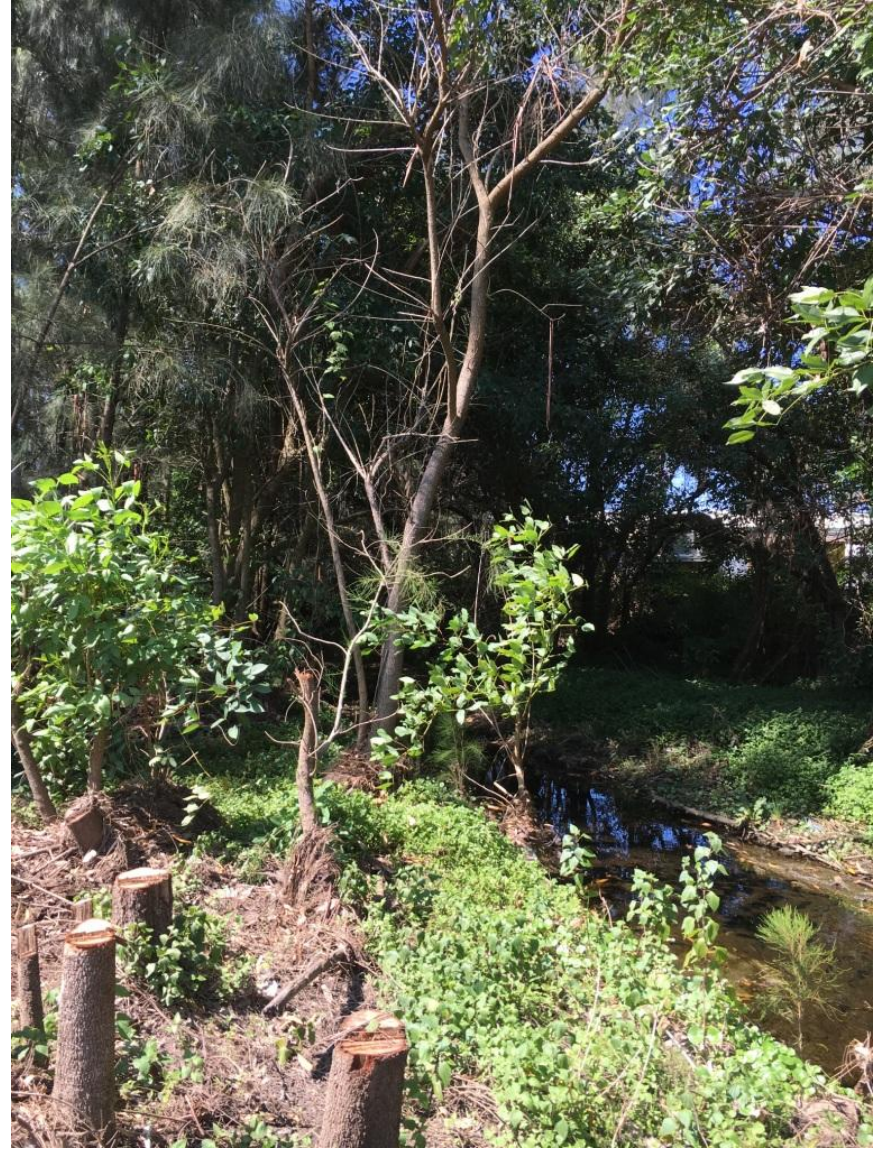


Photo 2 – Group 2 & 3 – stumps in foreground as the subject of previously approved report.



Photo 3 – Group 3 Area heavily infested with weed species such as Cockcombe Coral (red arrow).



Photo 4 – Group 2 & 3 – Area subject to flooding and currently dense with debris/rubbish.



Photo 5 – Group 4 Area dense/impenetrable currently with noxious Cockscombe Coral.



Photo 6 – Trees 5 & 6 being retained.



Photo 7 – Group 4 Area dense/impenetrable with noxious weed - Cockscombe Coral Tree.



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