



Australian Rail Track Corporation
Cabramatta Loop Project
Environmental Impact Statement
Arboricultural Assessment

August 2019

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Glossary

Term	Definition
BC Act	<i>Biodiversity Conservation Act 2016</i>
DBH	Diameter at Breast Height
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The area within a 10 km radius of the project site.
OEH	Office of Environment and Heritage
Study area	The area that was subject to a detailed site survey and assessed for direct or indirect impacts arising from future construction and operation of the proposal.
Project	The construction and operation of the Cabramatta Loop.
Project site	Refers to the area that would be directly disturbed by construction of the project (for example, as a result of ground disturbance and the construction of foundations for structures). It includes the location of construction activities, compounds and work sites, and the location of permanent operational infrastructure.
SULE	Safe Useful Life Expectancy (after Burrell 2001)
Tree	For the purposes of this assessment, a tree was defined as a perennial plant with a height over 3 metres.
TPZ	Tree protection zone
VTA	Visual Tree Assessment

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Executive Summary

GHD Pty Ltd (GHD) has been engaged by Australian Rail Track Corporation (ARTC) to undertake an Arboricultural Assessment of landscape trees within and adjoining the project site for The Cabramatta Loop Project ("the project").

ARTC proposes to construct and operate a passing loop for 1,300 metre length trains on the Southern Sydney Freight Line (SSFL) between Sydney Trains' Cabramatta and Warwick Farm stations. The Cabramatta Loop Project ('the project') would allow freight trains to pass and provide additional rail freight capacity along the SSFL.

The purpose of this arboricultural assessment report is to determine those trees which will require removal and those trees which could be retained, given appropriate protection. This report identifies the following:

- trees to be removed or impacted by the project
- measures to protect those trees that will be retained during construction activities. It provides recommendations for the protection of retained trees and their root zones proximate to construction activities within the subject site.

The project would result in the unavoidable removal of 43 planted trees which are indigenous to the Fairfield/Liverpool LGAs and 77 exotic specimens. The majority of these are along Broomfield Street. All trees proposed for removal are located within the project site.

Indirect impacts on trees to be retained may include loss of or damage to roots and branches of trees located near the project site.

Management and mitigation measures have been recommended with respect to minimising tree removal on site and for the protection of trees to be retained.

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1. Introduction

1.1 Project overview

Australian Rail Track Corporation (ARTC) proposes to construct and operate a passing loop for up to 1,300 metre length trains on the Southern Sydney Freight Line (SSFL) between Sydney Trains' Cabramatta and Warwick Farm stations. The Cabramatta Loop Project ('the project') would allow freight trains to pass and provide additional rail freight capacity along the SSFL.

The project is State significant infrastructure in accordance with Division 5.2 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). As State significant infrastructure, the project needs approval from the NSW Minister for Planning and Public Spaces.

This report has been prepared to accompany the environmental impact statement (EIS) to support the application for approval of the project, and address the environmental assessment requirements of the Secretary of the Department of Planning and Environment (the SEARs), issued on 17 May 2018.

1.2 The project

1.2.1 Location

The project is generally located within the existing rail corridor between the Hume Highway and Cabramatta Road East road overbridges in the suburbs of Warwick Farm and Cabramatta. In addition, the project includes works to Broomfield Street adjacent to the rail corridor in Cabramatta.

The rail corridor is owned by the NSW Government (RailCorp) and leased to ARTC.

The location of the project is shown in Figure 1.1.

1.2.2 Key features

- New rail track – providing a 1.65 kilometre long section of new track with connections to the existing track at the northern and southern ends
- Track realignment – moving about 550 metres of existing track sideways (slewing) to make room for the new track
- Bridge works – constructing two new bridge structures adjacent to the existing rail bridges over Sussex Street and Cabramatta Creek
- Road works – reconfiguring Broomfield Street for a distance of about 680 metres between Sussex and Bridge streets.

Ancillary work would include communication upgrades, works to existing retaining and noise walls, drainage work and protecting/relocating utilities. In addition, minor works in the form of new signalling would be installed at a number of locations within the rail corridor (indicative locations provided in the EIS).

The key features of the project are shown in Figure 1.2.

Further information on the project is provided in the EIS.

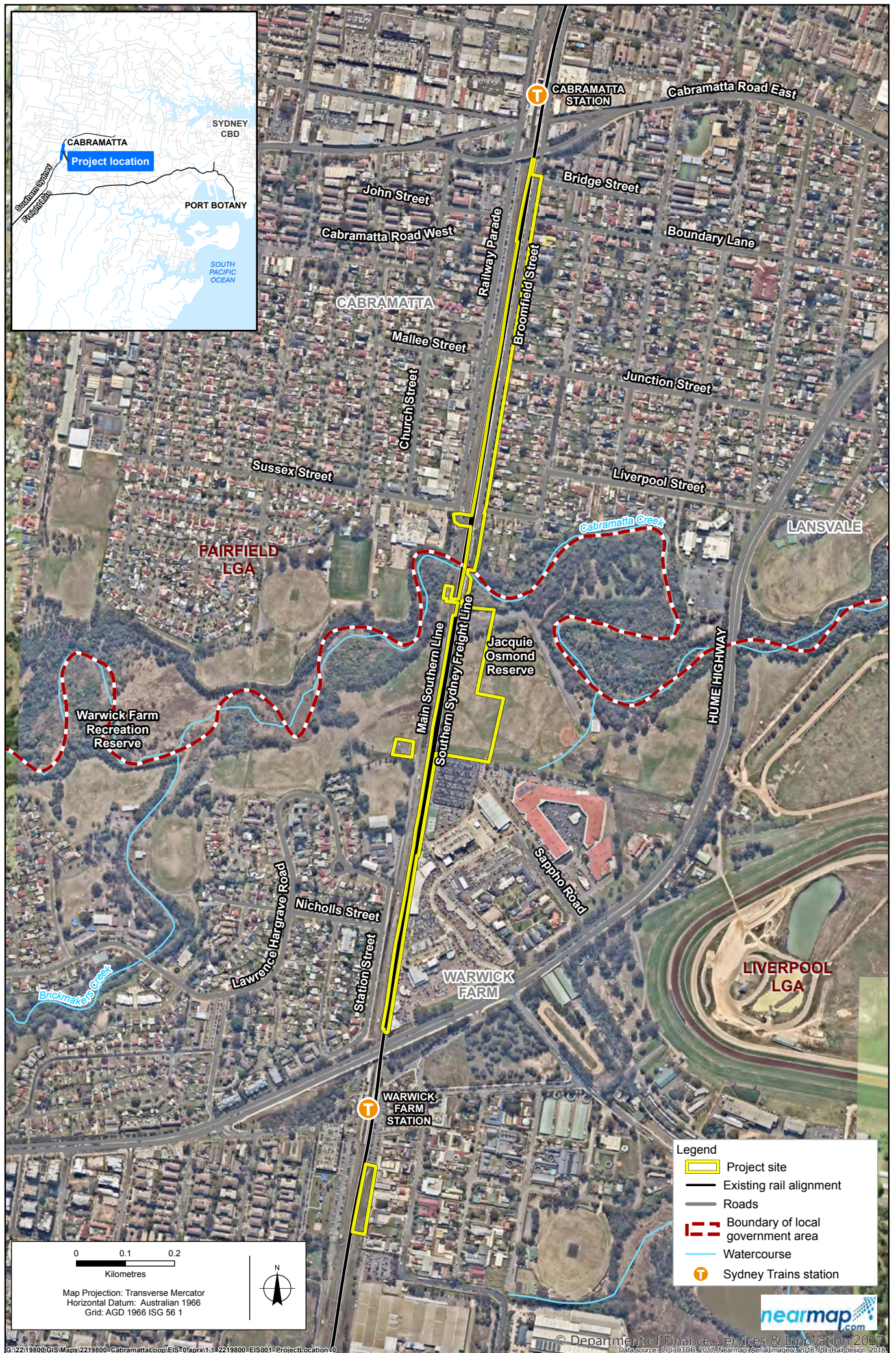


Figure 1.1 Location of the project

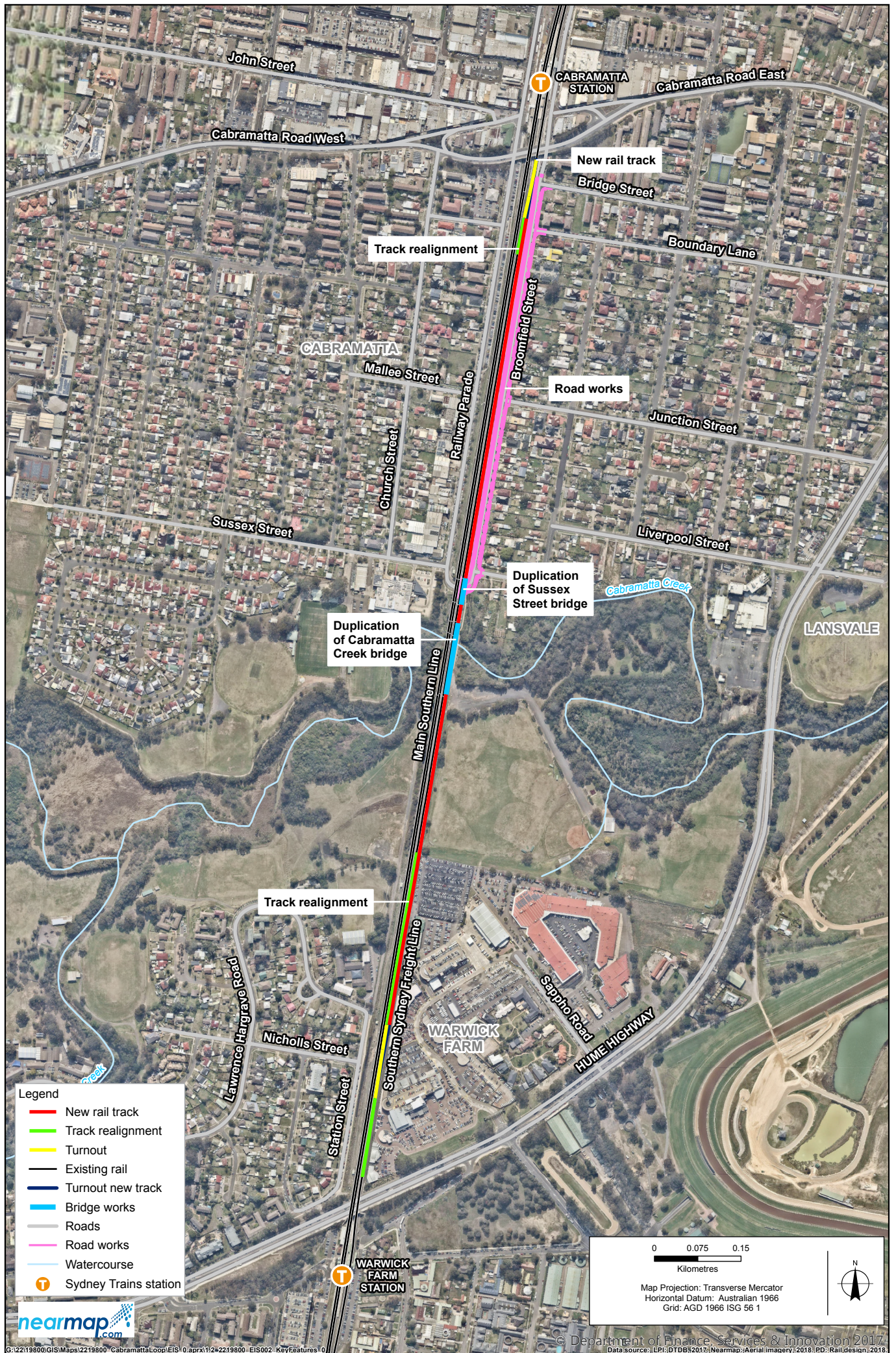


Figure 1.2 Key features of the project

1.2.3 Timing

Subject to approval of the project, construction is planned to start in early 2021, and is expected to take about two years. Construction is expected to be completed in early 2023.

It is anticipated that some features of the project would be constructed while the existing rail line continues to operate. Other features of the project would need to be constructed during programmed weekend rail possession periods when rail services along the line cease to operate. Possession periods typically occur for 48 hours four times per year.

1.2.4 Operation

The project would operate as part of the SSFL and would continue to be managed by ARTC. ARTC is not responsible for the operation of rolling stock. Train services are currently, and would continue to be, provided by a variety of operators.

Following the completion of works, the existing functionality of Broomfield Street would be restored, with one travel lane in each direction, kerb-side parking on both sides and a shared path on the western side of the street.

1.3 Purpose and scope of this report

The purpose of this arboricultural assessment report is to determine those trees which will require removal and those trees which could be retained, given appropriate protection. This report identifies the following:

- trees to be removed or impacted by the project
- measures to protect those trees that will be retained during construction activities. It provides recommendations for the protection of retained trees and their root zones proximate to construction activities within the subject site.

The impacts of tree removal in the project site on biodiversity values and landscape and visual amenity are assessed in the Biodiversity Development Assessment Report (GHD 2019a) and the Landscape and Visual Impact Assessment (GHD 2019b) respectively.

The following terms are used in this report:

- The 'project' refers to the construction and operation of the Cabramatta Loop.
- The 'project site' refers to the area that would be directly affected by construction (also known as the construction footprint). It includes the location of operational project infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of the storage areas/compounds etc that would be used to construct that infrastructure.
- The 'study area' refers to the wider area including and surrounding the project site, with the potential to be directly or indirectly affected by the project.

1.4 Limitations and assumptions

This report has been prepared by GHD for Australian Rail Track Corp Ltd and may only be used and relied on by Australian Rail Track Corp Ltd for the purpose agreed between GHD and the Australian Rail Track Corp Ltd as set out in section 1 of this report. GHD otherwise disclaims responsibility to any person other than Australian Rail Track Corp Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Australian Rail Track Corp Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.5 Structure of this report

The structure of the report is outlined below.

- Section 1 – provides an introduction to the project and this report
- Section 2 – describes the methodology for the assessment, including the legislative and policy context for the assessment, and relevant guidelines
- Section 3 – describes the existing environment
- Section 4 – assesses the potential impacts of project
- Section 5 – describes tree protection measures
- Section 6 – provides a list of references

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2. Methods

2.1 Study area

The study area for the assessment included all trees located with the project site and immediately adjacent to the project site.

Trees are defined by:

- Liverpool City Council (2013) as “a living perennial plant not less than 2 metres high which, if permitted to grow to maturity, would have a height in excess of 3 metres.” Trees
- Fairfield Council (2018) as “A perennial plant with a self-supporting stem. Has a height of more than 4 metres, spread of more than 3 metres, a trunk diameter of more than 75mm measured 1 metre above the ground level”.

This assessment included identification and assessment of all trees over 3 metres in height within the project site and in some proximate areas.

2.2 Assessor

The arboricultural survey of all trees located within the project site and adjoining areas was conducted by Gary Leonard, GHD Arborist and Senior Botanist (International Society of Arboriculture membership no. 212238 and Arboriculture Australia membership no. 2173) on 16th November, 2018.

2.3 Visual tree assessment

All trees in the subject site were assessed by conducting a ground-based Visual Tree Assessment (VTA) (see Matheney and Clark 1994a and 1994b).

Attributes for each tree recorded included:

- Tree number (according to Tree Plan)
- Botanical name of tree species
- Common name of tree species
- Height of tree in metres (m)
- Spread (radius metres)
- Diameter at Breast Height (DBH) (metres)
- Age class
- Health
- Structure.

The diameters of each tree at breast height were measured, using a Forestry DBH tape. The height and crown spread of trees were estimated.

No diagnostic equipment, aerial inspection (climbing) or tree root mapping was undertaken. Tagging of the trees was not necessary, because of the ease of on-site location, with reference to existing roads and infrastructure. The information provided in this report reflects the condition of the trees at the time of inspection and only relates to the trees surveyed.

Individual trees or tree groups, comprising multiple trees, were numbered on a tree map for identification purposes (see Figure 2.1). The details of individual trees and the trees that make

up tree groups were documented in a tree schedule with reference to the unique numerical identifier indicated on the tree map (see Appendix A).

2.3.1 Structure and health

For each tree, the Safe Useful Life Expectancy (SULE) was determined based on the health and structure of the subject tree (after Barrell, 2001). The SULE code is provided in Appendix A. The health and structural integrity of each tree were evaluated according to the criteria outlined in Table 2.1 below.

Table 2.1 List of items used to determine tree structure and health

Structural Considerations *	
Presence/absence of cankers (abnormal growth caused by fungi or bacteria)	Evidence of 'end weight' (accumulation of mass at the end of a branch)
Presence/absence of cavities (open wound with evidence of decay)	Presence/absence of epicormic shoots (shoots arising from latent or adventitious buds)
Presence/absence of co-dominant stems (Stems or branches of equal diameter, often weekly attached)	Presence/absence of previous branch or trunk failure
Presence/absence of conks (fruiting body of decay fungi e.g. Bracket Fungus)	Evidence of girdling roots (roots that encircle the base [above ground] of the stem)
Presence/absence of decay (degradation of wood by fungi / bacteria)	Leaning trunk (bias)
Evidence of decline (loss of vigour)	Low canopy (branches that are close to ground may require heavy pruning for construction clearance)
Evidence of dieback (death of twigs and branches)	Presence/absence of wounds (injuries on the surface of a stem or branch)
Health Considerations	
Presence/absence of pest and diseases	Proportion of necrotic material in platform
Amount of extension growth	Absence/presence of epicormic growth
Density of canopy	Foliage size and colour

* Adapted from Matheny & Clark (1998).

The estimate of a tree's age was based on the definitions outlined by Draper and Richards (2009). Trees were classed as follows:

- Young (Early Mature): age <20% of their life expectancy *in situ*
- Mature: aged between 20 to 80% of their life expectancy *in situ*
- Over-mature: aged >80% of their life expectancy *in situ*

2.3.2 Tree protection zones

A theoretical Tree Protection Zone (TPZ) has been calculated for trees identified for retention, based on the location of planned construction activities. The calculations of the TPZs for assessed trees were based on the measured DBH as outlined in *Australian Standard 4970 'Protection of Trees on Development Sites'* (SA, 2009) (see Appendix A).

TPZ radius = DBH x 12 where: DBH = Diameter at Breast height (in metres)

Where the tree has co-dominant leaders, the following formula was applied, in order to calculate DBH:

$$DBH = (dbh1^2 + dbh2^2 + \dots + dbhn^2)^{0.5}$$

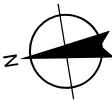
The TPZ is the optimal area over the tree's root zone which would be required to ensure the tree's vigour and stability, if located near a construction site. The TPZ calculation according to SA (2009) is stated for each tree in Appendix A.



- Legend
- Project site
 - 5 Tree/tree groups to be retained
 - ↔ Compound access route
 - T Sydney Trains station

Paper Size ISO A3
0 10 20 30 40
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: AGD 1966 ISG 56 1

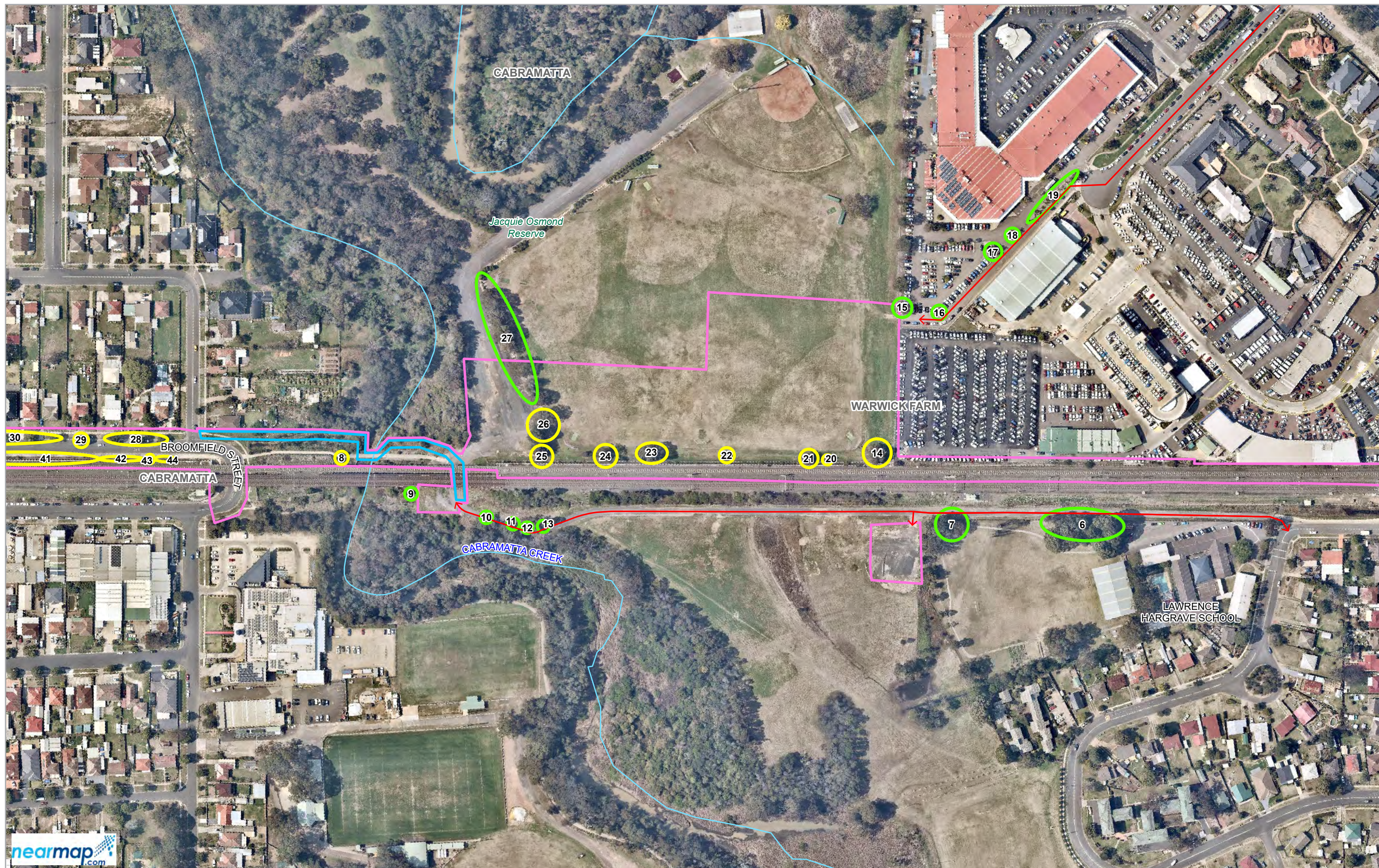


ARTC
Cabramatta Rail Loop
Arborist Assessment

Tree Map

Project No. 22-19800
Revision No. 0
Date 17/04/2019

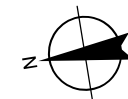
FIGURE 2.1a



- Legend
- Project site
 - Temporary access
 - Tree/tree groups to be retained
 - Tree/tree group to be removed
 - Watercourse
 - T Sydney Trains station
 - ↔ Compound access route

Paper Size ISO A3
0 10 20 30 40
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: AGD 1966 ISG 56 1

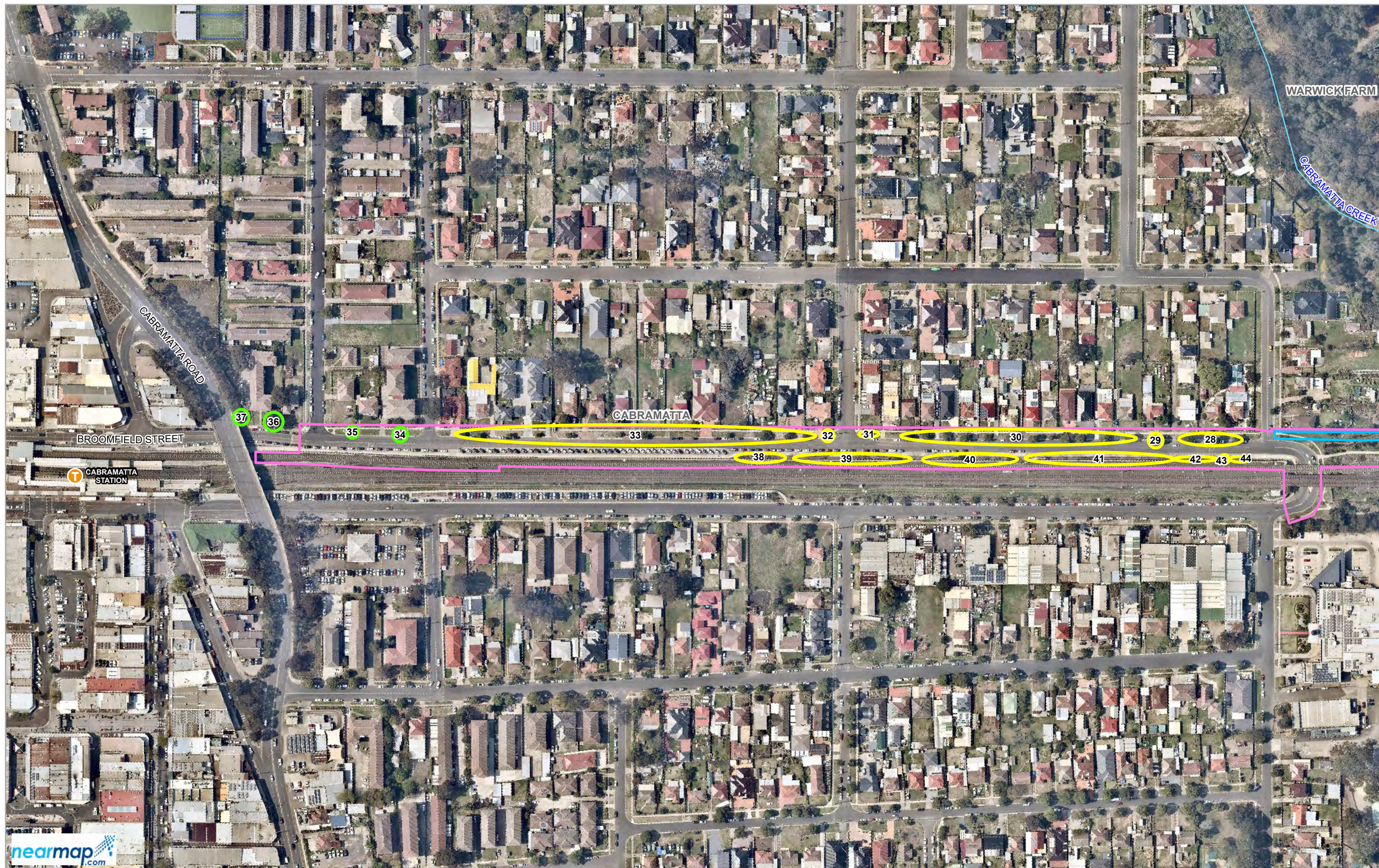


ARTC
Cabramatta Rail Loop
Arborist Assessment

Tree Map

Project No. 22-19800
Revision No. 0
Date 17/04/2019

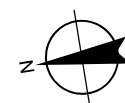
FIGURE 2.1b



- Legend
- Project site
 - Tree/tree groups to be retained
 - Tree/tree group to be removed
 - Temporary access
 - Watercourse
 - T Sydney Trains station
 - ↔ Compound access route

Paper Size ISO A3
0 10 20 30 40
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian 1966
Grid: AGD 1966 ISG 56 1



ARTC
Cabramatta Rail Loop
Arborist Assessment

Tree Map

Project No. 22-19800
Revision No. 0
Date 17/04/2019

FIGURE 2.1c

3. Existing environment

3.1 The study area

The study area is located in the City of Fairfield and City of Liverpool local government areas (LGA). The project site is predominately located within the existing rail corridor from Cabramatta to Warwick Farm. Land uses adjoining the project site consist primarily of urban streetscapes and residential, commercial and industrial developments, interspersed with urban parklands.

Cabramatta Creek flows through the project site in a northerly direction.

Topography of the subject site is mostly level to gently inclined. Soils are derived from the South Creek Soil Landscape Group along Cabramatta Creek and the Blacktown Group to the north and south of the creek (see Hazelton, Bannerman and Tille 1989). Soils of the South Creek Group are derived from "Quaternary alluvium derived from Wianamatta Group Shales and Hawkesbury Sandstone" (Bannerman and Hazelton 1990). Soils of the Blacktown Group are derived from "Ashfield Shale consisting of laminite and dark grey siltstone, Bringelly Shale which consists of shale with occasional calcareous claystone, laminite and infrequent coal and Minchinbury Sandstone consisting of fine to medium-grained quartz lithic sandstone" (Bannerman and Hazelton 1990). There are substantial areas of fill material in the project site, including railway ballast, gravel, building debris and excavated soil material.

There is no native vegetation in the project site. There are three non-native vegetation map units in the project site: planted native species; exotic vegetation; and cleared lands (see GHD 2019). There is native vegetation in the broader study area, comprising Cumberland River-flat Forest in moderate condition and Coastal freshwater wetland in moderate condition. The project design, construction laydown areas and construction access routes have been purposefully selected and designed to avoid impacts to these areas of native vegetation.

Trees within or adjoining the project site are probably all planted, occurring within school grounds, private gardens, parkland and roadside nature strips.

3.2 Trees in or adjoining the project site

The locations of trees and tree groups located surveyed for this assessment are indicated on Figure 2.1. Details of surveyed trees and tree groups are presented in the Tree Schedule at Appendix A.

The trees assessed comprise a mixture of native species indigenous to the locality, non-indigenous native species and exotic ornamental specimens (see Appendix A).

No remnant trees occur within the project site, although there are several specimens which are probably > 80 years old. The older specimens appear, however, to have been planted, based on their locations in the context of proximity to fences, paths and other trees or tree groups.

For example, Photo 1 indicates a group of small trees, which are located within a fenced garden area adjacent to Warwick Farm railway station. The trees are in a straight line, are evenly spaced and appear to be the same age.



Photo 1 Tree group 1 planted within the footpath

Photo 2 indicates a group of trees, mainly *Eucalyptus* and *Corymbia* species, which appear to have been planted as a visual screen along the boundary of Lawrence Hargrave School. The trees have probably all been planted over the same period.



Photo 2 Tree group 6 in Lawrence Hargrave school yard

Photo 3 indicates a group of trees, which form part of a line of trees which delineate the boundary between the railway reserve and Jacquie Osmond Reserve and Softball Centre. It is apparent that some groups were planted more than 50 years ago, while others appear to be less than 30 years old.



Photo 3 Part of Tree group 20 in parkland

Photo 4 indicates lines and groups of trees, especially exotic palm species, planted within small, narrow planter beds adjacent to access roads and car-parks. It is apparent that there have been several plantings, over the last 30 years.



Photo 4 Tree group 19 in an industrial setting

Photo 5 indicates a section of footpath planting along Broomfield Street, near Cabramatta Station. All plantings in this area are recent (ie within the last ten years).



Photo 5 Trees that form part of tree group 40 in footpath

Several old specimens of Blue Box (*Eucalyptus baueriana*) occur near Cabramatta Creek, in appropriate habitat. The specimens have probably been planted, however, because they follow the alignment of the adjacent pathway and are approximately the same age. The trees are numbered and described as Tree Group 10 and Trees 11, 12 and 13, in this report (Figure 2.1).

The largest tree in the project site is a Spotted Gum (*Corymbia maculata*) that forms a component of Tree group 23. It is likely that this specimen has also been planted, probably more than fifty years ago. There are several factors which indicate that the specimen has been planted, including:

- Location – the specimen is located on the edge of a playing field which appears to have been cleared and levelled. The specimen forms part of a fragmented line of trees and shrubs which follows the western boundary of Jacquie Osmond Park
- Habitat – the specimen occurs on the floodplain and more typically originally occurred on hilly country in the locality (Benson and Howell 1990)
- Form – the specimen has a broadly-spreading canopy, indicating that the specimen did not develop from within a patch of Spotted Gum Forest, in which case the canopy would have been narrow” (G. Leonard pers. obs.)

An indigenous threatened species, Downy Wattle (*Acacia pubescens*), occurs on the outer edge of the rail corridor near Fairfield Station. The specimens of Downy wattle are located and described as Tree Group 4 (Appendix A; Figure 2). It appears that the specimens of Downy Wattle have also been planted.

In their current locations and condition, a large proportion of the planted trees are in a state of gradual decline. This is likely as a result of several factors, but especially resulting from compaction of root zones by pedestrian and vehicular traffic, mechanical damage to leaders (trunks), stress from lack of shelter and an absence of native ground-cover and mid-storey (see Hitchmough 1994; Lonsdale 1999, James *et al.* 2006).

There are also a number of juvenile specimens that have regenerated or self-recruited in the rail reserve. These include, Acacias that form part of Tree Group 21, Acacias and Hopbush that are a component of Tree Group 22 and Banksias and Casuarinas that are a part of Tree group 24 (Figure 2.1).

3.3 Conservation values of trees

3.3.1 Heritage or significant trees

Searches were carried out in order to determine whether any tree growing within the subject site is listed as a Heritage or Significant Tree, within Development control plans or local environment plans (LEPs) of Liverpool or Fairfield City Councils or within National Trust Registers. Trees may be listed as significant because of dimensions, species or location. Heritage trees are generally listed because of age, location or relationship to historical factors.

No trees which have been assessed are identified as Heritage items or Significant Trees in lists prepared by the NSW Government (2009), Liverpool City Council (2008) or Fairfield City Council (2013).

3.3.2 Threatened species

A small patch of Downy Wattle (*Acacia pubescens*) is located within a section of railway reserve about 60 metres south of the project site (Photo 6). *Acacia pubescens* is listed as a vulnerable species under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). These trees will not be affected by the proposed works (Figure 2.1)



Photo 6 The threatened species, *Acacia pubescens* (Tree Group 4) growing along the outside edge of the rail corridor

A Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) occurs within Tree Group 22 along the western boundary of Jacquie Osmond Reserve. This specimen has been planted and has co-dominant leaders as a result of mechanical damage to the leader (Photo 7). *Eucalyptus nicholii* is listed as a vulnerable species under the BC Act and EPBC Act. This specimen is proposed for removal.

Trees of conservation significance that occur within the project site are discussed in more detail in the Biodiversity Development Assessment Report (BDAR) (GHD 2019a).



Photo 7 Epicormic regrowth on the *Eucalyptus nicholii* (part of Tree Group 22)

3.3.2 Other conservation values

Blue Box (*Eucalyptus baueriana*) is located and described as Tree Group 10 and Trees 11, 12 and 13 in this report (Photo 8). Blue Box is described as “regionally vulnerable” by James *et al.* (1999) but is not listed as a threatened species under the BC Act or EPBC Act. As stated in James *et al.* (1999) “...Regional significance of species should also be considered as part of strategies for their conservation...”. The listings of regionally significant plant species by James *et al.* (1999) are proposed as guidelines for local government and other agencies that are engaged in conservation and bush regeneration. The specimens identified in the study area will not be removed for the project.



Photo 8 *Eucalyptus baueriana* (Tree Group 10)

The large Spotted Gum (*Corymbia maculata*) which is a component of Tree 23 (Photo 9) is the largest tree in the project site and has some landscape value due to its size.. The tree is mature and in good health with typical structure for the species. It contains hollows and may have habitat value for fauna species that use tree-hollows for refuge and nesting. This specimen is proposed for removal (see Section 4.1). Landscape and visual impacts of tree removal in the project site are discussed in the Landscape and Visual Amenity Impact Assessment (GHD 2019b). The impacts of tree removal on flora and fauna are assessed in the Biodiversity Development Assessment Report (2019a).



Photo 9 The large *Corymbia maculata* (on the right) growing along the boundary of Jacquie Osmond Reserve (Tree Group 23)

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4. Potential impacts

4.1 Trees to be removed

The requirement for tree removal has been minimised through the location of compound sites in cleared areas and the use of existing roads and tracks for access where practicable.

The project will result in the unavoidable removal of 43 planted trees which are indigenous to the Fairfield/Liverpool LGAs and 77 exotic specimens, as defined in Table 2.1 and shown on Figure 2.1. All trees proposed for removal are located within the project site.

Table 4.1 lists the trees that would be removed for construction. The trees vary in age, suggesting different planting events and also vary in health and form, depending on location and maintenance history. Further details of these trees are provided in the Tree Schedule at Appendix A.

Table 4.1 Trees that would be removed

Tree/ Tree group number	Scientific name	Common name	Number of Trees	Comments
8	<i>*Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	1	Growing in dense, recently planted shrubbery adjacent to pathway
	<i>*Callistemon viminalis</i>	River Bottlebrush	1	
	<i>Casuarina glauca</i>	Swamp Oak	5	
	<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i>	Hop Bush	1	
	<i>Kunzea ambigua</i>	Tick Bush	1	
14	<i>Eucalyptus tereticornis</i>	Forest Red Gum	1	Early mature specimen growing in rail reserve
20	<i>Eucalyptus tereticornis</i>	Forest Red Gum	4	Planted specimens, forming informal line along edge of park
21	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	1	Planted specimen, forming informal line along edge of park
	<i>Acacia fimbriata</i> <i>Acacia floribunda</i>	Fringed Wattle Sallow Wattle	1 1	Self-recruited wattles growing in the adjacent rail reserve
22	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	2	Planted specimen, forming informal line along edge of park
	<i>*Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	1	Planted threatened species outside of its natural distribution
	<i>Acacia floribunda</i> x 3	Sallow Wattle	3	Self-recruited specimens growing in the adjacent rail reserve
	<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i> x 2	Sticky Hopbush Wedge-leaf Hopbush	2 1	
	<i>D. viscosa</i> subsp <i>cuneata</i>	River Bottlebrush		
	<i>*Callistemon viminalis</i>			

Tree/ Tree group number	Scientific name	Common name	Number of Trees	Comments
23	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	1	
	<i>Corymbia maculata</i>	Spotted Gum	1	Fine, large specimen
24	<i>Corymbia maculata</i>	Spotted Gum	1	
	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	3	
	<i>*Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	3	Self-recruited or possibly planted specimens in the adjacent rail reserve
	<i>Casuarina glauca</i>	Swamp Oak	2	
25	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	3	
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	1	
26	<i>Corymbia maculata</i>	Spotted Gum	8	Planted thicket on edge of playing fields
	<i>Casuarina glauca</i>	Swamp Oak	10	
28	<i>*Lophostemon confertus</i>	Brush Box	3	Street trees
29	<i>*Platanus x acerifolia</i>	Plane Tree	1	Street trees
30	<i>*Lophostemon confertus</i>	Brush Box	10	Street trees
31	<i>*Callistemon viminalis</i>	River Bottlebrush	1	Street trees
32	<i>*Callistemon</i> 'Kings Park Special'	Bottlebrush	1	Street trees
33	<i>*Lophostemon confertus</i>	Brush Box	9	Street trees
38	<i>*Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	5	Recently planted street trees
38	<i>*Robinia pseudoacacia</i> 'Frisia'	Golden Robinia	6	Street trees
40	<i>*Robinia pseudoacacia</i> 'Frisia'	Golden Robinia	14	Street trees
41	<i>*Robinia pseudoacacia</i> 'Frisia'	Golden Robinia	8	Street trees
42	<i>*Robinia pseudoacacia</i> 'Frisia'	Golden Robinia	1	Street trees
43	<i>*Syzygium floribundum</i>	Waterhousia	1	Street trees
44	<i>*Robinia pseudoacacia</i> 'Frisia'	Golden Robinia	1	Street trees
Total trees to be removed			120	

* species not indigenous to Fairfield or Liverpool LGAs (see James *et al.* 1999)

4.2 Trees to be retained

Many of the trees surveyed for this assessment are already subject to existing levels of disturbance associated with soil compaction, high levels of foot traffic, landscaping and parkland maintenance, lawn mowing *etc.* Additionally, there are existing made-made structures such as fencing, concrete bases and footpaths, as well as formal and informal car parking areas that would be contributing to existing levels of disturbance, alterations to moisture regime and

compaction within the TPZ of many trees. Photo 8 indicates a group of Blue Box growing close to a pathway. The leaders show bias and wounds, probably caused by mechanical damage associated with vehicular and pedestrian impact.

Indirect impacts on trees to be retained may include loss of or damage to roots and branches of trees located near proposed construction areas. Australian Standards (2009) require a maximum of 10% disturbance to a tree's TPZ and no disturbance within the tree's SRZ. Trees proposed for retention may require protection during construction, if they are located near proposed parking areas or vehicular access tracks. Any soil compaction associated with encroachment over a tree's TPZ would certainly result in loss of fine roots (growing on the top 150 mm) but may also affect the health of supporting roots. While supporting roots store energy and provide stability, the loss of surface fine roots reduces a tree's ability to absorb moisture and nutrients, and, as a result, reduces the tree's capability to grow healthily and resist attacks by insects and other organisms (see Perry 1982; Miller and Rathke 1993; Hamilton 1989 and Helliwell 1985).

There is currently insufficient design and construction detail to make definitive observations about proposed alterations to existing soil levels near trees that are to be retained proximate to the project site. In general, it is recommended that no trees should be retained where the existing surface levels within the TPZ are either raised or reduced by more than 150 mm.

For this reason, measures to protect trees proposed for retention should include the appointment of a project arborist (see section 5).

Trees and Tree Groups which are to be retained and that may potentially require protection during construction include:

- Tree Group 10, Trees, 11, 12 and 13, and Tree Groups 6 and 7 which occur along the proposed compound access route
- Tree Group 27, located within and adjoining the project site within Jacquie Osmond Reserve.

Tree group 10, Trees, 11, 12 and 13 and Tree groups 6 and 7 are located outside of the project site along both sides of a sealed pathway which is currently used for pedestrian and traffic access (Figure 2.1). The path in its current form is likely to be sufficiently wide to accommodate large vehicles (if required) without affecting the trees. If, however, there is a need for movement by overly wide vehicles and machinery and there will be encroachment of the TPZs, protective measures would be required. Protective measures would also be required for Tree group 27 if the disturbance footprint extends into the TPZ of retained trees (see section 5).

The specimens of the threatened *Acacia pubescens* (Tree Group 4) are located about 60 metres from the project site and are therefore unlikely to be affected by the proposed works. Protective measures should be implemented if a decision is made to utilise the area adjacent to Tree Group 4 for storage, parking or vehicular access.

Tree protection measures for retained trees are outlined in Section 5.

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5. Tree protection measures

The following management and mitigation measures are recommended with respect to tree removal on site and for the protection of retained trees during detailed design and construction:

- Tree removal will be carried out according to the guidelines outlined in Safe Work Australia (2016).
- A Project Arborist will be appointed to advise on tree protection measures for retained trees proximate to the project site prior to and during construction.
- The Project Arborist will determine the requirement for fencing and the location and extent of protective fencing for trees which are proposed for retention proximate to the project site or access roads (eg for Tree Group 27, Tree Group 10, Trees, 11, 12 and 13, and Tree Groups 6 and 7 and 27). This will be completed prior to construction commencing, once the limits of on ground disturbance are known.
- If further locations of disturbance are identified during detailed design (e.g. for drainage or services) the Project Arborist, will reassess potential impacts to the TPZs of retained trees. If protection of the full TPZ of some trees will not be possible, because of the proposed locations of structures, paths and roads or vehicle/plant access, the Project Arborist will:
 - determine the optimal TPZ
 - review existing plans and determine if they can be altered to accommodate the full extent of retained tree's TPZs. For example if permeable surfaces or bridging over the extent of the tree's TPZ
- If during detailed design, the need to utilise the area adjacent to the threatened *Acacia pubescens* specimens (Tree Group 4) for storage, parking or vehicular access, is identified, the Project Arborist will identify if and where, temporary perimeter fence is to be installed.
- Tree fencing will comply with Australian Standards 2009 and be installed prior to construction and removed when construction is completed. An example of appropriate fencing is indicated in Appendix C. The fencing will be installed prior to commencement of clearing and will be retained in place until the completion of construction.
- The following actions will not be permitted within the TPZ of any tree:
 - Storage of materials, plants or equipment
 - Installation of site sheds or portable toilets
 - Excavations, trenching, ripping or cultivation of soils
 - Modification of existing soil level or addition of fill materials
 - Disposal of waste materials and chemicals (both solid or liquid)
 - Mechanical removal of vegetation
 - Pedestrian or vehicular movement.
- During construction the Project Arborist will inspect any required excavated areas within retained tree TPZs, which reveal quantities of live tree roots. Any root pruning required within the TPZ will be approved by the Project Arborist, prior to being carried out, and any digging and pruning of roots (only roots less than five centimetres may be pruned) within the TPZ will be conducted by hand for a clean cut. Where larger roots require pruning the Project Arborist will provide advice as to whether the loss of tree roots constitutes a safety risk to workers (because of reduced tree stability), a potential long-term risk, or if it is apparent that the amount of root loss would cause accelerated rate of decline in adjacent retained trees.

- The Project Arborist will advise if:
 - To protect soil within the TPZ of any tree or tree group which may be affected by construction, excavation or level changes, a layer of organic mulch will need to be applied (no more than 75 mm thick). Any mulch used will comply with the Australian Standard – composts, soil conditioners and mulches AS4454-2012 (SA 2012).
 - Irrigation systems need to be installed for retained trees where the TPZs have been affected by construction, if an extended period of drought occurs. The Project Arborist will advise on the frequency of watering needed. As a guide, the watering should occur at least once per week and allow deep soil penetration. The specific watering requirements will also depend on the climatic conditions.

The following management and mitigation measures are recommended with respect to tree removal on site and for the protection of retained trees during operation of the project:

- Once the construction works are completed:
 - any retained trees located near construction sites where the TPZ has been affected, will be re-inspected by the Project Arborist who will carry out an assessment that would prescribe remedial work where necessary to reduce any identified risk to pedestrians or parked vehicles
 - the Project Arborist will identify if any of the retained trees will require further monitoring to assess their health, vigour and to identify potential hazards. This is of particular importance given the proximity of the trees to areas of public access. In consultation with ARTC, the contractor and the landowner, the method of monitoring, duration and responsibilities will be agreed.

It is important to note that some defects, ill-health or decay in a tree are not always identifiable using VTA. In addition, there are occasions where supposed healthy and defect-free trees break or are damaged by wind-throw, especially those trees growing along a newly created edge. This is described as a 'normal failure rate' and is a function of the energy-saving, cost-effective and lightweight structure of a tree. Therefore, every tree represents some potential danger of failure (see Mattheck and Breloer, 2003). Retained trees that have had disturbance of their TPZ should be monitored by the Project Arborist at six months and one year after completion of the works.

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Appendices

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Appendix A – Tree schedule

Tree Schedule

Tree or tree group No.	Botanical name	Common Name	Height (m)	Canopy radius (m)	Age ¹	Health ²	Form ³	DBH ⁴ (m)	TPZ ⁵	SULE ⁶	Proposed retention or removal and additional comments
1 (group)	<i>Melaleuca linariifolia</i> x 3	Snow in Summer	3.5	2	M	G	G	0.22 (av.)	3	2A	To be retained Growing within fenced area adjacent to Warwick Farm station
2	* <i>Callistemon</i> Kings Park Special	Bottle Brush	3.5	3	OM	M	M	0.19	3	3A	To be retained Bias, sparse canopy
3 (group)	<i>Casuarina cunninghamiana</i> x 2	River Oak	12	3	M	G	G	0.27	4	2A	Growing within fenced area
	<i>Corymbia maculata</i>	Spotted Gum	12	2	M	M	F	0.24	3	3A	To be retained Severe bias, suppressed growth
	* <i>Eucalyptus grandis</i>	Flooded Gum	12	3	M	M	G	0.45	6	3A	To be retained Bracket Fungus near base, possibly indicating decay in leader
	<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark	8	3	M	G	G	0.51	6	1A	To be retained
4 (group)	<i>Callistemon salignus</i>	Pink Tips	6	1.5	EM	G	G	0.17	3	2A	To be retained Growing in rail reserve
	# <i>Acacia pubescens</i> x 5	Downy Wattle	2.5	1.5	M	G	G	multi	2	3A	To be retained
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Blackthorn	3.5	2	M	G	G	multi	2	3A	To be retained
	<i>Melaleuca linariifolia</i>	Snow in Summer	4.5	2.5	M	G	G	0.27	4	2A	To be retained
5 (group)	<i>Eucalyptus tereticornis</i>	Forest Red Gum	7	3	EM	G	G	0.25	3	2A	To be retained * <i>Acacia saligna</i> (invasive species) adjacent
	<i>Callistemon citrinus</i>	Crimson Bottlebrush	3	1.5	M	G	G	multi	2	3A	To be retained
	* <i>Cotoneaster pannosus</i>	Coroneaster	3.5	2.5	M	G	G	multi	2	4A	To be retained
	<i>Casuarina cunninghamiana</i> x 2	River Oak	12	3	M	M	M	0.22	3	3A	To be retained
6 (group)	* <i>Eucalyptus microcorys</i> x 4	Tallowwood	19	5	M	G	G	0.39	5	1A	To be retained Growing in school grounds

Tree or tree group No.	Botanical name	Common Name	Height (m)	Canopy radius (m)	Age ¹	Health ²	Form ³	DBH ⁴ (m)	TPZ ⁵	SULE ⁶	Proposed retention or removal and additional comments
7 (group)	<i>Corymbia maculata</i> x 2	Spotted Gum	18	5	M	G	G	0.25	4	1A	To be retained
	<i>Eucalyptus globoidea</i> x 2	Thick-leaved Stringybark	16	5	M	G	G	0.44	5	1A	To be retained Growing in school grounds
	<i>Eucalyptus robusta</i>	Swamp Mahogany	15	5	M	G	G	0.42	5	1A	To be retained
	<i>Eucalyptus globoidea</i> x 2	White Stringybark	10	2.5	EM	G	M	0.26	4	2A	Growing on road verge and pollarded
	<i>Acacia fimbriata</i> x 2	Fringed Wattle	4	1.5	M	G	G	multi	2	3A	To be retained
	<i>Eucalyptus tereticornis</i> x 2	Forest Red Gum	5	1.5	M	M	F	multi	3	3A	To be retained
8 (group)	<i>*Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia	5	4	EM	G	G	multi	2	3A	Removal required
	<i>*Callistemon viminalis</i>	River Bottlebrush	6	4	EM	G	G	multi	2	3A	Removal required
	<i>Kunzea ambigua</i>	Tick Bush	4	1	EM	G	G	multi	2	3A	Removal required
	<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i>	Sticky Hop Bush	4	1	EM	G	G	multi	2	3A	Removal required
	<i>Casuarina glauca</i> x 5	Swamp Oak	5	1.5	EM	G	G	0.15	2	2A	Removal required
9 (thicket)	<i>*Ligustrum lucidum</i>	Large-leaved Privet	16	5	M	G	M	0.62 0.41	8.88	5A	To be retained Growing in long grass adjacent to bridge Invasive species
10 (group)	<i>Eucalyptus baueriana</i>	Blue Box	13	5	M	G	G	0.35	4.2	1A	To be retained
	<i>Eucalyptus baueriana</i>	Blue Box	11	7	M	G	G	0.14 0.12	2.16	3A	To be retained Damage at base of leader
	<i>Eucalyptus baueriana</i>	Blue Box	5	2	EM	M	M	0.08 0.06	2	3A	To be retained
11	<i>Eucalyptus baueriana</i>	Blue Box	11	4	M	G	G	0.28 0.26 0.28	5.46	3A	To be retained
12	<i>Eucalyptus baueriana</i>	Blue Box	10	3	M	M	F	0.22	2.64	3A	To be retained Damage at base of leader

Tree or tree group No.	Botanical name	Common Name	Height (m)	Canopy radius (m)	Age ¹	Health ²	Form ³	DBH ⁴ (m)	TPZ ⁵	SULE ⁶	Proposed retention or removal and additional comments
13	<i>Eucalyptus baueriana</i>	Blue Box	11	4	M	G	G	0.28 0.16	3.36	3A	To be retained Co-dominant leaders at base
14	<i>Eucalyptus tereticornis</i>	Forest Red Gum	15	5	EM	G	G	0.26	3.12	2A	Removal required
15 (group)	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	14	4	M	M	F	0.22 0.25 0.19 0.17	5.04	2A	To be retained Growing in garden bed Co-dominant leaders
	<i>*Triadica sebifera</i>	Chinese Tallowwood	9	4	M	G	G	0.26	3.3	4A	To be retained Invasive species
16 (group)	<i>*Coprosma repens</i>	Taupata	6	2	M	G	G	multi	2	4A	To be retained Growing in garden bed
	<i>*Raphiolepis indica</i>	Indian Hawthorn	5	2.5	M	G	M	multi	2	3A	To be retained
	<i>*Metrosideros excelsa</i> 'Variegata'	Pohutukawa	6	2	M	G	G	multi	2	3A	To be retained
17 (group)	<i>Corymbia maculata</i>	Spotted Gum	19	7	M	G	G	0.49	5.88	1A	To be retained Growing in garden bed near car park
	<i>*Washingtonia robusta</i> x 5	Mexican Fan Palm	8	2.5	EM	G	G	0.29	2	1A	To be retained
	<i>*Syagrus romanzoffiana</i>	Cocos Palm	7	2.5	EM	G	G	0.22	2	5A	To be retained Invasive species
	<i>*Syagrus romanzoffiana</i>	Cocos Palm	5	2	EM	G	G	0.20	2	5A	To be retained Invasive species
19 (group)	<i>*Syagrus romanzoffiana</i> x 7	Cocos Palm	10	3	M	G	M	0.29	2	5A	To be retained
	<i>*Washingtonia robusta</i> x 2	Mexican Fan Palm	17	3	M	G	G	0.37	2	2A	Invasive species
20 (group)	<i>Eucalyptus tereticornis</i> x 4	Forest red Gum	16	6	M	G	M	0.49	5.88	2A	Removal required Longicorn damage in leaders

Tree or tree group No.	Botanical name	Common Name	Height (m)	Canopy radius (m)	Age ¹	Health ²	Form ³	DBH ⁴ (m)	TPZ ⁵	SULE ⁶	Proposed retention or removal and additional comments
21 (group)	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	13	8	M	G	G	0.54	6.48	5A	Removal required
	<i>Acacia fimbriata</i>	Fringed Wattle	8	2	EM	G	G	0.25	3	5A	Removal required Growing in rail corridor
	<i>Acacia floribunda</i>	Sallow Wattle	8	3	EM	G	G	0.21	2.52	5A	Removal required Growing in rail corridor
22 (group)	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	13	4	M	G	M	0.28 0.17 0.19	3.36	2A	Removal required Co-dominant leaders
	<i>#*Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	12	4	M	G	M	0.32 0.11 0.13	4	2A	Removal required Two epicormic shoots from wound near base
	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	14	3	M	G	G	0.35	4	2A	Removal required
	<i>*Callistemon viminalis</i>	River Bottlebrush	9	2	M	M	M	0.17 0.14	3	3A	Removal required Sparse canopy
	<i>Acacia floribunda</i> x 3	Sallow Wattle	4	1.5	EM	G	G	multi	2	3A	Removal required Growing in rail corridor
	<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i> x 2	Sticky Hop Bush	3	1	EM	G	G	multi	2	3A	Removal required Growing in rail corridor
	<i>Dodonaea viscosa</i> subsp. <i>cuneata</i>	Wedge-leaf Hop Bush	3	1	EM	G	G	multi	2	3A	Removal required Growing in rail corridor
23(group)	<i>Corymbia maculata</i>	Spotted Gum	22	6	M	G	G	0.87	8	1A	Removal required Large specimen with fine form and high landscape value
	<i>*Melaleuca quinquenervia</i>	Broad-leaved Paperbark	6	2	EM	M	M	0.22	3	3A	Removal required Sparse canopy

Tree or tree group No.	Botanical name	Common Name	Height (m)	Canopy radius (m)	Age ¹	Health ²	Form ³	DBH ⁴ (m)	TPZ ⁵	SULE ⁶	Proposed retention or removal and additional comments
24 (group)	<i>Corymbia maculata</i>	Spotted Gum	22	6	M	G	G	0.87	8	1A	Removal required
	* <i>Melaleuca quinquenervia</i> x 3	Broad-leaved Paperbark	6	2	EM	M	M	0.16 0.19	3	3A	Removal required Sparse canopy
	* <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> x 3	Coast Banksia	4	1	EM	G	M	multi	2	3A	Removal required Growing in rail corridor
	<i>Casuarina glauca</i> x 2	Swamp Oak	5	1	EM	G	M	multi	2	3A	Removal required Growing in rail corridor
25	* <i>Melaleuca quinquenervia</i> x 3	Broad-leaved Paperbark	6	2	EM	M	M	0.13 0.15	3	3A	Removal required Sparse canopy
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	13	5	M	M	G	0.36	5	2A	Removal required Longicorn damage; sparse canopy
26 (group)	<i>Casuarina glauca</i> x 10	Swamp Oak	12	2	M	G	M	0.22 0.15 0.24	4	2A	Removal required Co-dominant leaders, possibly in response to crowding
	<i>Corymbia maculata</i> x 8	Spotted Gum	14	3	M	G	G	0.32	4	2A	Removal required
27 (group)	<i>Corymbia maculata</i> x 7	Spotted Gum	15	3	M	G	G	0.33	4	2A	
	<i>Casuarina glauca</i> x 8	Swamp Oak	12	2	M	G	G	0.28	4	2A	
28 (group)	* <i>Lophostemon confertus</i>	Brush Box	7	3	M	G	M	0.30	4	2A	Removal required
	* <i>Lophostemon confertus</i> x 2	Brush Box	12	4	M	G	M	0.31	4	2A	Removal required
29	* <i>Platanus x acerifolia</i>	London Plane	6	2	M	M	M	0.26	4	3A	Removal required
30 (group)	* <i>Lophostemon confertus</i> x 10	Brush Box	12	4	M	G	M	0.31	4	2A	Removal required
31	* <i>Callistemon viminalis</i>	River Bottlebrush	5	1.5	M	M	M	multi	2	3A	Removal required
32	* <i>Callistemon</i> 'Kings Park Special'	Bottlebrush	5	1.5	M	M	M	multi	2	3A	Removal required
33 (group)	* <i>Lophostemon confertus</i> x 9	Brush Box									Removal required
34	* <i>Callistemon viminalis</i>	River Bottlebrush	8	2	M	G	M	multi	2	3A	To be retained

Tree or tree group No.	Botanical name	Common Name	Height (m)	Canopy radius (m)	Age ¹	Health ²	Form ³	DBH ⁴ (m)	TPZ ⁵	SULE ⁶	Proposed retention or removal and additional comments
35	<i>*Lophostemon confertus</i>	Brush Box	9	2	EM	G	M	0.21	3	2A	To be retained
36	<i>Corymbia maculata</i>	Spotted Gum	15	5	M	G	G	0.37	5	2A	To be retained Growing in private garden
37	<i>*Morus alba</i>	Mulberry	7	4	M	G	G	multi	3	3A	To be retained Growing in private garden
38	<i>*Banksia integrifolia</i> subsp. <i>integrifolia</i> x 5	Coast Banksia	5	1	EM	M	M	0.17	3	3A	Removal required
39 (group)	<i>*Robinia pseudoacacia</i> 'Frisia' x 6	Golden Robinia	10	4	M	G	G	0.33	4	3A	Removal required Some <i>Callistemon</i> Cvs planted close to wall
40 (group)	<i>*Robinia pseudoacacia</i> 'Frisia' x 14	Golden Robinia	11	5	M	G	G	0.33	4	3A	Removal required
41 (group)	<i>*Robinia pseudoacacia</i> 'Frisia' x 8	Golden Robinia	10	4	M	G	G	0.32	4	3A	Removal required
42	<i>*Robinia pseudoacacia</i> 'Frisia'	Golden Robinia			EM	M	M	0.21	3	3A	Removal required
43	<i>*Syzygium floribundum</i>	Waterhousia			EM	G	M	multi	3	3A	Removal required
44	<i>*Robinia pseudoacacia</i> 'Frisia'	Golden Robinia	7	2	EM	M	M	0.23	3	3A	Removal required

Notes:

* - species not indigenous to Liverpool or Fairfield LGA (see James *et al.* 1999)

- plant species of conservation significance

1 Age: OM = Over-mature; M = Mature; EM = Early-mature

2 Health: G=Good; M=Moderate; F = Fair

3 Form : G=Good; M=Moderate; F = Fair

4 DBH = Diameter at breast height

5 TPZ = Tree protection zone

6 SULE Classifications - see Appendix B for SULE Matrix

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Appendix B – Safe Useful Life Expectancy (SULE) Matrix

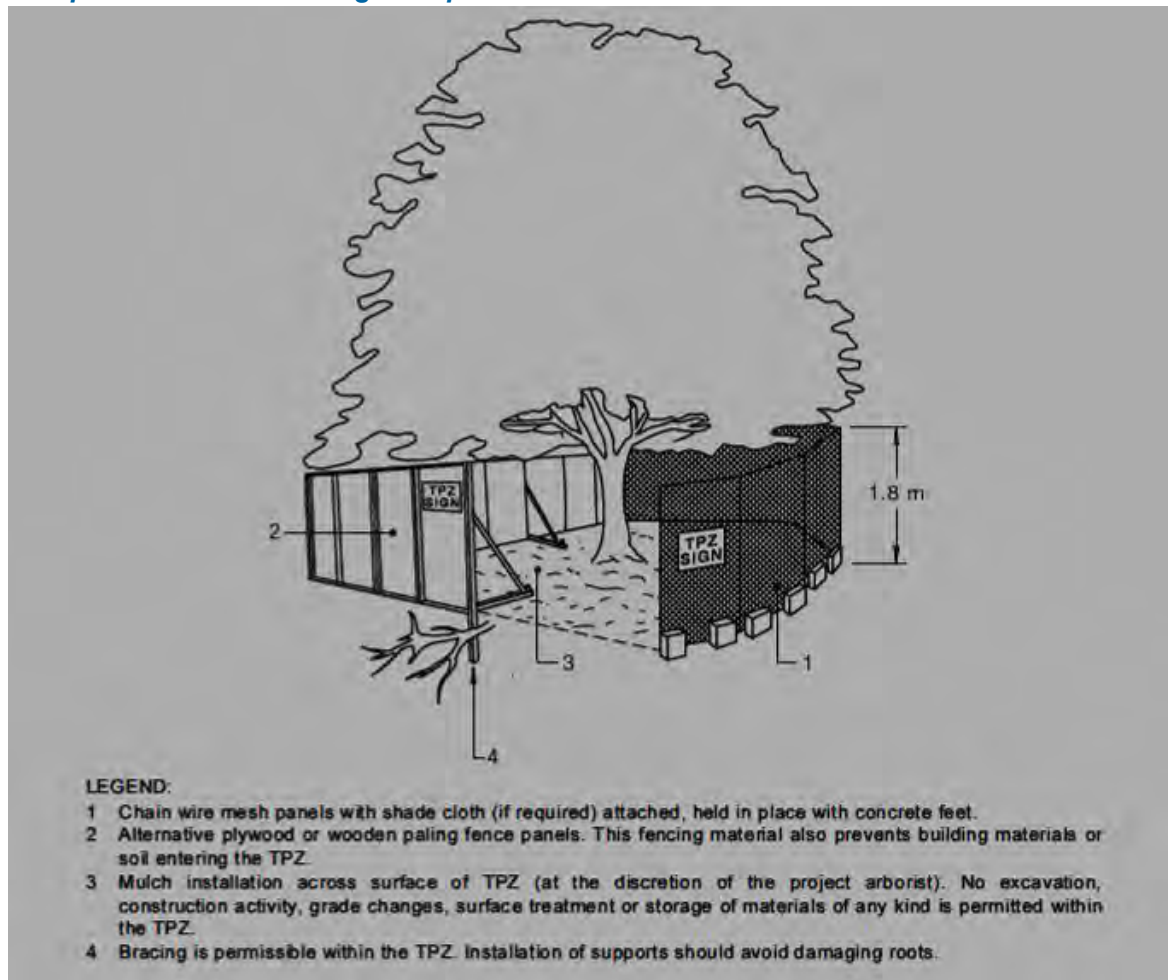
The SULE value generated by the below matrix gives an indication of the time a tree is expected to be usefully retained. Adapted from Barrell (2001).

Safe Useful Life Expectancy (SULE) Matrix

	1 Long SULE	2 Medium SULE	3 Short SULE	4 Removal	5 Move or Replace
A	Tree that appear to be retainable at the time of assessment for >40 years with an acceptable degree of risk, assuming reasonable maintenance.	Tree that appear to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Tree that appear to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	Trees which should be removed within the next 5 years.	Trees which can be readily moved or replaced.
B	Structurally sound trees located in positions that can accommodate for future growth.	Trees that may only live for 15-40 years.	Trees that may only live for another 5-15 years.	Dead, dying, suppressed or declining trees.	Small trees <5 (m) in height.
C	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.	Dangerous trees because of instability or loss of adjacent trees.	Young trees less than 15 years old but over 5m in height.
D	Trees of special significance that would warrant extraordinary efforts to secure their long term retention.	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting.	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.	Dangerous trees because of structural defects.	
E		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees not safe to retain.	
F				Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.	
G				Trees that are damaging or may cause damage to existing structures within 5 years.	

Appendix C – Tree protection zone fencing example

Tree protection zone fencing example



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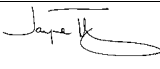
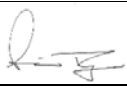
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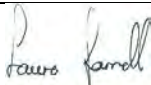

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