

Appendix G

Biodiversity

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Appendix G.1 – Biodiversity inspection (AECOM, 2020)

Appendix G.2 – Arboricultural assessment (Earthscape Horticultural Services, 2015)

Green Square to Ashmore Precinct Connector Road

Biodiversity Assessment

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Biodiversity Assessment

Client: City of Sydney

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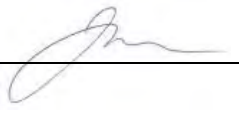
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1.0 Introduction

An ecological inspection was undertaken of the proposed Green Square to Ashmore Precinct Connector Road in Green Square, NSW (the Proposal). The road would run between the intersection of Bourke Road and Bowden Street through to Botany Road. The inspection sought to understand the context of the project proposed by City of Sydney aimed at improving traffic and active transport connectivity within this rapidly growing part of Sydney.

The site was inspected for biodiversity values on 24 July 2020. The results of this inspection, an analysis and high level assessment of impacts are presented below.

2.0 The Proposal

The Proposal includes the following overarching activities:

- Removal of trees affected by the proposed road
- Excavation and export of contaminated material
- Construction of new road for approximately 380 m including associated cycleway
- New traffic signals at intersections
- Batters, mounds and retaining walls to provide the structural support to the road and required interfaces to adjacent properties
- Stormwater connections to the Green Square stormwater drain
- Street lighting of all roads to meet required statutory requirements with increased illumination at proposed pedestrian crossing facilities
- Landscaping and tree planting, as well as street furniture

The scope of works may be further evaluated and refined during detailed design.

The Proposal area is defined by the maximum area required to complete the work. In this case, the Proposal area comprises the proposed road and the associated construction compound/materials laydown area.

The proposed construction compound/material laydown area would be located within the footprint of the building demolished opposite the intersection of Bowden Road with Bourke Road. This area is predominantly comprised of the slab of the previous building, as well as associated parking and other hard-stand areas free of vegetation.

3.0 Methodology

This assessment has been prepared on the basis of desktop analysis and a site inspection undertaken by Jamie McMahon, a qualified and experienced ecologist from AECOM Australia.

The aim of the site inspection was to:

- confirm the status of any vegetation communities present
- confirm the presence or absence of any threatened species or threatened ecological communities within or near the proposal area
- provide any further advice relevant to the maintenance of biodiversity values as part of the proposal.

The site inspection was undertaken alongside staff from City of Sydney, AECOM's engineering design lead and construction contractors. Inspection of the site included access to all parts of the site between Bourke Road and O'Riordan Street. The section between O'Riordan Street and Botany Road was not accessible as it was surrounded by temporary construction fencing. The site had been subject to recent earthworks and had a light covering of grass grown from hydromulching.

The site inspection was undertaken as a ground truthing exercise in order to confirm desktop searches. No detailed surveys, including biometrics or fauna trapping, were undertaken. Survey effort and coverage was of a level to provide a suitable level of confidence in the results and assessment.

Site and layout

The proposal area is located at Alexandria and Green Square, NSW, approximately 4 km south of the Sydney CBD (as the crow flies). The area is located within the City of Sydney Local Government Area (LGA).

The nearest waterway is the heavily channelised section of Sheas Creek, approximately 120 m to the north. Sheas Creek flows into Alexandra Canal, the upper extent of which is 750 m to the southwest. The nearest green open space is Perry Park, approximately 190 m to the southwest.

The site is accessible from each of Bourke Road, O'Riordan Street and Botany Road. No upgrades or changes are required for access.

The area around the Proposal area is heavily urbanised. The terrain is generally flat, with a minor slope towards the west. The site itself drains to the west, eventually flowing into Sheas Creek via the reticulated stormwater system.

Adjacent to the site are existing and operational buildings including the Taxis Combined depot and Australian Red Cross Lifeblood.

At the time of inspection most of the proposed road footprint was cleared of buildings and remnant vegetation. The exception were street trees on Bourke Road and O'Riordan Street, those within the landscaped area of the A2B car park, and a small amount of vegetation at the periphery of the previous properties (the buildings of which are now demolished).

4.0 Relevant legislation

As directed by *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) the proposal would be permissible without development consent under Part 5 of the *Environmental Planning and Assessment Act 1979*. As such development consent would not be required from City of Sydney Council, nor would local council vegetation protection measures such as tree protection orders apply.

The following legislation has been considered when carrying out the field inspection and preparing this memorandum:

- The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires that Commonwealth approval be obtained for certain actions, and establishes an assessment and approvals system for actions that have, or are likely to have, a significant impact on Matters of National Environmental Significance (MNES)
- The *Biodiversity Conservation Act 2016* (BC Act) protects threatened flora and fauna species and ecological communities and their habitats within NSW
- The *Fisheries Management Act 1994* (FM Act) protects threatened species, populations and ecological communities of fish and marine vegetation, and other living resources of NSW waters. Species listed under this act are considered alongside those of the BC and EPBC Acts. Under section 219 works within a waterway that may result in the temporary or permanent blockage of fish passage will require a permit from NSW DPI. Section 199 of the Act requires a public authority provide the Minister for Primary Industries 21 days' notice dredging or reclamation works, though clause 227 of the *Fisheries Management (General) Regulations 2019* provides an exemption from this requirement if the works are carried out in accordance with the Code of Practice for Minor Works in NSW Waterways. The project is not expected to require any permits given there are not nearby waterbodies directly affected by the proposal.
- The *Biosecurity Act 2015* manages threats from invasive species such as weeds, disease and fauna pests

- *Coastal Management Act 2016* and *State Environmental Planning Policy (Coastal Management) 2018* – the site is not mapped as being part of the coastal zone (including coastal wetlands and littoral rainforests) under these policies.

5.0 Desktop searches

A search of the NSW Bionet Atlas and the Commonwealth Protected Matters Search Tool indicated the potential for 121 threatened and migratory species to be present within a 5 km radius of the Proposal. This includes highly mobile species such as Grey-headed Flying-fox and Powerful Owl, as well as less mobile species such as Wallum Froglet and Green and Golden Bell Frog. Threatened plants in this radius include *Acacia pubescens*, *Pimelea spicata*, *Syzygium paniculatum* and *Persoonia hirsuta*. A likelihood of occurrence assessment was undertaken for all threatened species identified by desktop searches (Appendix A). This assessment considered the likelihood any threatened species to utilise the site to be low.

No recognised vegetation communities were identified as being present within the site. The nearest mapped community in *The Native Vegetation of the Sydney Metropolitan Area - Version 3.1* (OEH, 2016) VIS ID 4489 was 'Urban exotic/native', located 50 metres south on O'Riordan Street and over the Botany Road/Geddes Avenue intersection.

The nearest mapped native plant community was Coastal Sand Apple-Bloodwood Forest (PCT 1775), located within the NSW Golf Club around 2 km from the proposal.



Figure 1 Vegetation mapping



Figure 2 Threatened species records

6.0 Inspection results

The proposal area was inspected on the morning of 24 July 2020. Conditions during the inspection were cool, approximately 15°C with scattered cloud and light wind. There had been very little recorded rain throughout the week prior to the survey (2.2 mm in the previous seven days at Sydney Airport). As expected, no water was observed flowing through the site, though a very small amount of static water was observed within the drain adjacent to the Red Cross Lifeblood property.

The site is generally flat and is separated into two almost completely flat sections in a terrace fashion. The lower terrace, adjacent to Bourke Road, is the site of a recently demolished commercial building. The upper terrace area is bordered by O’Riordan Street and appears to also be a former commercial building site. It is not clear how long this land has been vacant. Beyond O’Riordan Street the proposal area slopes slightly upwards towards Botany Road. This area has some semi-formalised drainage present as a result of recent earthworks.

None of the landforms present are considered to be natural. All parts of the Proposal area are likely to have been subject to historic cut and fill to facilitate commercial and industrial development. Despite this, the site still maintains a general slope to the west, indicative of the original landform.

Vegetation within the Proposal area is generally very limited. Much of the vegetation present appears to be common urban native and exotic species, with some seemingly planted.

Street trees along the interface of the Proposal area with Bourke Road consist of two large *Melaleuca quinquenervia* and one *Eucalyptus sideroxylon*. Two planted areas of *Lomandra longifolia* are present between the traffic lanes and the bike lane of Bourke Road on the intersection with Bowden Street.

Vegetation within the previous commercial building site at 54 Bourke Road is largely comprised of planted and regenerated native species as shown in Figure 1. Native species present include:

- Tuckeroo (*Cupaniopsis anacardioides*)
- *Acacia implexa*

- *Casuarina glauca*
- *Melaleuca quinquenervia*

Exotic vegetation in this area included:

- African olive (*Olea europaea* subsp. *cuspidata*)
- Lantana (*Lantana camara*)
- Crofton weed (*Ageratina adenophora*)
- Rhodes grass (*Chloris gayana*)
- Pink Diosma (*Coleonema pulchellum*)
- Pampas grass (*Cortaderia selloana*)
- Fountain grass (*Pennisetum* sp.)
- Cobbler's pegs (*Bidens pilosa*)
- Purple top (*Verbena bonariensis*).

Vegetation within the land at 15 O'Riordan Street is comprised of the same species with the exception of several Chinese elm (*Ulmus parviflora*) growing alongside the A2B building (refer Figure 2 and Figure 3). In addition, the front car park of the A2B building would be affected by the Proposal. This area includes a number of Scrub cherry (*Syzigium australe*) employed as a hedge and a cultivated Grevillea 'Honey gem'. Street trees along O'Riordan Street (Figure 4) include several large Broad-leaved paperbark (*Melaleuca quinquenervia*) and several smaller Narrow-leaved ironbark (*Eucalyptus crebra*). Both of these are commonly planted street trees throughout the Sydney region and neither are threatened species.



Figure 3 *Melaleuca quinquenervia* and *Eucalyptus crebra* along the boundary with O'Riordan Street (photo facing east)



Figure 4 *Acacia implexa* along the northern boundary with A2B Australia



Figure 5 *Syzigium australe* (with Rhodes grass in the foreground) located at the southeastern corner of the A2B Australia car park.



Figure 6 Street trees along O'Riordan Street (*Melaleuca quinquenervia* and *Eucalyptus crebra*)



Figure 7 Tuckeroo (*Cupaniopsis anacardioides*) part of landscaping at the rear of the property formerly facing Bourke Road.

The only fauna species observed around the site was Noisy miner (*Manorina melanocephala*). No evidence of other occupation in the form of scats or tracks was observed, though the site would be reasonably expected to accommodate a selection of native and exotic species. This is likely to include common native and exotic urban-adapted species such as European fox, Rabbit, domestic and feral cats, as well as Brushtail and ringtail possums.

The site lacks any substantial habitat value in the form of typical aspects such as permanent water, coarse woody debris, leaf litter, tree hollows or fallen logs.

7.0 Potential impacts

7.1 Vegetation

The construction of the new connector road would require localised vegetation clearance which is not considered significant. This is based on the nature of the existing vegetation, being heavily modified from its original state.

Vegetation along the alignment is generally characterised by planted or naturally generated exotic species, and environmental weeds. None of the vegetation is considered to be remnant due to extensive historic clearing in this highly urbanised landscape. Vegetation in this area is also subject to ongoing management to a small degree to maintain the site in an orderly condition for future development.

The loss of vegetation in this area for the purposes of construction would not affect any threatened species or ecological community. On this basis and given the likelihood that the road reserve would be landscaped with more suitable species, the impact of vegetation removal for the purposes of construction in this location is considered to be negligible.

7.2 Fauna Habitat

An arboricultural assessment was undertaken as part of the 2017 REF (Earthscape Horticultural Services, March 2015) (Refer Appendix G.2 of the REF) which identified the tree removal likely to be required as part of the Proposal at Bourke Road / Bowden Street and O'Riordan Street. The conclusions of this report are still considered relevant to this REF, as the corridor for the Proposal remains largely unchanged. The location of trees to be removed with respect to the proposed road are shown in Appendix G.2 and would include the street trees in Figure 4. Fauna habitat.

As outlined above this area has been subject to extensive historic clearing. As such the existing habitat value of the site is significantly reduced from the original assemblage that would have occupied the area prior to European settlement (likely to be a marsh-like community). The site is largely bare ground, with areas of weeds and semi-mature regenerated or planted native species. This environment generally favours only highly urban-adapted native and exotic fauna.

The site also has little in the way of trees likely to provide foraging resources for Grey-headed Flying-fox – an urban adapted threatened species. The one exception is the Tuckeroo located at the rear of the property formerly facing Bourke Road. This tree would be cleared to facilitate construction of the road. The loss of this tree is unlikely to result in a significant impact upon any viable local population of this species given the abundance of similar fruiting or flowering vegetation within landscaped areas of Sydney generally.

Construction of the drainage line is likely to disturb soils and may lead to localised erosion and sedimentation in local waterways if not managed appropriately. This impact may be managed through the application of appropriate sediment controls.

The proposal would result in localised changes to drainage, including the formalisation of some drainage into the road's stormwater network. Given the lack of nearby waterbodies or marsh areas, the impact of these changes are considered to be negligible.

Operation of machinery including chainsaws during construction has the potential to directly disturb native fauna through noise impacts. Whilst these impacts are inevitable and largely unable to be mitigated, they would be temporary and are therefore not considered to be significant.

The loss of this vegetation in this area would remove a small degree of understory habitat. This vegetation is likely to be utilised by small insectivorous birds for foraging, with most medium to large ground-dwelling native mammals not likely to be present in this urbanised environment. Habitat for arboreal mammals would not be substantially affected by construction and operation on the basis that the project would affect only a small number of semi-mature native trees providing canopy cover.

Given the absence of constructed masonry buildings and surfaces, or large trees with hollows or flaking bark, it is unlikely that the project would affect any threatened microbat species.

The operation of the connector road would result in a minor increase in the potential for vehicle strike. However, given the generally low speeds of roads in this area, with regular traffic-light controlled intersections, and the general absence of ground-dwelling native fauna, this risk is considered to be low.

Whilst no threatened species were recorded during the site inspection, there remains the potential that this area may be used on occasion by one or more of the above mobile fauna species for shelter or foraging. Such usage is not expected to be extensive nor to the degree that threatened species are likely to solely rely on vegetation subject to removal as part of the proposal.

Overall, the construction of the new road is not expected to result in any significant impacts upon threatened fauna or their habitat.

8.0 Mitigation measures

In order to reduce impacts upon the biodiversity values of the site, the following mitigation measures are proposed to be implemented as part of the works:

- Site sediment and debris control measures should be put in place prior to any excavation or construction activity
- Environmental and high threat weeds should be cleared from the broader site as far as possible as part of construction. If vegetation containing weeds is chipped on site it should be kept separate from native species and should be disposed of separately at a licenced waste management facility
- Removal of woody environmental weeds should include adequate poisoning of the plant to reduce the chance of regrowth. This should include measures such as application of glyphosate to the exposed trunk immediately after cutting
- Soils within the site should be stabilised upon completion of the proposed works. This should include measures such as the spread of clean, native-derived vegetation chippings/mulch and/or the application of geofabrics
- The site should be monitored at least once within three to six months of the completion of works to remove any emergent weeds
- Landscaping the new road and surrounds should be undertaken with local native species as far as practical.
- Any planted vegetation should be monitored at least once within three to six months of the completion of works with any planted stock that has died off being replaced
- Another inspection should be undertaken between nine to twelve months after construction to remove weeds and replace any planted stock that has died off.

9.0 Conclusion

The main impacts of the construction of the Proposal would be through the direct clearing of scattered native vegetation for construction of the road. This would result in very minor, localised impacts upon existing native vegetation, with negligible impacts to fauna. Most vegetation in the area is generally comprised of environmental weeds common to urban areas of Sydney. The removal of these individuals and replacement with native landscape planting would result in a minor net benefit for vegetation in this location.

Habitat impacts associated with the works would be localised and temporary. There would be no significant impact on habitat for known threatened species, including the Powerful owl, Grey-headed Flying-fox and Magenta Lilly Pilly.

The proposal is not considered likely to result in local hydrological changes that would lead to adverse aquatic impacts within any nearby creeks, drainage lines or other waterbodies.

On the basis of the above the proposal is not considered likely to result in a significant impact upon biodiversity values including threatened species and ecological communities.

Appendix A

Likelihood of occurrence
for threatened species in
the local area

Appendix A Likelihood of occurrence for threatened species in the local area

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Crinia tinnula</i>	Wallum Froglet		V		Usually associated with acidic swamp on coastal sand plains and occur in a range of habitats, including sedgeland, wet heathland, paperbark swamps and drainage lines. This species can persist in disturbed areas and breed in both permanent and ephemeral water bodies. Shelter under leaf litter, debris or in burrows.	Low
<i>Heleioporus australiacus</i>	Giant Burrowing Frog		V	V	Distributed through the Sydney Basin sandstone country in woodland, open woodland and heath vegetation, breeding habitat is generally soaks or pools within first or second order streams, but also 'hanging swamp' seepage lines and where small pools form from the collected water. Spend the majority of time in non-breeding habitat up to 300 m away and burrows in soil surface or leaf litter.	Low
<i>Litoria aurea</i>	Green and Golden Bell Frog		E	V	Large populations in NSW are located around coastal and near coastal areas of the metropolitan areas of Sydney, Shoalhaven and mid north coast. It inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.)	Low
<i>Anseranas semipalmata</i>	Magpie Goose		V		Typically found in shallow open wetlands with fringing rushes or sedges.	Low
<i>Anthochaera phrygia</i>	Regent Honeyeater		CE	CE	Inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. NSW the distribution is very patchy and mainly confined to the two main breeding areas at Capertee Valley and the Bundarra-Barraba region and surrounding fragmented woodlands. Birds are also found in drier coastal woodlands and forests. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak. These habitats have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Nectar and fruit from the mistletoes are also eaten during the breeding season.	Low
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow		V		The Dusky Woodswallow is found in open forests and woodlands, and may be seen along roadsides and on golf courses	Low
<i>Botaurus poiciloptilus</i>	Australasian Bittern		E	E	Inhabits temperate freshwater wetlands and occasionally estuarine reedbeds, with a preference for permanent waterbodies with tall dense vegetation. The species prefers wetlands with dense vegetation, including sedges, rushes and reeds. Freshwater is generally preferred, although dense saltmarsh vegetation in estuaries and flooded grasslands are also used by the species.	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Burhinus grallarius</i>	Bush Stone-curlew		E		Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	Low
<i>Calidris alba</i>	Sanderling		V		The current NSW distribution is patchy and scattered, with sporadic distribution around Sydney. In coastal areas typically found in lower elevation grassy woodland and open forest, with broad ground and understorey structural features.	Low
<i>Calidris canutus</i>	Red Knot			E, M	Tidal mudflats, sandflats, beaches, saltmarsh, ploughed fields, flooded pasture	Low
<i>Calidris ferruginea</i>	Curlew Sandpiper		E	CE, M	Coastal migratory species with a NSW distribution from Hastings Point to Shoalhaven Heads. Found in open, sandy beaches with exposed sand bars and rocky outcrops. Rare use of near-coastal wetlands.	Low
<i>Calidris tenuirostris</i>	Great Knot		V	CE, M	Migratory shorebird distributed along entire coast of NSW. Occur on intertidal mudflats in sheltered coastal area	Low
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo		V		Occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests in winter and open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas in summer.	Low
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo		V		Occupy coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where Casuarina and Allocasuarina species are present. This species is dependent on large hollow-bearing eucalypts for nesting.	Low
<i>Charadrius leschenaultii</i>	Greater Sand-plover		V	V, M	Occurs in coastal areas and inhabits littoral and eustarine habitats. Prefer sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks.	Low
<i>Charadrius mongolus</i>	Lesser Sand-plover		V	E, M	Occur along the Australian coastline with highest abundance north of Shoalhaven estuary. Habitat preferences for beaches, mudflats and mangroves.	Low
<i>Diomedea antipodensis</i>	Antipodean A batross		V	V, M	Marine, pelagic and aerial. It rarely enters the belt of icebergs region of Antarctica, but in late summer, it may approach the edge of pack-ice. It sleeps and rests on ocean waters when not breeding.	Low
<i>Diomedea antipodensis gibsoni</i>	Gibson's Albatross		V	V, M	This species is known only to breed on the Adams, Disappointment and Auckland Islands in the subantarctic Auckland Island group. Breeds biennially in colonies among grass tussocks on isolated subantarctic islands, using the wind to travel great distances both during and between breeding seasons. Most eggs are laid in December and January, with chicks fledging the following year in January and February. The annual breeding population is relatively small and has been estimated at 6,077 pairs. This species regularly occurs off the NSW coast from Green Cape to Newcastle	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Diomedea epomophora</i>	Southern Royal Albatross			V, M		Low
<i>Diomedea exulans</i>	Wandering Albatross		E	E, M	Migratory marine species. Island breeding sites located on coastal/inland ridges with open, patchy vegetations and grass tussocks.	Low
<i>Diomedea sanfordi</i>	Northern Royal Albatross			E, M		Low
<i>Epthianura albigrons</i>	White-fronted Chat		V		Open damp ground, grass clumps, fencelines, heath, samphire saltmarsh, mangroves, dunes, saltbush plains	Low
<i>Erythrotriorchis radiatus</i>	Red Goshawk		CE	V	Occurs in coastal and sub-coastal areas in woodland and forests, including riverine forests. Favours intermediate density forests to aid hunting of birds. Nest in tall trees, often beside permanent water sources.	Low
<i>Falco hypoleucos</i>	Grey Falcon		E			Low
<i>Fregetta grallaria grallaria</i>	White-bellied Storm-Petrel			V	The White-bellied Storm-Petrel occurs across sub-tropical and tropical waters in the Tasman Sea, Coral Sea and, possibly, the central Pacific Ocean. In the non-breeding season, it reaches and forages over near-shore waters along the continental shelf of mainland Australia	Low
<i>Glossopsitta pusilla</i>	Little Lorikeet		V		Mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. Nest in small hollows (entrance approx. 3 cm) of Eucalyptus spp. between 2 - 15 m above the ground.	Low
<i>Grantiella picta</i>	Painted Honeyeater		V	V	Occurs in Eucalyptus woodland and forests, with a preference for mistletoe (<i>Amyema</i> spp.). Can also occur along watercourses and in farmland. Nests from spring to autumn in outer canopy of eucalypts, she-oak, paperbark and mistletoe branches.	Low
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		V		Occurs on rocky shorelines and headlands, stony beaches, offshore islands and exposed reefs and only occasionally on sandy beaches.	Low
<i>Haematopus longirostris</i>	Pied Oystercatcher		E		Inhabits marine littoral habitats, including islands. It occupies muddy, sandy, stony or rocky estuaries, inlets and beaches, particularly intertidal mudflats and sandbanks in large marine bays.	Low
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		V	M	Coastlines, estuaries, large rivers and lakes; occasionally over adjacent habitats; builds a large stick nest in a tall tree, rarely on artificial structures	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Hieraetus morphnoides</i>	Little Eagle		V		Occupies habitats rich in prey (birds, reptiles and mammals) within open eucalypt forest, woodland or open woodland. Requires tall living trees for building a large stick nest and preys on birds, reptiles and mammals and occasionally carrion.	Low
<i>Hirundapus caudacutus</i>	White-throated Needletail			M	Aerial space over a variety of habitat types, but prefers to forage over treed habitats as these would provide a greater abundance of insect prey; often forage on the edge of low pressure systems and may follow these systems ; breeds in Asia.	Low
<i>Ixobrychus flavicollis</i>	Black Bittern		V		Occurs below 200 m above sea level and inhabit both terrestrial and estuarine wetlands, with a preference for permanent water bodies and dense vegetation. Roosts in trees or amongst dense reeds.	Low
<i>Lathamus discolor</i>	Swift Parrot		E	CE	In NSW mostly occurs on the coast and south west slopes, occurring in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany (<i>Eucalyptus robusta</i>), Spotted Gum (<i>Corymbia maculata</i>), Red Bloodwood (<i>C. gummifera</i>), Mugga Ironbark (<i>E. sideroxylon</i>), and White Box (<i>E. albens</i>).	Low
<i>Limicola falcinellus</i>	Broad-billed Sandpiper		V		Migratory species. Favour estuarine mudflats, saltmarshes and reefs as feeding and roosting habitat throughout Australian distribution.	Low
<i>Limosa lapponica baueri</i>				V, M	Estuaries and lagoons with large intertidal sandflats or mudflats	Low
<i>Limosa lapponica menzbieri</i>				CE	Estuaries and lagoons with large intertidal sandflats or mudflats	Low
<i>Limosa limosa</i>	Black-tailed Godwit		V	M	Estuaries and lagoons with large intertidal sandflats or mudflats	Low
<i>Lophoictinia isura</i>	Square-tailed Kite		V		Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Low
<i>Macronectes giganteus</i>	Southern Giant Petrel		E	E, M	Migratory marine bird distributed from Antarctic to subtropical waters and nests on offshore and Antarctic islands.	Low
<i>Macronectes halli</i>	Northern Giant-Petrel		V	V, M	Circumpolar pelagic distribution with breeding on Australian offshore islands. Nest in secluded, sheltered coastal habitat with dense vegetation.	Low
<i>Neophema chrysogaster</i>	Orange-bellied Parrot		CE	CE	On the mainland, the Orange-bellied Parrot spends winter mostly within 3 km of the coast in sheltered coastal habitats including bays, lagoons, estuaries, coastal dunes and saltmarshes. The species also inhabits small islands and peninsulas and occasionally saltworks and golf courses. Birds forage in low samphire herbland or taller coastal shrubland. Diet mainly comprises seeds and fruits of	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
					sedges and salt-tolerant coastal and saltmarsh plants. Occasionally, flowers and stems are eaten. Orange-bellied Parrots are known to forage among flocks of Blue-winged Parrots. Recent records from unexpected places, including Shellharbour and Maroubra suggest that the species may be expanding their selection of habitats and foraging plant species. Birds seen in NSW in 2003 were foraging on weed species several hundred metres from the coast	
<i>Neophema pulchella</i>	Turquoise Parrot		V		Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Low
<i>Ninox strenua</i>	Powerful Owl		V		Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. They require large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. Powerful Owls nest in large tree hollows (at least 0.5m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Low
<i>Numenius madagascariensis</i>	Eastern Curlew			CE, M	Estuaries, tidal mudflats, sandspits, saltmarsh, mangroves	Low
<i>Pachyptila turtur subantarctica</i>	Fairy Prion			V	A marine bird, found mostly in temperate and subantarctic seas. The Fairy Prion sometimes forages over continental shelves and the continental slope, but it can come close inshore in rough weather.	Low
<i>Petroica boodang</i>	Scarlet Robin		V		In NSW it occupies open forests and woodlands from the coast to the inland slopes. Breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat.	Low
<i>Pterodroma leucoptera leucoptera</i>	Gould's Petrel		V	E	Breeds on both Cabbage Tree Island, 1.4 km offshore from Port Stephens and on nearby Boondelbah island. They nest predominantly in natural rock crevices among the rock scree and also in hollow fallen palm trunks, under mats of fallen palm fronds and in cavities among the buttresses of fig trees.	Low
<i>Pterodroma neglecta neglecta</i>	Kermadec Petrel (west Pacific subspecies)		V	V	The Kermadec Petrel (western) is a pelagic seabird that occurs in tropical, subtropical and temperate waters of the Pacific Ocean. It has been recorded in waters of 15–25 °C in the subtropics	Low
<i>Ptilinopus superbus</i>	Superb Fruit-Dove		V		Inhabits rainforests and similar closed forest at all altitudes.	Low
<i>Rostratula australis</i>	Painted Snipe (Australian subspecies)		E	E, M	Inhabits shallow inland wetlands, either freshwater or brackish water bodies. Nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats.	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Stagonopleura guttata</i>	Diamond Firetail		V		Found in grassy eucalypt woodlands, open forest, mallee, grassland and riparian areas.	Low
<i>Sternula albifrons</i>	Little Tern		E	M	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands.	Low
<i>Sternula nereis nereis</i>	Australian Fairy Tern			V	It breeds on sheltered mainland coastlines and close islands, usually on sandy beaches above the high tide line but below where vegetation occurs. It feeds almost entirely on fish mainly by following shoals of feeding predatory fish, and is rarely found out of sight of land.	Low
<i>Stictonetta naevosa</i>	Freckled Duck		V		Prefers heavily vegetated wetlands; uses more open wetlands during drought in non-breeding period.	Low
<i>Thalassarche bulleri</i>	Buller's Albatross			V	Buller's Albatross are marine and pelagic, inhabiting subtropical and subantarctic waters of the southern Pacific Ocean.	Low
<i>Thalassarche cauta</i>	Shy Albatross		V	V, M	The Shy Albatross is a marine species occurring in subantarctic and subtropical waters, reaching the tropics in the cool Humboldt Current off South America. The Shy Albatross preference for sea-surface temperatures is poorly known. In the southern Indian Ocean the species has been observed over waters of 6.4-13.5°C. Birds have been noted in shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, the Shy Albatross occurs over continental shelves around continents. The species occurs both inshore and offshore	Low
<i>Thalassarche melanophris</i>	Black-browed Albatross		V	V	Circumpolar distribution and inhabits antarctic, subantarctic and subtropical marine waters.	Low
<i>Thinornis cucullatus cucullatus</i>	Hooded plover			V		Low
<i>Tyto novaehollandiae</i>	Masked Owl		V		Occurs throughout NSW, roosting and nesting in heavy forest. Hunts over open woodland and farmland, with a home range of 500 - 1000 ha. The main requirements are tall trees with suitable large hollows for nesting and roosting and adjacent areas for foraging. Feeds on small mammals.	Low
<i>Xenus cinereus</i>	Terek Sandpiper		V	M	Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools..	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Carcharias taurus</i>	Grey Nurse Shark	CE		V, M	Grey nurse sharks are often observed just above the sea bed in or near deep sandy-bottomed gutters or rocky caves, in the vicinity of inshore rocky reefs and islands. The diet of the adult grey nurse shark consists of a wide range of fish, other sharks, squids, crabs and lobsters.	Low
<i>Carcharodon carcharias</i>	Great White Shark	V		V, M	The white shark is widely distributed throughout temperate and sub-tropical regions in the northern and southern hemispheres. It is most frequently found off southern Australia, South Africa, northern California and the north-eastern United States. In Australian waters the white shark's range extends primarily from southern Queensland, around the southern coastline and to the North West Cape in Western Australia.	Low
<i>Epinephelus daemeli</i>	Black Cod	V		V	Adult black cod are usually found in caves, gutters and beneath bombores on rocky reefs. They are territorial and often occupy a particular cave for life. Small juveniles are often found in coastal rock pools, and larger juveniles around rocky shores in estuaries.	Low
<i>Macquaria australasica</i>	Macquarie Perch	E		E	Found in both river and lake habitats, especially the upper reaches of rivers and their tributaries.	Low
<i>Prototroctes maraena</i>	Australian Grayling			V	Occur in freshwater streams and rivers, especially clear gravelly streams with a moderate flow, as well as estuarine areas.	Low
<i>Rhincodon typus</i>	Whale Shark			V, M	Whale sharks have a broad distribution in tropical and warm temperate seas, usually between latitudes 30°N and 35°S. This species is widely distributed in Australian waters. Although most common at Ningaloo Marine Park (and to a lesser extent at Christmas Island and in the Coral Sea), sightings have been confirmed further south than Kalbarri (on the mid-west coast of Western Australia) and Eden (on the New South Wales south coast).	Low
<i>Synemon plana</i>	Golden Sun Moth		E	CE	Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by wallaby grasses <i>Austrodanthonia</i> spp. Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature	Low
<i>Arctocephalus forsteri</i>	New Zealand Fur-seal		V		Prefers rocky parts of islands with jumbled terrain and boulders. Feeds principally on cephalopods and fish, but also seabirds and occasionally penguins.	Low
<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal		V		Prefers rocky parts of islands with flat, open terrain. They occupy flatter areas than do New Zealand Fur-seals where they occur together.	Low
<i>Balaenoptera musculus</i>	Blue Whale		E	E	Blue Whale habitat is variable, as shown by the main Australian feeding areas, generally associated with known upwellings.	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat		V	V	Roosts in disused mine shafts, caves, overhangs and disused Fairy Martin nests for shelter and to raise young. Also potentially roost in tree hollows. Occurs in low to mid-elevation dry open forest and woodlands, preferably with extensive cliffs, caves or gullies. Pied Bat is largely restricted to the interface of sandstone escarpment (for roost habitat) and relatively fertile valleys (for foraging habitat).	Low
<i>Dasyurus maculatus maculatus</i>	Spotted-tail Quoll (southeastern mainland population)		V	E	Utilises a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.	Low
<i>Eubalaena australis</i>	Southern Right Whale		E	E	Migrate between summer feeding grounds in Antarctica and winter breeding grounds around the coasts of southern Australia, New Zealand, South Africa and South America.	Low
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)		E	E	Generally only found in heath or open forest with a heathy understorey on sandy or friable soils. Feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea</i> spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest.	Low
<i>Megaptera novaeangliae</i>	Humpback Whale		V	V	The population of Australia's east coast migrates from summer cold-water feeding grounds in Subantarctic waters to warm-water winter breeding grounds in the central Great Barrier Reef. They are regularly observed in NSW waters in June and July, on northward migration and October and November, on southward migration.	Low
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat		V		Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
					colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the treetops.	
<i>Myotis macropus</i>	Southern Myotis		V		This species generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. They forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Low
<i>Perameles nasuta</i>	Long-nosed Bandicoot		EP		Habitat includes rainforest, wet and dry forest, woodland, heathland, grassland and urban areas. North Head population occupy all of the habitat types available including woodlands, scrub, heath and open areas.	Low
<i>Petauroides volans</i>	Greater Glider			V	The greater glider is an arboreal marsupial, largely restricted to eucalypt forests and woodlands. It is found in highest abundance typically in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. During the day it shelters in tree hollows, with a particular selection for large hollows in large, old trees.	Low
<i>Phascolarctos cinereus</i>	Koala		V	V	Inhabits a range of eucalypt forest and woodland communities. Adequate floristic diversity, availability of feed trees (primarily <i>Eucalyptus tereticornis</i> and <i>E. viminalis</i>) and presence of mature trees very important. Preferred food tree species vary with locality and there are quite distinct regional preferences. They are able to persist in fragmented habitats, and even survive in isolated trees across a predominantly agricultural landscape.	Low
<i>Pseudomys novaehollandiae</i>	New Holland Mouse			V	Inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. Nest in burrows and have a preference for deeper top soils and softer substrates to aid digging. Spends considerable time foraging above-ground for food in areas of high floristic diversity.	Low
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox		V	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are commonly found in gullies, close to water, in vegetation with a dense canopy. They travel up to 50 km to forage, on the nectar and pollen of native trees, in particular <i>Eucalyptus</i> , <i>Melaleuca</i> and <i>Banksia</i> , and fruits of rainforest trees and vines.	Low
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat		V		Inhabits eucalypt rainforest, sclerophyll forest and open woodland vegetation. Availability of tree hollows is important for access to roosting sites.	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Caretta caretta</i>	Loggerhead Turtle		E	E, M	Loggerhead turtles have a worldwide tropical and subtropical distribution. In Australia, they occur in coral reefs, bays and estuaries in tropical and warm temperate waters off the coast of Queensland, Northern Territory, Western Australia and New South Wales.	Low
<i>Chelonia mydas</i>	Green Turtle		V	V, M	Ocean-dwelling species spending most of its life at sea. Carnivorous when young but as adults they feed only on marine plant material. Eggs laid in holes dug in beaches throughout their range. Scattered nesting records along the NSW coast.	Low
<i>Dermochelys coriacea</i>	Leathery Turtle		E	E, M	Occurs in inshore and offshore marine waters. Rarely breeds in Australia, with the nearest regular nesting sites being the Solomon Islands and Malayan Archipelago. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW. Number of sightings in southern waters suggest species actively seeks temperate feeding grounds, rather than occurring only as stray vagrants.	Low
<i>Eretmochelys imbricata</i>	Hawksbill Turtle			V, M	Hawksbill turtles typically occur in tidal and sub-tidal coral and rocky reef habitats throughout tropical waters, extending into warm temperate areas as far south as northern New South Wales. In Australia the main feeding area extends along the east coast, including the Great Barrier Reef. Other feeding areas include Torres Strait and the archipelagos of the Northern Territory and Western Australia, possibly as far south as Shark Bay or beyond. Hawksbill turtles also feed at Christmas Island and the Cocos (Keeling) Islands.	Low
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake		E	V	Confined to the Sydney basin within a radius of approximately 200 km of Sydney. Preferred habitat of sandstone outcrops with woodland, open woodland and/or heath vegetation. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges and tree hollows.	Low
<i>Natator depressus</i>	Flatback Turtle			V, M	The Flatback Turtle is found only in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya and is one of only two species of sea turtle without a global distribution.	Low
<i>Thalassarche bulleri platei</i>	Northern Buller's Albatross			V		Low
<i>Thalassarche eremita</i>	Chatham Albatross			E		Low
<i>Thalassarche impavida</i>	Campbell Albatross			V		Low
<i>Thalassarche salvini</i>	Salvin's Albatross			V		Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Thalassarche steadi</i>	White-capped Albatross			V		Low
<i>Acacia pubescens</i>	Downy Wattle		V	V	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravelly soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Concentrated around the Bankstown-Fairfield-Rookwood area and the Pitt Town area.	Low
<i>Acacia terminalis</i> <i>subsp. terminalis</i>	Sunshine Wattle		E	E	Habitat requirements include open coastal eucalypt woodland or forest, usually in sandy soil on creek banks, hill-slopes or in shallow soil in rock crevices and sandstone platforms on cliffs.	Low
<i>Allocasuarina glareicola</i>			E	E	Occurs in Castlereagh woodland on lateritic soil. Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.	Low
<i>Asterolasia elegans</i>			E	E	Occurs in the northern hills of Sydney. Habitat requirements are wet, sheltered sclerophyll forests on the mid to lower slopes of moist gullies and rocky outcrops.	Low
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid		E	V	Requires low, dry sclerophyll woodland with a heathy or sometimes grassy understorey on clay loams or sandy soils, specifically in dry, low Brittle Gum (<i>Eucalyptus mannifera</i>), Inland Scribbly Gum (<i>E. rossii</i>) and <i>Allocasuarina</i> spp. woodland with a sparse understorey and stony soil.	Low
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid		V	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>).	Low
<i>Dichanthium setosum</i>	Bluegrass		V	V		Low
<i>Doryanthes palmeri</i>	Giant Spear Lily		V			Low
<i>Eucalyptus camfieldii</i>	Heart-leaved Stringybark		V	V	Occurs mostly in small scattered stands in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. Requires shallow sandy soils.	Low
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint		V	V	Occurs in grassy sclerophyll woodland in association with other eucalyptus species.	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
<i>Eucalyptus pulverulenta</i>	Silver-leafed Gum		V	V	Grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (<i>Eucalyptus mannifera</i>), Red Stringybark (<i>E. macrorhynca</i>), Broad-leafed Peppermint (<i>E. dives</i>), Silvertop Ash (<i>E. sieberi</i>) and Apple Box (<i>E. bridgesiana</i>).	Low
<i>Eucalyptus scoparia</i>	Wallangarra White Gum		E	V	Low altitude populations (below 1300 m) mainly occur in podsolic soils in damp habitat.	Low
<i>Genoplesium baueri</i>	Bauer's Midge Orchid		E	E	Occurs in coastal areas. Habitats include heathland, open forest, shrubby forest, heathy forest and woodland with sandy/sandy loam and well draining soils.	Low
<i>Hibbertia puberula</i>			E		Flowering time is October to December, sometimes into January. Occurs on sandy soil often associated with sandstone, or on clay. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. One of the recently (2012) described subspecies also favours upland swamps.	Low
<i>Melaleuca biconvexa</i>	Biconvex Paperbark		V	V	The species may occur in dense stands forming a narrow strip adjacent to watercourses, in association with other <i>Melaleuca</i> species or as an understorey species in wet forest.	Low
<i>Melaleuca deanei</i>	Deane's Paperbark		V	V	Endemic to Sydney Basin region and grows in heath on sandstone or flat broad ridge tops. Strongly associated with sandy loam soils that are low in nutrients, sometimes with ironstone present	Low
<i>Persicaria elatior</i>	Tall Knotweed		V	V	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low
<i>Persoonia hirsuta</i>	Hairy Geebung		E	E	Occurs in shrub-woodlands and dry sclerophyll forest. It grows in sandy to stony soils derived from sandstone or very rarely on shale, from near sea level to 600 m altitude.	Low
<i>Pimelea curviflora</i> var. <i>curviflora</i>			V	V	Confined to the coastal area of the Sydney and Illawarra regions. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain.	Low
<i>Pimelea spicata</i>	Spiked Rice-flower		E	E	Occurs on an undulating topography on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark.	Low
<i>Prostanthera marifolia</i>	Seaforth Mintbush		CE	CE	Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses and occurs in woodland dominated by <i>Eucalyptus sieberi</i>	Low

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat	Likelihood of occurrence
					(Black Ash) and <i>Corymbia gummifera</i> (Bloodwood) in or clode to Duffys Forest Ecological Community (DFEC).	
<i>Rhodamnia rubescens</i>	Scrub Turpentine					Low
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly		E	V	Grows in subtropical and littoral rainforest on sandy soils or stabilized dunes near the sea. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.	Low
<i>Tetraloche juncea</i>	Black-eyed Susan		V	V	Confined to the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. Usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest.	Low
<i>Thesium australe</i>	Austral Toadflax		V	V	Suitable habitat for this species includes grassland and grassy woodland, often in damp sites.	Low



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Arboricultural, Horticultural and Landscape Consultants

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ARBORICULTURAL ASSESSMENT REPORT

**GREEN SQUARE 2 ASHMORE COLLECTOR
ALEXANDRIA**

September 2017

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EXECUTIVE SUMMARY

This report examines the potential impact of the proposed Green Square 2 Ashmore Collector (GS2AC) on existing street trees under the care, control and management of the City of Sydney Council located in the vicinity of the proposed roadworks. A total of thirty-eight (38) street trees are located within the vicinity of the proposed works, within O’Riordan Street, Botany Road, Bourke Road and Bowden Street, Alexandria.

The proposed works will necessitate the removal of a total of twelve (12) street trees, including six (6) assessed as being of low retention value, eight (8) of moderate retention value and one (1) of high retention value. A further six (6) trees may be adversely affected by the proposed works. However, the implementation of tree protection measures in accordance with AS 4970:2009 prior to and during construction will minimize any adverse impact on these trees.

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1 INTRODUCTION

- 1.1.1 This report was commissioned by the Council of the City of Sydney to assess the health and condition of thirty-eight (38) trees located within sections of O’Riordan Street, Botany Road, Bourke Road and Bowden Street, Alexandria in the vicinity of the proposed Green Square 2 Ashmore Collector (GS2AC) road forming part of the Green Square development. Only those trees under the care, control and management of the City of Sydney Council have been included in this assessment.
- 1.1.2 The purpose of this report is to identify the trees within the site, provide information on their current health and condition, determine their remaining Safe Useful Life Expectancy (SULE) and assess their suitability for retention/preservation. The report also provides recommended Tree Protection Zones to ensure the long-term preservation of the trees to be retained where appropriate.
- 1.1.3 This report has been prepared in accordance with the City of Sydney Council’s guidelines for preparation of Arborists Reports, the scope of work outlined in Section 4.4.1 of the City of Sydney’s Consultant Arboricultural Services Contract No. 1352 and Sections 2.3.2 and 2.3.3 of the Australian Standard for *Protection of Trees on Development Sites* (AS 4970:2009).

2 THE SITE

- 2.1.1 The subject property includes several sections of the Road Reserve within O’Riordan Street, Botany Road and the intersection of Bourke Road and Bowden Street, Alexandria, which form three (3) main intersections with the GS2AC. For the purposes of this report, the subject areas of road reserve will be referred to as ‘the site’. Botany Road and O’Riordan Street are zoned Infrastructure (SP2) [Classified Road] and Bourke Road and Bowden Street are zoned General Industrial (IN1) under the *Sydney Local Environmental Plan 2012* (SLEP).
- 2.1.2 The intersection of Bowden Street and Bourke Road is located in an industrial area with low level warehousing and some commercial premises. Bowden Street contains an avenue of predominantly Broad-leaved Paperbark trees. Bourke Road contains a mixed planting of Broad-leaved Paperbark, Black Poplar, Balsam Poplar and recent plantings of Mugga Ironbark. O’Riordan Street is also mainly industrial with some commercial premises. The street planting includes predominantly Broadleaved Paperbark and Narrow-leaved Ironbark. Botany Road is mainly old warehousing, with some adjacent dilapidated and demolished former industrial land. The street plantings include Broad-leaved Paperbark, Golden Robinia, London Plane and Brushbox.
- 2.1.3 The landscape and soils of this area have been extensively disturbed and modified for urban development. Remnant soils of this area are typical of the Tuggerah Soil Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of “deep (greater than 2000mm) *Podzols* on dunes and *Podzol/Humus Podzol* intergrades on swales.” The landscape of the area was formerly gently undulating to rolling coastal dune fields with slope gradients of 1-10%.¹
- 2.1.4 Most of the locally indigenous vegetation has been cleared from surrounding areas for residential and industrial development. The original vegetation of this area consisted of open woodland & Eastern Suburbs Banksia Scrub, with dominant locally-indigenous tree species formerly occurring in this area including *Angophora costata* (Sydney Red Gum), *Eucalyptus piperita* (Sydney Peppermint) and *Banksia aemula* (Wallum Banksia), with *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca quinquenervia* (Broadleaved Paperbark) occurring in low lying areas.²

3 SUBJECT TREES

- 3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 24th February 2015. Each tree has been provided with an identification number for reference purposes denoted on

the attached Tree Location Plan (**Appendix 6**), based on the survey prepared by Cardno Hard & Forester, Dwg. Ref No. 117367500 Rev 00, dated 30/01/2015. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 4**). Photographs of each tree are shown in **Appendix 3**.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.³ All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

4.1.2 The following information was collected for each tree:-

- Tree Species (Botanical & Common Name);
- Approximate height;
- Canopy spread; measured using a metric tape and an average taken.
- Trunk diameter (measured at 1.4 metres from ground level);
- Live Crown Size; (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres).
- Health & vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators,
- Condition; using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
- Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

This information is presented in a tabulated form in **Appendix 3**.

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy⁴ of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 4**.

4.2.2 The following ranges have been allocated to each tree:-

- Greater than 40 years (Long)
- Between 15 and 40 years (Medium)
- Between 5 and 15 years (Short)
- Less than 5 years (Transient)
- Dead or immediately hazardous (defective or unstable)

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its amenity, environmental and heritage values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure in a

consistent approach, the assessment criterion shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. **Significant**
2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**
7. **Insignificant**

5.2 Environmental Significance

5.2.1 *Tree Preservation Order*

Trees within the City of Sydney Local Government Area (LGA) are protected under Section 3.5.3 of the *Sydney Development Control Plan 2012* (SDCP), made pursuant to Clause 5.9 (2) of the *Sydney Local Environmental Plan 2012* (SLEP). The SDCP generally protects all trees of a height of five (5) metres or greater or with a canopy spread of five (5) metres or greater, or trunk diameter of 300mm or greater (measured at ground level) or any tree listed on Council's Significant Tree Register. Some exemptions apply. However, all of the subject trees are protected under the provisions of the SDCP.

5.2.2 *Wildlife Habitat*

Melaleuca quinquenervia (Broad-leaved Paperbark) [T206, T207, T208, T209, T211, T221, T223, T228, T304, T130, T129, T120, T106, T105, T103, T101, T146 & T118] are all locally-indigenous species, representative of the original vegetation of the area and would be of benefit to native wildlife. Note that all of these trees have been planted (none of the trees are remnant of the original vegetation community). None of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds or other visible signs of wildlife habitation.

5.2.3 *Noxious and Environmental Weed Species*

None of the trees assessed are scheduled as Noxious Weeds under the meaning of *Noxious Weeds Act* (NSW) 1993.

5.2.4 *Threatened Species and Endangered Ecological Communities*

None of the trees are listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities (EECs) under the provisions of the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.

5.3 Heritage Significance

5.3.1 *Heritage Items*

The site does *not* contain any items of Environmental Heritage under Part 1, Schedule 5 of the Sydney Local Environmental Plan (SLEP) 2012. None of the trees have any known or suspected heritage significance.

5.3.2 *Heritage Conservation Area*

The site is *not* located within a Heritage Conservation Area under Part 2 of Schedule 5 of the SLEP 2012.

5.3.3 *Significant Tree Register*

None of the subject trees are listed on Council’s Register of Significant Trees Volume 2 (Significant Street Trees).⁵

5.4 **Amenity Value**

5.4.1 Criteria for the assessment of amenity values are incorporated into **Appendix 1**. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

6 **TREE RETENTION VALUES**

6.1.1 The Retention Values shown in **Appendix 5** and **Appendix 6** have been determined on the basis of the estimated longevity of the trees and their landscape significance rating, in accordance with **Table One**. Together with guidelines contained in **Section 7** (Tree Protection Zones) this information should be used to determine the most appropriate position of building footprints and other infrastructure within the site, with due consideration to other site constraints, to minimise the impact on trees considered worthy of preservation.

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

		Landscape Significance Rating							
		1	2	3	4	5	6	7	
Estimated Life Expectancy	Life	High Retention Value			Moderate Retention Value		Low Ret. Value		Very Low Retention Value
Long - Greater than 40 Years		High Retention Value			Moderate Retention Value		Low Ret. Value		Very Low Retention Value
Medium- 15 to 40 Years		High Retention Value			Moderate Retention Value		Low Ret. Value		Very Low Retention Value
Short - 5 to 15 years		High Retention Value			Moderate Retention Value		Low Ret. Value		Very Low Retention Value
Transient - Less than 5 Years		High Retention Value			Moderate Retention Value		Low Ret. Value		Very Low Retention Value
Dead or Potentially Hazardous		High Retention Value			Moderate Retention Value		Low Ret. Value		Very Low Retention Value

TABLE 2 – TREE RETENTION PRIORITIES.

6.1.2 The following table describes the implications of the retention values on site layout and design.

RETENTION VALUE	RECOMMENDED ACTION
“High”	<ul style="list-style-type: none"> • These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority. • Proposed site design and placement of buildings and infrastructure should consider the recommended setbacks as discussed in the following section to minimise any adverse impact. • In addition to Minimum Setback Distances, the extent of the canopy (canopy drip-line) should also be considered, particularly in relation to high rise developments. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.

“Moderate”	<ul style="list-style-type: none"> • The retention of these trees is desirable, but not essential. • These trees should be retained as part of any proposed development if possible, however they trees are considered less critical for retention. • If these trees must be removed, replacement planting should be considered in accordance with Council’s Tree Replenishment Policy to compensate for loss of amenity.
“Low”	<ul style="list-style-type: none"> • These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. • These trees should not be considered as a constraint to the future development of the site.
“Very Low”	<ul style="list-style-type: none"> • These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. • The removal of these trees is therefore recommended regardless of the implications of any proposed development.

7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 5**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).⁶

7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree

7.1.3 Notwithstanding the above recommendations, it is likely that the existing kerb and gutter and adjacent road pavement limit root development to a certain extent. The kerb and kerb footing create a physical barrier and the level of compaction of the sub-grade and sub-base material beneath the road pavement generally create hostile environment that deters root growth. It is likely therefore, that most of the root development of the subject trees is limited to the nature strip area between the kerb line and the boundary with private properties, where the footings of built structures also create a physical barrier to root growth to some extent.

7.2 Structural Root Zone (SRZ)

7.2.1 The Structural Root Zone (SRZ) provides the bulk of mechanical support and anchorage for a tree. This is also a radial distance measured from the centre of the trunk as specified in **Appendix 5**. The SRZ has been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).

7.2.2 Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may compromise the stability of the tree or lead to its decline and demise.

7.3 Acceptable Incursions to the Tree Protection Zone.

7.3.1 Where encroachment to the TPZ is unavoidable, an incursion to the TPZ of not exceeding 10% of the area of the TPZ and outside the SRZ may be acceptable. Examples of acceptable incursions are shown in **Appendix 2**. Greater incursions to the TPZ may result in an adverse impact on the tree.

- 7.3.2 Where incursions greater than 10% of the TPZ are unavoidable, exploratory excavation using non-destructive methods may be required to evaluate the extent of the root system affected and determine whether or not the tree can remain viable.

7.1 Acceptable Incursions to the Canopy.

- 7.1.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as “lopping” and is no longer an acceptable arboricultural practice. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.
- 7.1.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding to be erected during construction (typically 1-1.5 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

8 IMPACT OF THE PROPOSED DEVELOPMENT

- 8.1.1 The proposed development will necessitate the removal of six (6) trees of low retention value. These include Tree No.s T132 (Black Poplar), T222 (Narrow-leaved Ironbark), T223 & T304 (Broad-leaved Paperbark) and T305 & T306 (Golden Robinia). None of these trees are considered significant or worthy of special measures to ensure their preservation. The removal of these trees to accommodate the proposed development is considered warranted in this instance.
- 8.1.2 The proposed development will also necessitate the removal of eight (8) trees of moderate retention value. These include Tree No.s T128 (Mugga Ironbark), T133 (Balsam Poplar) and T101, T129, T206, T207, T208 & T221 (Broadleaved Paperbark). These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties. In order to compensate for loss of amenity resulting from the removal of these trees to accommodate the proposed development, consideration should be given to replacement planting elsewhere within the road reserve in accordance with Section 9.
- 8.1.3 The proposed development will also necessitate the removal of one (1) tree of high retention value, being T120, a Broadleaved Paperbark. This tree has no special ecological or heritage significance, but is in good health and condition and makes a positive contribution to the amenity of the streetscape. Given the limitations of the road alignment and design, there are no feasible alternatives that can be recommended that would permit the retention of this tree. In order to compensate for loss of amenity resulting from the removal of this tree to accommodate the proposed development, consideration should be given to replacement planting elsewhere within the road reserve in accordance with Section 9.
- 8.1.4 Proposed kerb and gutter and stormwater works are located within the TPZs of trees T204 & T218 (Narrow-leaved Ironbark), T106 (Broad-leaved Paperbark) and T108 (Balsam Poplar) of moderate retention value and T303 (London Plane) & T227 (Narrow-leaved Ironbark) of low retention value. These works have the potential to result in an adverse impact on these trees. However, implementation of suitable tree protection measures prior to and during construction should avoid any adverse impact.

9 REPLACEMENT PLANTING

9.1.1 Where compromises to tree retention are proposed, consideration should be given to replanting new trees within the streetscape in accordance with Council's Street Tree Master Plan (STMP) 2011. The STMP indicates the following species for each of the nominated streets within the study area (refer STMP Part C, Precinct 30 – Southern Industrial):-

Bowden Street:-

- *Fraxinus pennsylvanica* (Green Ash)

Bourke Road:-

- *Corymbia eximia* (Yellow Bloodwood)
- *Lophostemon confertus* (Brushbox).

O'Riordan Street:-

- *Eucalyptus sideroxylon* (Mugga Ironbark)

Botany Road:-

- *Robinia pseudoacacia* 'Frisia' (Golden Robinia)
- *Lophostemon confertus* (Brushbox).

10 RECOMMENDATIONS:-

1. Trees nominated in **Appendix 4 & 6** as significant or of high retention value are considered worthy of preservation. Careful consideration should be given to their retention. Proposed site design and placement of buildings and infrastructure should consider the recommended Tree Protection Zones (**Section 7**) to minimise any adverse impact.
2. Trees nominated in **Appendix 4 & 6** as being of moderate retention value should be retained wherever possible. These trees are considered to be worthy of preservation but are less critical for retention.
3. Trees nominated in **Appendix 4 & 6** as being of low or very low retention value are not considered to be worthy of any special measures to ensure their preservation. These trees should not be viewed as a constraint to the development.



Andrew Morton

EARTHSCAPE HORTICULTURAL SERVICES

29th September 2017

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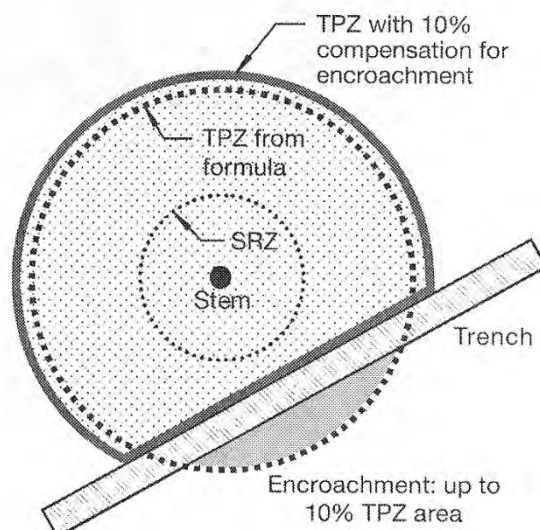
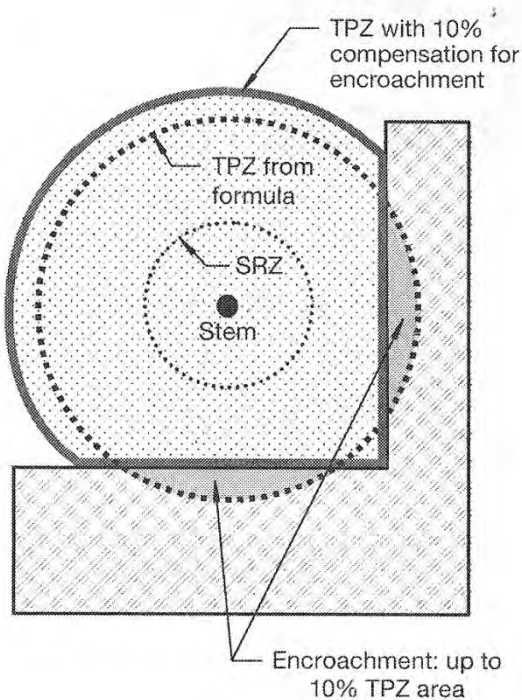
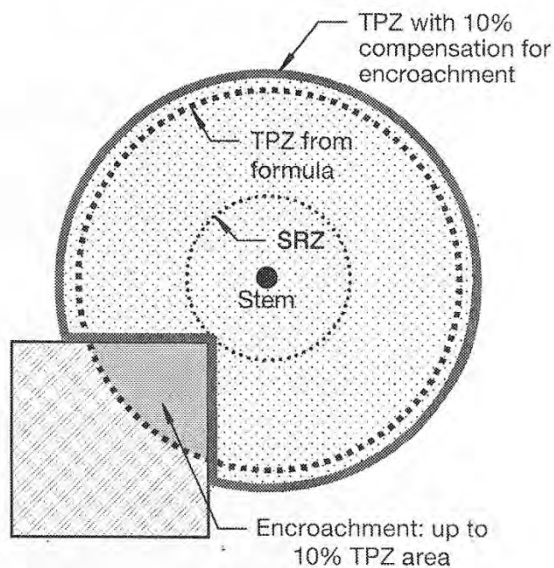
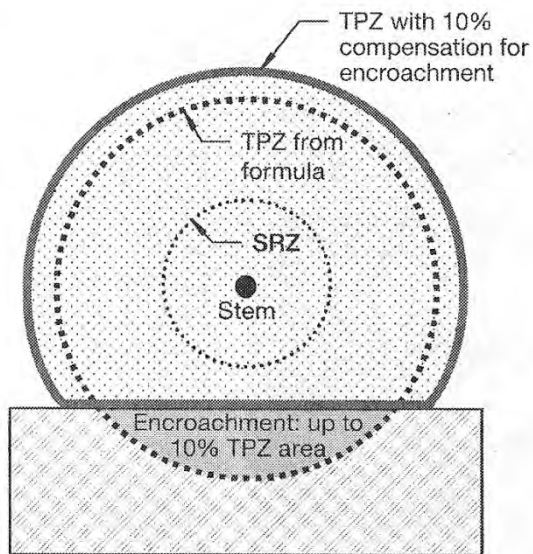
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Standards Australia, Sydney

APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m ² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m ² ; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m ² ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m ² ;The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m ² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

Ref:- Morton, Andrew (2006) **Determining the Retention Value of Trees on Development Sites** Proceedings of the 7th National Street Tree Symposium TreeNet Adelaide Australia

APPENDIX 2 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

REF:- Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
 Standards Australia, Sydney

APPENDIX 3 – PHOTOGRAPHS OF EACH TREE



Plate 1 – T101 *Melaleuca quinquenervia*



Plate 3 – T105 *Melaleuca quinquenervia*

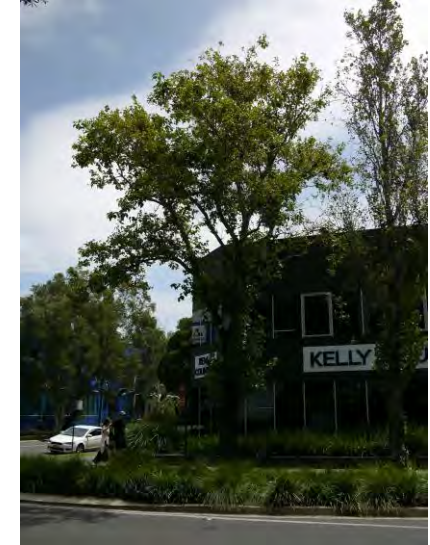


Plate 5 – T108 *Populus sp [basamifera]*



Plate 2 – T103 *Melaleuca quinquenervia*



Plate 4 – T106 *Melaleuca quinquenervia*



Plate 6 – T109 *Populus nigra 'Italica'*



Plate 7 – T110 *Populus nigra*



Plate 9 – T118 *Melaleuca quinquenervia*



Plate 11 – T128 *Eucalyptus sideroxylon*



Plate 8 – T117 *Populus nigra*



Plate 10 – T120 *Melaleuca quinquenervia*



Plate 12 – T129 *Melaleuca quinquenervia*



Plate 13 – T130 *Melaleuca quinquenervia*



Plate 15– T133 *Populus sp [basamifera]*



Plate 17 – T146 *Melaleuca quinquenervia*



Plate 14 – T132 *Populus nigra*



Plate 16 – T134 *Populus nigra*



Plate 18 – T201 *Eucalyptus sideroxylon*



Plate 19 – T202 *Eucalyptus crebra*



Plate 21– T206 *Melaleuca quinquenervia*



Plate 23 – T208 *Melaleuca quinquenervia*



Plate 20 – T204 *Eucalyptus crebra*



Plate 22 – T207 *Melaleuca quinquenervia*



Plate 24 – T209 *Melaleuca quinquenervia*



Plate 25 – T211 *Melaleuca quinquenervia*



Plate 27– T221 *Melaleuca quinquenervia*



Plate 29 – T223 *Melaleuca quinquenervia*



Plate 26 – T218 *Eucalyptus crebra*



Plate 28 – T222 *Eucalyptus crebra*



Plate 30 – T227 *Eucalyptus crebra*



Plate 31 – T228 *Melaleuca quinquenervia*



Plate 33 – T302 *Lophostemon confertus*

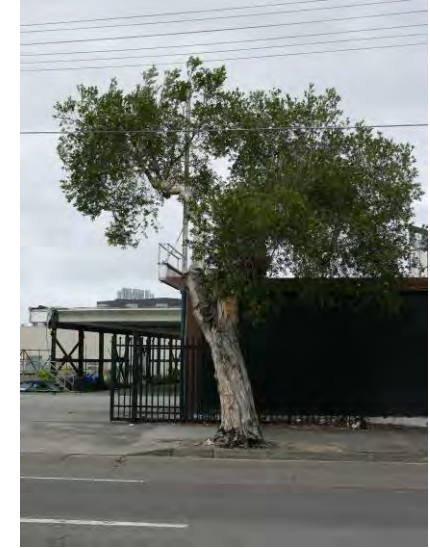


Plate 35 – T304 *Melaleuca quinquenervia*



Plate 32 – T229 *Eucalyptus crebra*

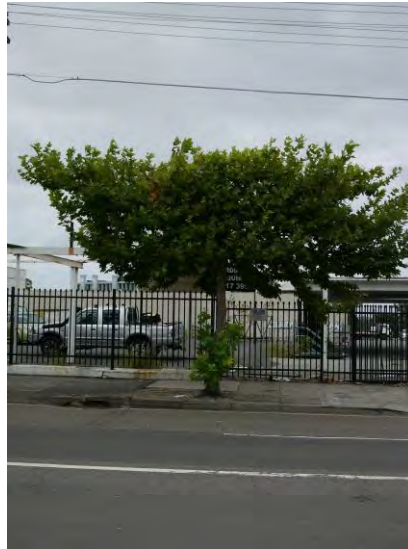


Plate 34 – T303 *Platanus x hybrida*



Plate 36 – T305 *Robinia pseudoacacia* 'Frisia'



Plate 37 – T306 *Robinia pseudoacacia* 'Frisia'



Plate 38 – T307 *Robinia pseudoacacia* 'Frisia'

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
101	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	8.5	12	857	66	M	Appears stable with fair branching structure.	Lopped at 4-5 metres (gully-cut) to clear powerlines.	Very Good	No Evidence	Medium 15-40 Years	3	Moderate	Bowden Street
103	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	14	12	697	132	M	Appears stable with fair branching structure.	Previously lopped at 5 metres (crown restored)	Good	No Evidence	Medium 15-40 Years	3	Moderate	Bowden Street
105	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	13	9	494	81	M	Appears stable with fair branching structure.	Crown lifted to 4 metres. Selectively pruned (gully cut) at 3-5 metres to clear powerlines.	Fair	No Evidence	Short 5-15 Years	4	Low	Bowden Street
106	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	9	10	678	70	M	Appears stable with fair branching structure. Exhibits multiple low bark inclusions at 2-3 metres.	Crown lifted to 3metres	Very Good	No Evidence	Long - more than 40 years	4	Moderate	Bowden Street
108	<i>Populus sp [balsamifera]</i> (Balsam Poplar)	16	11	443	132	M	Appears stable with sound branching structure.	Crown lifted to 4 metres	Good	No Evidence	Long - more than 40 years	4	Moderate	Bourke Road
109	<i>Populus nigra</i> (Black Poplar)	16	4	382	56	SM	Appears stable with sound branching structure. Located in close proximity to existing kerb and gutter. 15% epicormic growth.	Crown lifted to 3 metres	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	4	Low	Bourke Road
110	<i>Populus nigra</i> (Black Poplar)	15	9	624	117	M	Appears stable with sound branching structure.	Crown lifted to 3 metres	Fair with slightly thinning crown	Moderate Poplar Rust infection	Medium 15-40 Years	4	Moderate	Bourke Road
117	<i>Populus nigra</i> (Black Poplar)	16	9	404	108	M	Appears stable with sound branching structure.	Crown lifted to 3 metres	Fair with slightly thinning crown	Moderate Poplar Rust infection	Medium 15-40 Years	4	Moderate	Bourke Road
118	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	11	646	99	M	Appears stable with fair branching structure.	Previously lopped at 4 metres (crown restored)	Good	No Evidence	Long - more than 40 years	3	High	Bourke Road

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
120	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	13	10	1013	90	M	Appears stable with fair branching structure. Multiple primary limbs at 2 metres. Visible woody surface roots for 4 metres radius (lineal within landscape strip). Displacing kerb & footpath.	Previously lopped at 4 metres (crown restored)	Good	No Evidence	Long - more than 40 years	3	High	Bourke Road
128	<i>Eucalyptus sideroxylon</i> (Mugga Ironbark)	10	4	146	20	I	Appears stable with sound branching structure.	Crown lifted to 5 metres	Good	No Evidence	Long - more than 40 years	5	Moderate	Bourke Road
129	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	10	662	80	M	Appears stable with fair branching structure. Exhibits a prominent lean to the SE. Some dieback with 10% deadwood.	Selectively pruned to clear overhead powerlines	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	4	Moderate	Bourke Road
130	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	6	6	271	24	SM	Appears stable with poor branching structure. Exhibits a prominent lean to the north. Crown suppressed on the SE side due to previous pruning. 5% deadwood	Topped at 3 metres. lopped at 4-5 metres to clear powerlines.	Good	No Evidence	Short 5-15 Years	5	Low	Bourke Road
132	<i>Populus nigra</i> (Black Poplar)	14	5	481	60	M	Appears stable with fair branching structure. Exhibits multiple moderate axial wounds on secondary limbs at 7-9 metres. Some dieback with 10% deadwood and 10% epicormic growth.	Selectively pruned & deadwooded	Fair with slightly thinning crown	Moderate Poplar Rust infection	Short 5-15 Years	4	Low	Bourke Road
133	<i>Populus sp [balsamifera]</i> (Balsam Poplar)	12	8	334	88	SM	Appears stable with sound branching structure. Multiple epicormics on lower trunk	Crown lifted to 5 metres	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	4	Moderate	Bourke Road
134	<i>Populus nigra</i> (Black Poplar)	15	8	530	96	M	Appears stable with fair branching structure. Multiple basal epicormic sprouts with 15% deadwood.	Selectively pruned & deadwooded	Fair with slightly thinning crown	Moderate Poplar Rust infection	Short 5-15 Years	4	Low	Bourke Road
146	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	13	12	900	108	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 3 metres.	Lopped at 3-5 metres to clear powerlines (ABCs).	Good	No Evidence	Medium 15-40 Years	3	Moderate	Bourke Road
201	<i>Eucalyptus sideroxylon</i> (Mugga Ironbark)	8.5	3.5	153	19.25	I	Appears stable with sound branching structure. Minor dieback with 5% deadwood.	Crown lifted to 3 metres.	Fair with slightly thinning crown	No Evidence	Long - more than 40 years	5	Moderate	O'Riordan Street

GREEN SQUARE 2 ASHMORE COLLECTOR (GS2AC), ALEXANDRIA

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
202	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	7	4	182	16	I	Appears stable with sound branching structure. Crown suppressed on east side due to crowding. Exhibits multiple bends in trunk.	Crown lifted to 3 metres.	Good	No Evidence	Long - more than 40 years	5	Moderate	O'Riordan Street
204	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	9	5	194	32.5	SM	Appears stable with sound branching structure. Crown suppressed on east side due to overshadowing.	Crown lifted to 3 metres.	Very Good	No Evidence	Medium 15-40 Years	4	Moderate	O'Riordan Street
206	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	11	10	885	70	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 3-4 metres. Multiple termite flight tubes at 0.5 metres.	Crown lifted to 3 metres.	Good	Suspected termite infestation	Long - more than 40 years	4	Moderate	O'Riordan Street
207	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	10	1019	90	M	Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 2-3 metres.	Crown lifted to 3 metres.	Good	No Evidence	Medium 15-40 Years	3	Moderate	O'Riordan Street
208	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	10	10	599	70	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 1.5-3 metres.	Crown lifted to 3 metres.	Good	No Evidence	Long - more than 40 years	4	Moderate	O'Riordan Street
209	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	10	965	90	M	Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 2-3 metres. Multiple termite flight tubes on lower trunk. Visible woody surface roots for 4 metres radius (lineal within landscape strip)	Crown lifted to 3 metres.	Good	Suspected termite infestation	Medium 15-40 Years	3	Moderate	O'Riordan Street
211	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	9	806	63	M	Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 2-3 metres.	Crown lifted to 3 metres. Selectively pruned (gully cut) at 4-5 metres to clear powerlines (ABCs).	Good	No Evidence	Medium 15-40 Years	4	Moderate	O'Riordan Street
218	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	6	5	191	15	I	Appears stable with poor branching structure. Main leader suppressed due to previous pruning. 10% epicormic growth.	Lopped at 4-5 metres to clear overhead powerlines (ABCs).	Good	No Evidence	Short 5-15 Years	5	Low	O'Riordan Street

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
221	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	10	771	80	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 4 metres.	Lopped at 4-5 metres to clear overhead powerlines (ABCs).	Good	No Evidence	Medium 15-40 Years	3	Moderate	O'Riordan Street
222	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	10	3.5	210	14	SM	Appears stable with poor branching structure. Multiple elite epicormic sprouts emanating from old pruning wounds.	Lopped at 4-5 metres to clear overhead powerlines (ABCs).	Good	No Evidence	Short 5-15 Years	5	Low	O'Riordan Street
223	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	9	739	81	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 3.5 metres. Prominent lean to the north. Crown suppressed on south side due previous pruning. Large wound at 1.5 metres due previous pruning (removal of primary limb)	Crown lifted to 4 metres. Selectively pruned (gully cut) at 3-5 metres to clear powerlines (ABCs).	Good	No Evidence	Short 5-15 Years	4	Low	O'Riordan Street
227	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	9	6	303	33	SM	Appears stable with poor branching structure. Crown suppressed on east side due to previous pruning. Multiple elite epicormic sprouts emanating from old pruning wounds. 20% epicormic growth.	Lopped at 5 metres to clear overhead powerlines (ABCs).	Very Good	No Evidence	Short 5-15 Years	4	Low	O'Riordan Street
228	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	12	9	901	81	M	Appears stable with fair branching structure. Multiple moderate bark inclusions at 4 metres.	Crown lifted to 3 metres. Selectively pruned at 3-5 metres to clear powerlines (ABCs).	Good	No Evidence	Medium 15-40 Years	3	Moderate	O'Riordan Street
229	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	12	9	315	90	SM	Appears stable with fair branching structure.	Crown lifted to 3 metres. Lopped at 4 metres to clear powerlines (ABCs).	Very Good	No Evidence	Medium 15-40 Years	4	Moderate	O'Riordan Street
302	<i>Lophostemon confertus</i> (Brushbox)	5	3.5	204	10.5	I	Appears stable with fair branching structure. Exhibits multiple co-dominant leaders at 2.5 metres	Topped at 2.5 metres. lopped at 4-5 metres to clear powerlines.	Very Good	No Evidence	Long - more than 40 years	5	Moderate	Botany Road

GREEN SQUARE 2 ASHMORE COLLECTOR (GS2AC), ALEXANDRIA

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
303	<i>Platanus x hybrida</i> (London Plane)	4.5	5	191	15	I	Appears stable with fair branching structure. Crown suppressed on the east side due to previous pruning. Basal sprout.	Topped at 3.5 metres. lopped at 4-5 metres to clear powerlines.	Very Good	Moderate Sycamore Lace Bug infestation.	Medium 15-40 Years	5	Low	Botany Road
304	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	9	7	522	49	M	Appears stable with poor branching structure. Crown suppressed on east side due to previous pruning. Multiple moderate wounds due previous pruning. Large axial wound from GL to 2 metres with decay evident. 10% eicormic growth.	Crown lifted to 3 metres, topped at 3 metres	Good	Low termite infestation	Short 5-15 Years	5	Low	Botany Road
305	<i>Robinia pseudoacacia</i> 'Frisia' (Golden Robinia)	5.5	5	226	20	M	Appears stable with fair branching structure. Exhibits a moderate wound at 2.5 metres due borer damage. Large axial wound from GL to 0.7 metres (vehicle damage). Multiple elite epicormics with 70% epicormic growth.	Lopped at 4-5 metres to clear powerlines.	Good	Moderate borer damage	Short 5-15 Years	5	Low	Botany Road
306	<i>Robinia pseudoacacia</i> 'Frisia' (Golden Robinia)	5	4	178	12	M	Appears stable with poor branching structure. Small partially occluded wound from GL to 0.5 metres. Multiple elite epicormics with 50% epicormic growth.	Topped at 3.5 metres. lopped at 4-5 metres to clear powerlines.	Good	No Evidence	Short 5-15 Years	5	Low	Botany Road
307	<i>Robinia pseudoacacia</i> 'Frisia' (Golden Robinia)	5	5	236	15	M	Appears stable with poor branching structure. Exhibits a large axial wound from GL to 0.7 metres. Multiple elite epicormics with 50% epicormic growth.	Topped at 3 metres. lopped at 4-5 metres to clear powerlines.	Good	No Evidence	Short 5-15 Years	5	Low	Botany Road

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
101	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	7.7	3.1	186.7	Located within footprint of proposed pedestrian crossing.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
103	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	6.3	2.8	123.7	No proposed works within TPZ	No adverse impact	To be retained
105	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	4.9	2.5	76.5	No proposed works within TPZ	No adverse impact	To be retained
106	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	6.8	2.8	144.5	Realignment of kerb and gutter within offset 1.3 metres south-west (assumed close to existing grade). Demolition of existing kerb and excavations for footings of new kerb and gutter within SRZ/TPZ.	Proposed works have the potential to result in some adverse impact.	To be retained
108	<i>Populus sp [balsamifera]</i> (Balsam Poplar)	M	5.3	2.4	88.6	Proposed new pram ramp offset 4 metres south-west. Excavations for pram ramp within TPZ. Minor encroachment to TPZ (<5%).	No adverse impact	To be retained
109	<i>Populus nigra</i> (Black Poplar)	M	4.6	2.2	66.0	No proposed works within TPZ	No adverse impact	To be retained
110	<i>Populus nigra</i> (Black Poplar)	M	7.5	2.7	176.2	No proposed works within TPZ	No adverse impact	To be retained
117	<i>Populus nigra</i> (Black Poplar)	M	4.9	2.3	74.0	No proposed works within TPZ	No adverse impact	To be retained
118	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	6.5	2.8	131.2	No proposed works within TPZ	No adverse impact	To be retained

GREEN SQUARE 2 ASHMORE COLLECTOR (GS2AC), ALEXANDRIA

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
120	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	10.1	3.3	322.1	Located close to proposed new kerb and gutter, pram ramp and stormwater works	Proposed works may result in an adverse impact.	Remove tree. Undertake replacement planting in accordance with Section 9.
128	<i>Eucalyptus sideroxylon</i> (Mugga Ironbark)	P	2.2	1.5	15.2	Located within footprint of proposed roadway.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
129	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	6.6	2.8	137.8	Located within footprint of proposed roadway.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
130	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	3.2	1.9	33.1	No proposed works within TPZ	No adverse impact	To be retained
132	<i>Populus nigra</i> (Black Poplar)	M	5.8	2.4	104.6	Located within footprint of proposed new cycleway path.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
133	<i>Populus sp [balsamifera]</i> (Balsam Poplar)	M	4.0	2.1	50.6	Located within footprint of proposed new cycleway path.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
134	<i>Populus nigra</i> (Black Poplar)	M	6.4	2.5	127.0	No proposed works within TPZ	No adverse impact	To be retained
146	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	9.0	3.2	254.3	No proposed works within TPZ	No adverse impact	To be retained
201	<i>Eucalyptus sideroxylon</i> (Mugga Ironbark)	P	2.3	1.5	16.5	No proposed works within TPZ	No adverse impact	To be retained

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

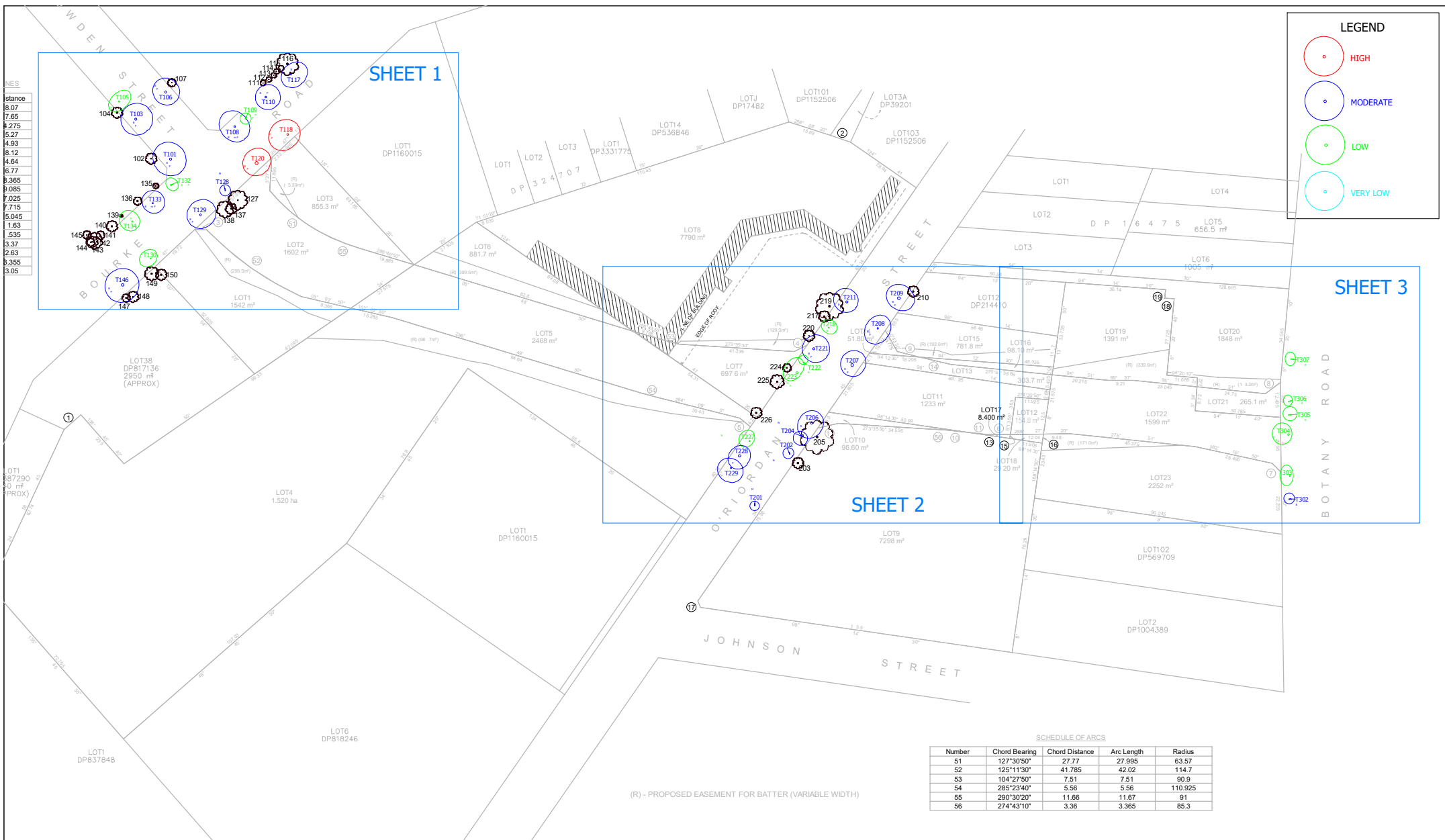
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
202	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	P	2.7	1.6	23.3	No proposed works within TPZ	No adverse impact	To be retained
204	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	P	2.9	1.7	26.7	Kerb and gutter and stormwater works within TPZ.	Proposed works may result in an adverse impact.	To be retained
206	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	8.9	3.1	246.1	Located close to proposed new kerb and gutter and stormwater works. Located within footprint of proposed new pram ramp.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
207	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	10.2	3.3	326.1	Located within footprint of proposed roadway.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
208	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	6.0	2.7	112.6	Located close to proposed new kerb and gutter and stormwater works	Proposed works may result in an adverse impact.	Remove tree. Undertake replacement planting in accordance with Section 9.
209	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	9.6	3.3	292.4	No proposed works within TPZ	No adverse impact	To be retained
211	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	8.1	3.0	203.9	No proposed works within TPZ	No adverse impact	To be retained
218	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	P	2.9	1.7	25.8	Kerb and gutter and stormwater works within TPZ.	Proposed works may result in an adverse impact.	To be retained

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
221	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	7.7	3.0	186.5	Located close to proposed new kerb and gutter and stormwater works. Located within footprint of proposed new pram ramp.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
222	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	P	2.5	1.7	20.0	Located within footprint of proposed roadway.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
223	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	7.4	2.9	171.4	Located within footprint of proposed roadway/ kerb and gutter	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
227	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	P	3.6	2.0	41.4	Realignment of kerb and gutter within offset 1.9 metres north-easts (assumed close to existing grade). Demolition of existing kerb and excavations for footings of new kerb an gutter within SRZ/TPZ.	Proposed works have the potential to result in some adverse impact.	To be retained
228	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	9.0	3.2	255.1	No proposed works within TPZ	No adverse impact	To be retained
229	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	P	4.7	2.0	70.2	No proposed works within TPZ	No adverse impact	To be retained
302	<i>Lophostemon confertus</i> (Brushbox)	M	2.4	1.7	18.8	No proposed works within TPZ	No adverse impact	To be retained

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
303	<i>Platanus x hybrida</i> (London Plane)	M	2.9	1.7	25.8	Kerb and gutter and stormwater works within TPZ.	Proposed works may result in an adverse impact.	To be retained
304	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	5.2	2.5	85.7	Located within footprint of proposed roadway.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
305	<i>Robinia pseudoacacia</i> 'Frisia' (Golden Robinia)	M	2.7	1.8	23.1	Located within footprint of proposed roadway.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
306	<i>Robinia pseudoacacia</i> 'Frisia' (Golden Robinia)	M	2.1	1.6	14.4	Located within footprint of proposed roadway.	Proposed works will necessitate removal	Remove tree. Undertake replacement planting in accordance with Section 9.
307	<i>Robinia pseudoacacia</i> 'Frisia' (Golden Robinia)	M	2.8	1.8	25.1	No proposed works within TPZ	No adverse impact	To be retained




APPENDIX 6
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
 Green Square East West Relief Road
 ALEXANDRIA



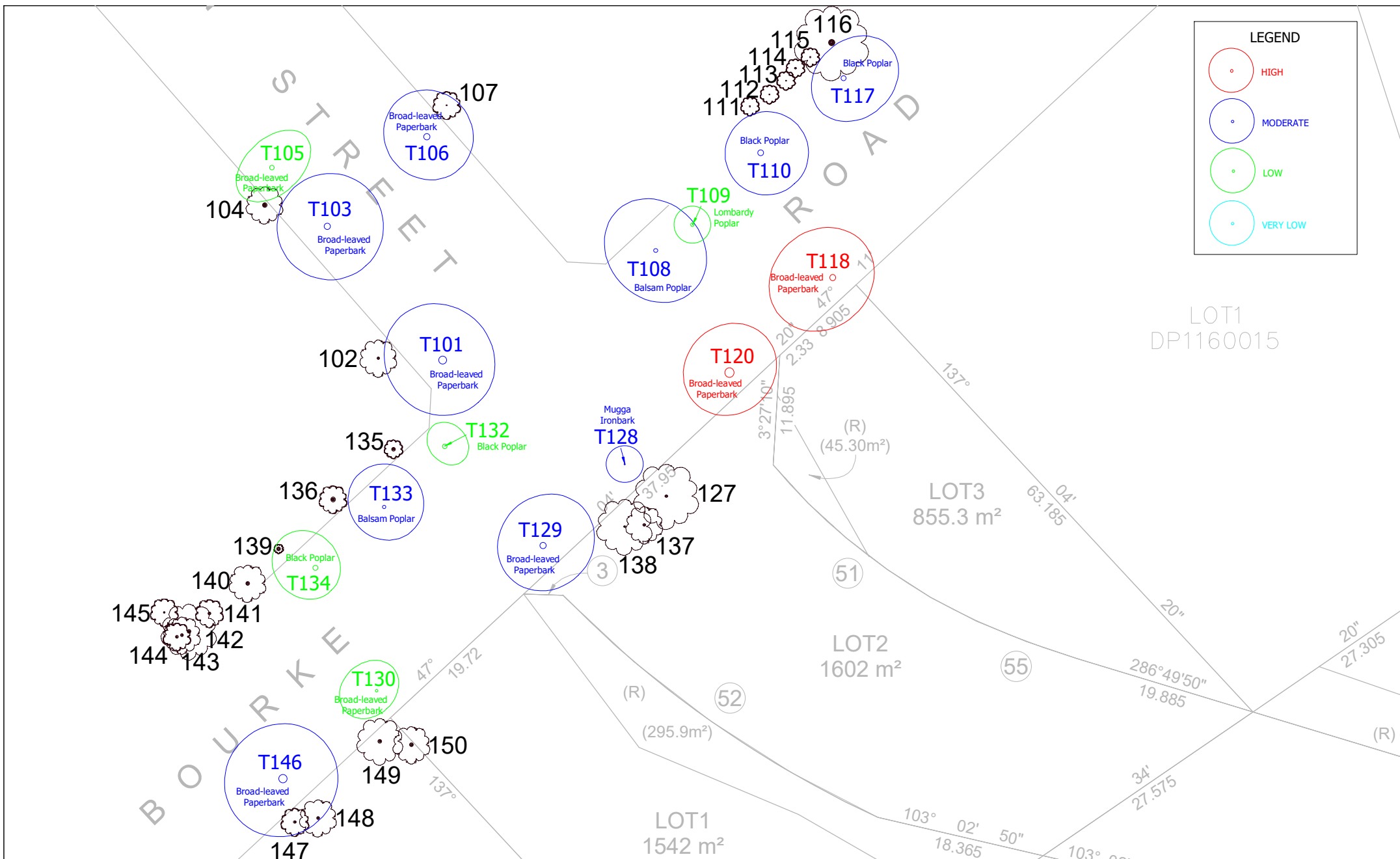
Eandscape Horticultural Services
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 PO Box 364
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Based on the Survey Drawing
 prepared by Cardno Hard & Forester
 Dwg Ref No. 117367500 Rev 00
 Dated 30/01/2015




DWG No. T15-030201 KEY PLAN

DATE: 02/03/2015

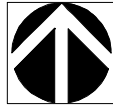


APPENDIX 6
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
 Green Square East West Relief Road
 ALEXANDRIA



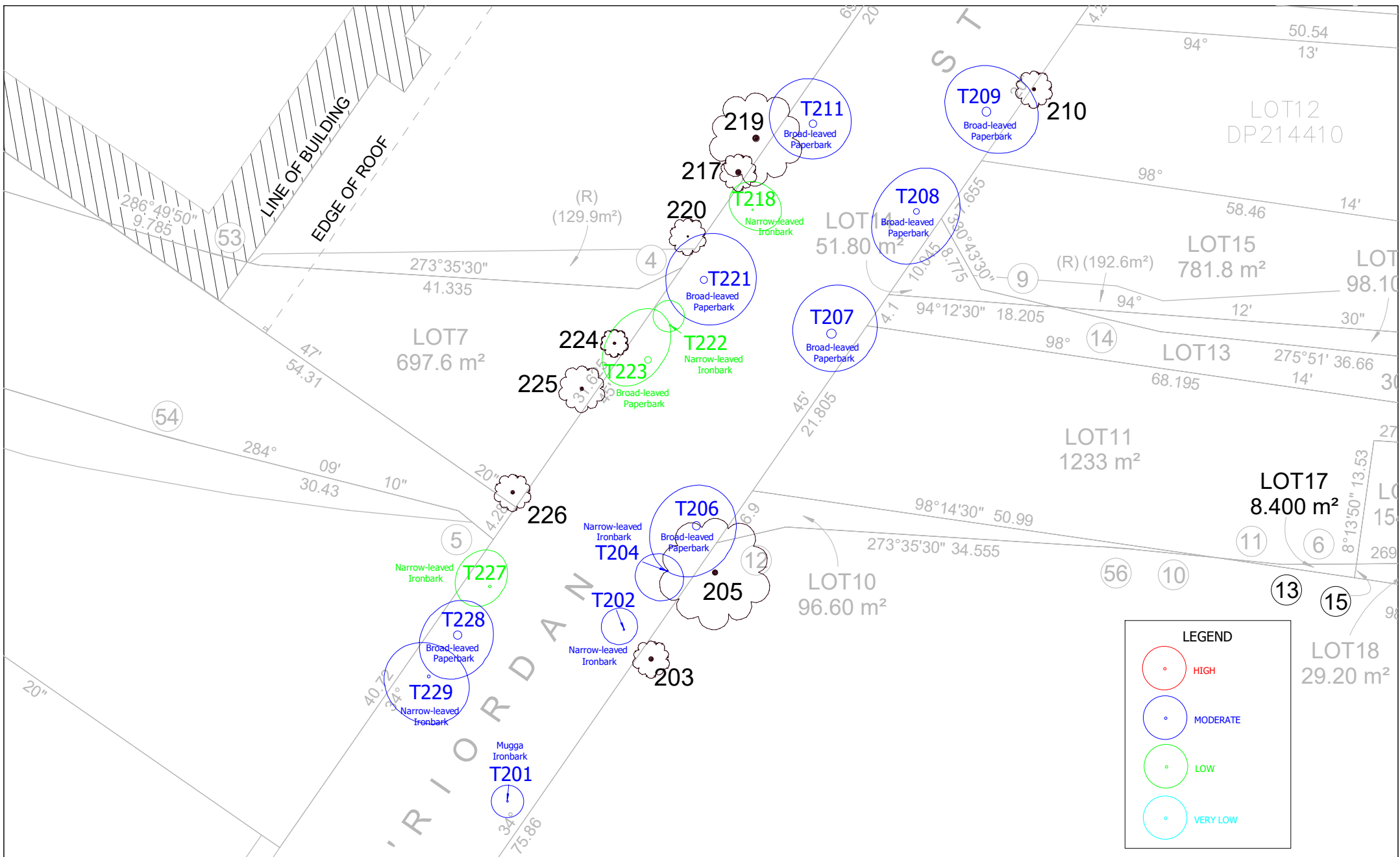
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 Dwg Ref No. 117367500 Rev 00
 Dated 30/01/2015




DWG No. T15-030201 SHEET 1

DATE: 02/03/2015

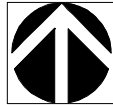


APPENDIX 6
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
 Green Square East West Relief Road
 ALEXANDRIA



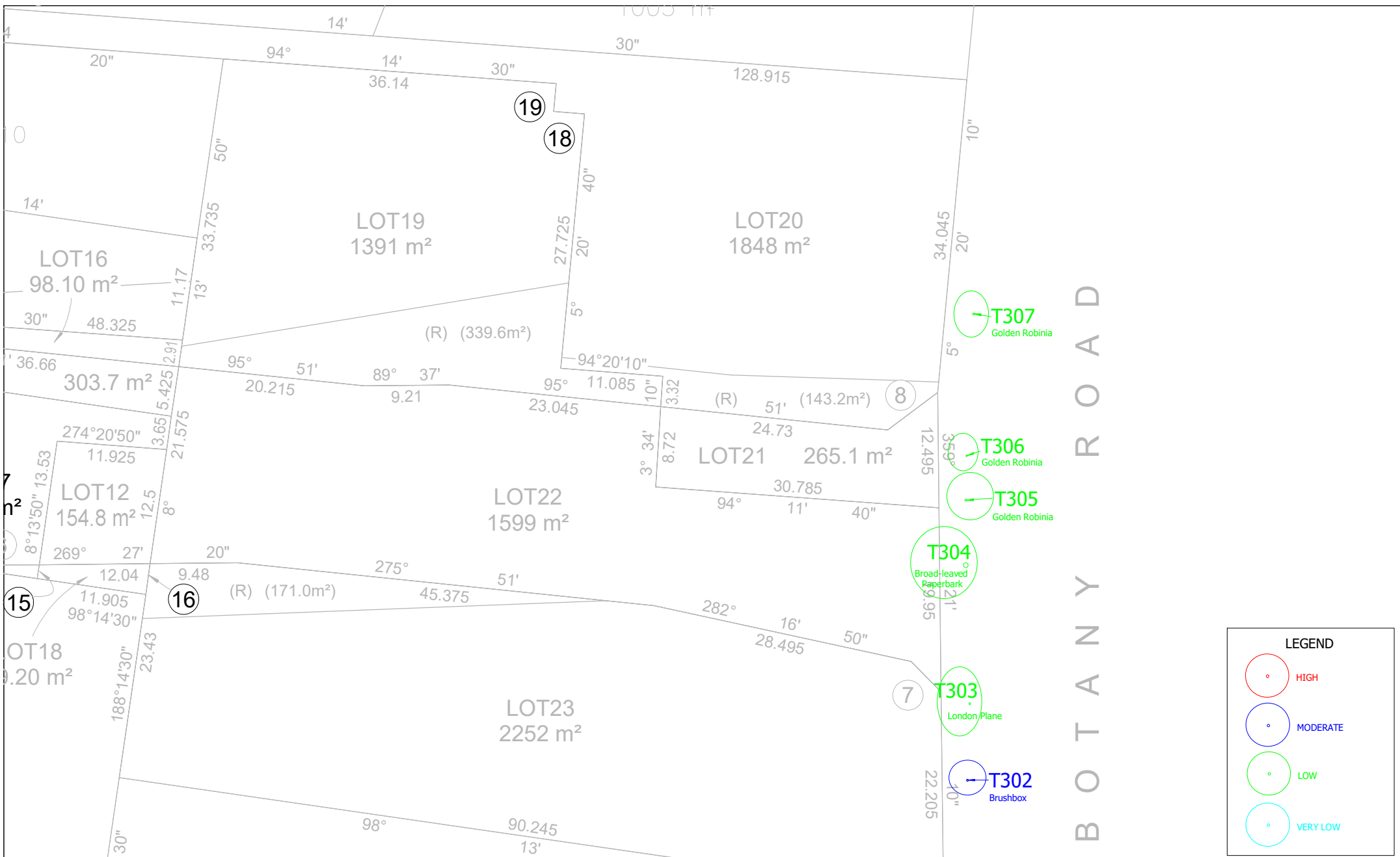
Earthscape Horticultural Services
 Arboricultural and Horticultural Consultants
 PO Box 364
 BEROWRA NSW 2081
 Ph: 02 9456 4787
 Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
 prepared by Cardno Hard & Forester
 Dwg Ref No. 117367500 Rev 00
 Dated 30/01/2015




DWG No. T15-030201 SHEET 2

DATE: 02/03/2015

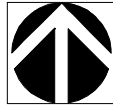


APPENDIX 6
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
 Green Square East West Relief Road
 ALEXANDRIA



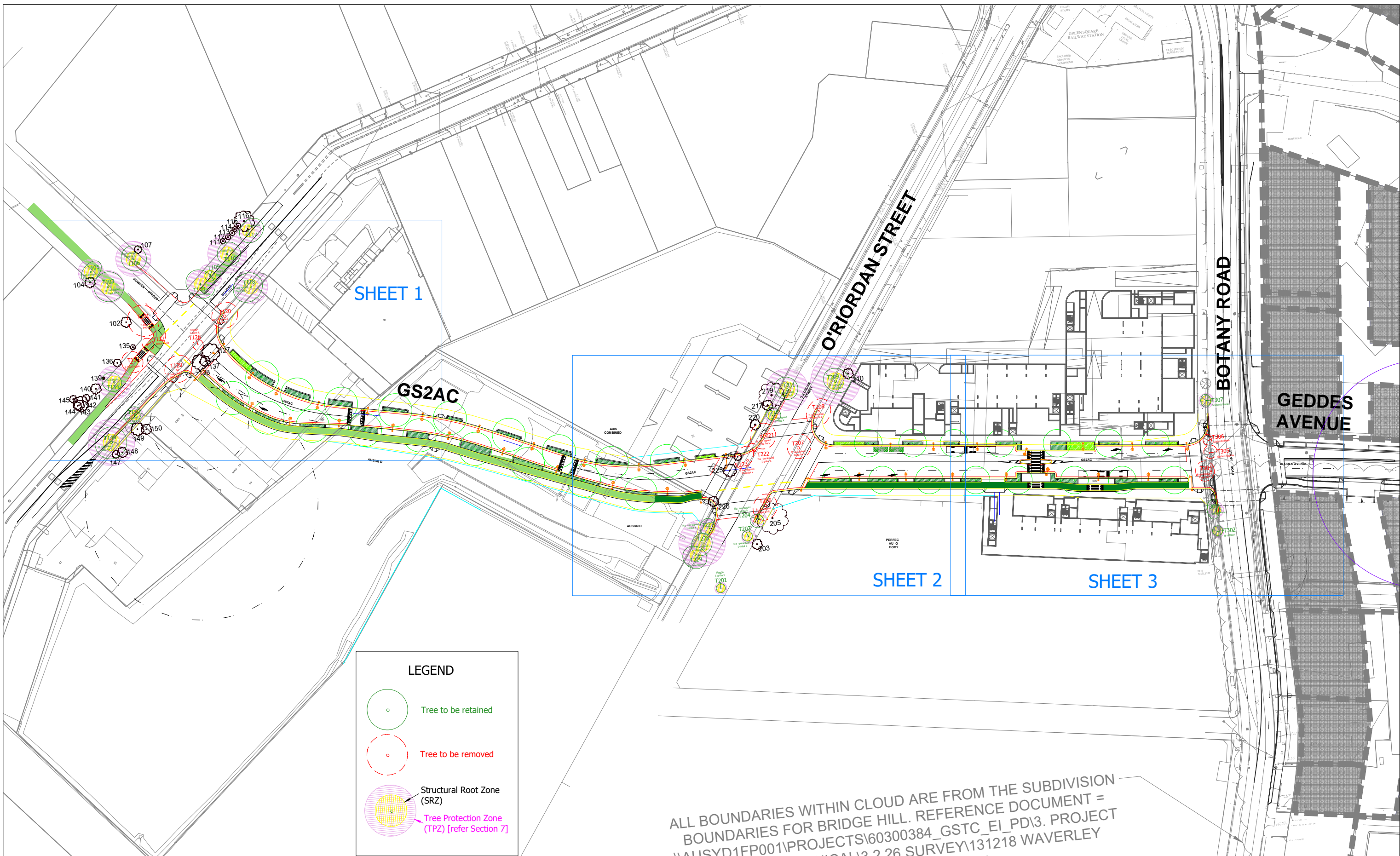
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DWG No. T15-030201 SHEET 3

DATE: 02/03/2015

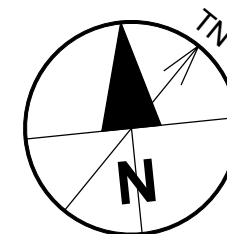


APPENDIX 7
TREE REMOVAL & RETENTION PLAN
 Green Square 2 Ashmore Collector
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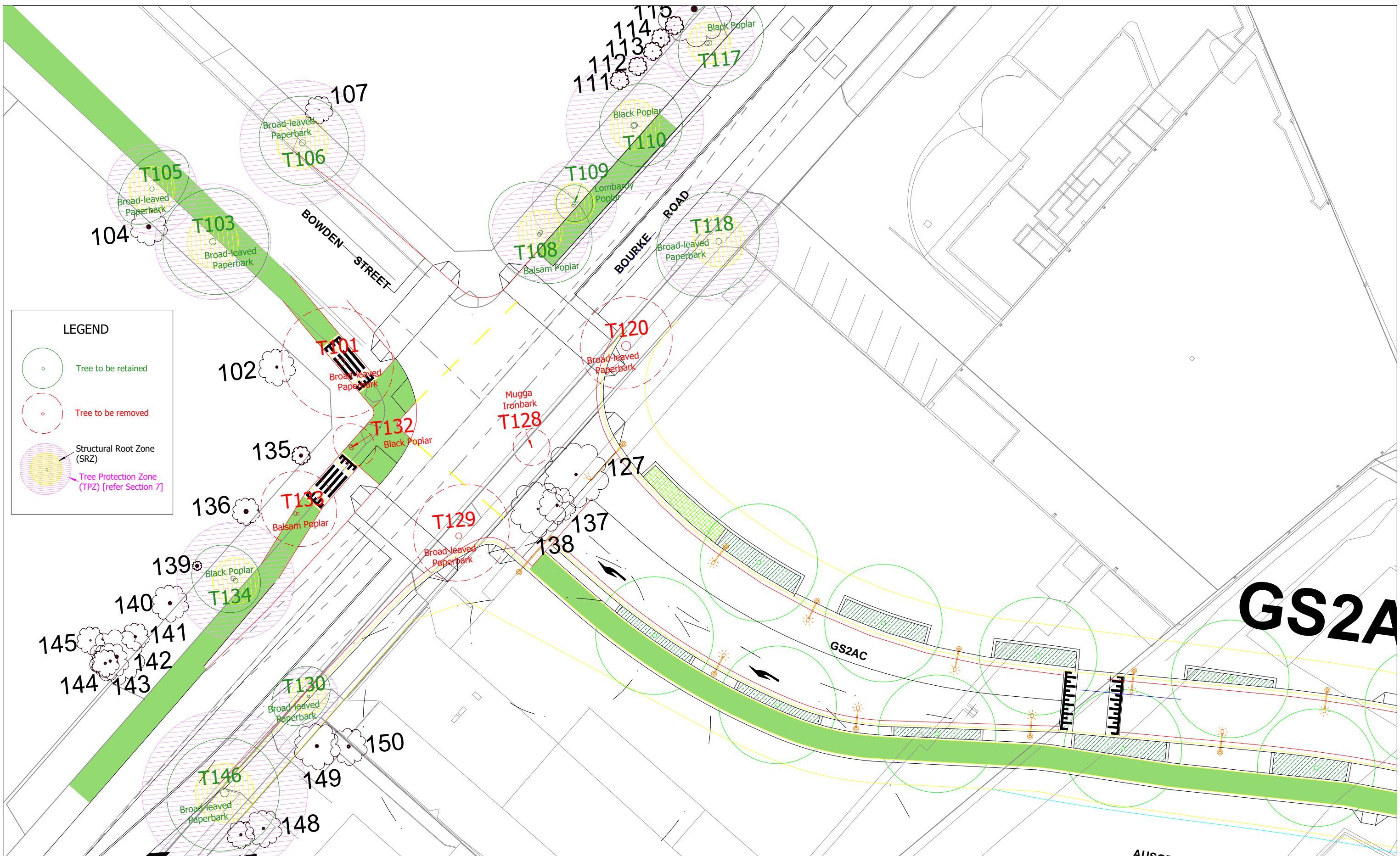
Based on the Survey Drawing
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 Dwg Ref No. 117367500 Rev 00
 Dated 30/01/2015



DWG No. T17-092203

KEY PLAN

DATE: 29/09/2017

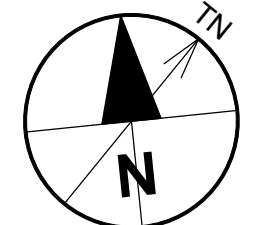


APPENDIX 7
TREE REMOVAL & RETENTION PLAN
 Green Square 2 Ashmore Collector
 ALEXANDRIA

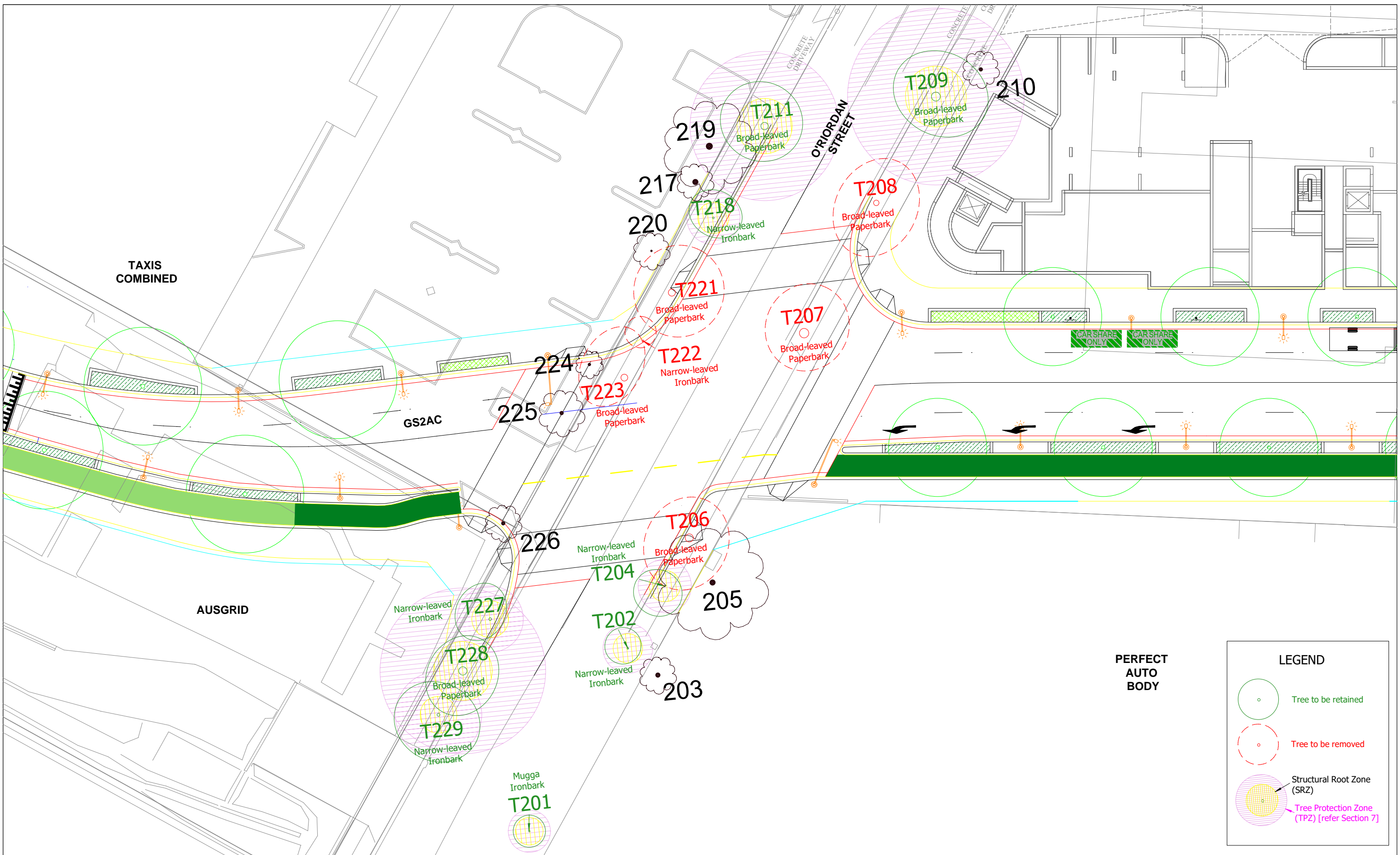


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DWG No. T17-092203
 SHEET 1
 DATE: 29/09/2017



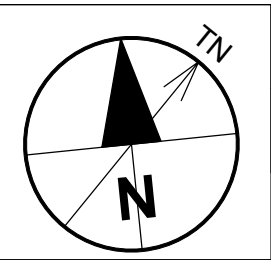
LEGEND

-  Tree to be retained
-  Tree to be removed
-  Structural Root Zone (SRZ)
-  Tree Protection Zone (TPZ) [refer Section 7]

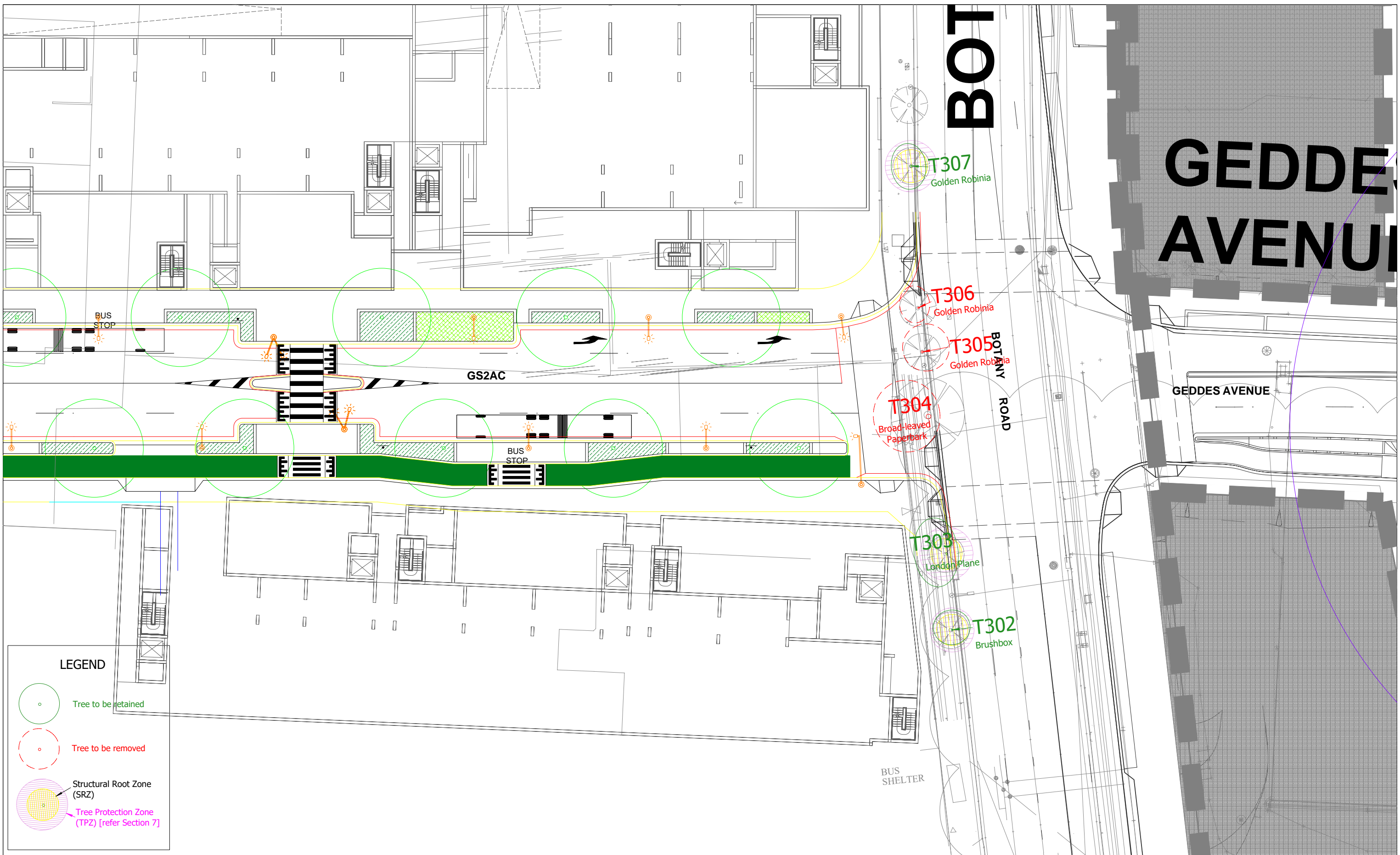
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TREE REMOVAL & RETENTION PLAN
 Green Square 2 Ashmore Collector
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DWG No. T17-092203
SHEET 2
 DATE: 29/09/2017

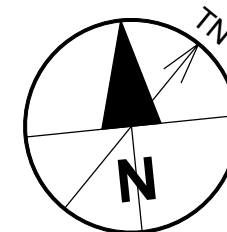


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DWG No. T17-092203

SHEET 3

DATE: 29/09/2017