15 Aboriginal heritage

This chapter provides a summary of the Aboriginal heritage assessment undertaken by Biosis. A full copy of the assessment report is provided as Technical Report 9 – Aboriginal and cultural heritage impact assessment. The report was written to address the relevant SEARs which are outlined in Appendix A.

15.1 Assessment approach

15.1.1 Methodology

15.1.1.1 Study area

A search of the AHIMS database was undertaken for a five by five kilometre search area, centred on the project site, in order to characterise the nature of recorded Aboriginal sites within the local area surrounding the project site.

The site inspection covered a study area targeting all areas with the potential for Aboriginal heritage in the vicinity of the project site. The focus of this was Warwick Farm Recreation Reserve, Jacquie Osmond Reserve and Cabramatta Creek.

15.1.1.2 Key tasks

The assessment involved:

- identifying the existing environment with respect to the history of the project site through a desk top study reviewing:
    - public databases
    - previous heritage assessments from the area
    - geotechnical studies.
- consultation with Registered Aboriginal Parties (RAPs)
- a field investigation of the project site, undertaken on 6 December 2018
- assessing the impacts of constructing and operating the project on Aboriginal cultural values in accordance with the *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011)
- recommending measures to mitigate the impacts identified.

The field investigation was restricted to the portions of the project site located outside of the heavily disturbed rail line. The overall effectiveness of the survey for examining the ground for Aboriginal sites was deemed low due to ground surface visibility combined with a low amount of exposures; however, ground disturbances were identified across much of the project site.

15.1.1.3 Consultation

Consultation with the Aboriginal community was undertaken in accordance with the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW, 2010). Known Aboriginal stakeholders in the Fairfield and Liverpool areas were contacted. A public notification was also placed in local newspapers. There were zero registered native title claims, unregistered claimant applications or registered indigenous land use agreements within the project site. A total of 22 groups registered interest in the project.

Details about the project were provided to the RAPs as well as the proposed test excavation methodology (provided in Appendix 3 of Technical Report 9) and Gandangarra Local Aboriginal Land Council (LALC) were invited to attend the field investigation of the study area. The RAPs were also provided with a copy of the draft Aboriginal cultural heritage assessment report on 17 April 2019 for review and comment. Eight responses were received within the 28 day review period. The majority of responses agreed with the recommendations. Other

responses were administrative around requesting a hard copy or a notice of receipt. A copy of the comments are provided in Appendix 4 of Technical Report 9.

15.1.2 Risks identified

The preliminary environmental risk assessment undertaken for the project included potential risks associated with Aboriginal heritage. Potential risks were considered according to the impacts that may be generated by the construction and/or operation of the project, pre-mitigation. The purpose of the preliminary environmental risk assessment was to inform the impact assessment. Further information on the preliminary risk assessment, including the approach and methodology is provided in Appendix D.

One risk with an assessed level of high was identified:

- disturbance of known or unidentified items or places of Aboriginal heritage significance.

This potential risk was considered as part of the assessment. The assessment also considered matters identified by the SEARs and stakeholders, as described in Chapter 3 (Approval and assessment requirements) and Chapter 4 (Consultation).

15.1.3 How potential impacts have been avoided/minimised

As described in Chapter 6 (Project features and operation) and Chapter 7 (Construction), design development and construction planning has included a focus on avoiding and/or minimising the potential for environmental impacts during all key phases of the process.

Potential Aboriginal heritage impacts have been avoided/minimised, where possible by:

- designing the project site to minimise the amount of ground disturbance required. The location of compound sites have been proposed to:
    - avoid areas of high archaeological potential
    - minimise areas of moderate potential
    - where possible, locate compounds in previously disturbed areas.
- selecting locations for compounds that would avoid impacts on two previously recorded AHIMS sites.

15.2 Existing environment

15.2.1 Aboriginal historical and landscape context

The timing for the human occupation of the Sydney Basin is uncertain. While there is some possible evidence for occupation of the region around 40,000 years ago, the earliest known radiocarbon date for the Aboriginal occupation of the Sydney Basin is associated with an archaeological deposit at Parramatta, which was dated to around 30,000 years before the present day.

The historical landscape resources around the project site are likely to have provided an abundance of natural resources able to be utilised by Aboriginal people.

The project site consists of gently undulating slopes forming in the north that flow south from two crest landforms towards Cabramatta Creek, forming flood plains on either side of the creek line. These flood plains are gently inclined and feature low lying crests which range in elevation from 6 to 10 metres. Areas along Cabramatta creek range from steeply incised to gently inclined flood plains.

Potential archaeological deposits (PADs) have been previously recorded within the region upon well drained topographies within the vicinity of permanent sources of fresh water, and therefore have the potential to occur upon low lying crests within the lower floodplains.

The study area contains portions of the railway corridor installed in the late 1880s, and as such the surrounding areas have likely been heavily disturbed by the construction, maintenance and upgrades of the rail line.

15.2.2 Registered Aboriginal sites

A simple analysis of the Aboriginal cultural heritage sites registered within a five by five kilometre area around the project site indicates that artefact scatters are the most common site type identified. A search of the AHIMS database identified the following within the search radius:

- 109 Aboriginal archaeological sites
- Collingwood Precinct Aboriginal Place.

Two previously recorded AHIMS sites were identified within 50 metres of the project site:

- AHIMS 45-5-3271(CC1)
- AHIMS 45-5-3428/CC1.

The archaeological significance assessment for these sites is provided in section 15.2.4.

15.2.3 Archaeological survey

Disturbances identified within the project area included a previously cleared laydown area, a modified drainage line, access tracks adjacent to the rail line, the rail line and bridge crossing, and a large asphalted area on the eastern side of the rail line. The creek line immediately around the bridge crossing is highly disturbed from bridge and rail construction. These areas of disturbance have been assessed as having low archaeological potential.

Due to the high levels of previous ground disturbance and the level of urban development within the majority of the project site, the field investigation undertaken on 12 December 2018 focused on Warwick Farm Recreation Reserve and Jacquie Osmond Reserve. One random meander transect targeting areas of exposure within Warwick Farm Recreation Reserve and Jacquie Osmond Reserve was undertaken. The location of the two previously recorded AHIMS sites were inspected during the field investigation. Generally the survey was hampered by grass cover and ground disturbances reducing surface visibility of the underlying ground profile.

No Aboriginal objects were identified during the survey. The previously recorded AHIMS sites could not be located during the survey due to low surface visibility across the project area.

The area to the west of the rail line within Warwick Farm Recreation Reserve was assessed as having high archaeological potential due to the presence of previously recorded AHIMS sites with demonstrated archaeological deposits, and low levels of previous ground disturbance observed. Further subsurface archaeological deposits are likely to exist within the undisturbed areas within Warwick Farm Recreation Reserve.

The area to the east of the existing rail line within Jacquie Osmond Reserve displayed higher levels of disturbance and was assessed as having moderate archaeological potential. While Jacquie Osmond Reserve displayed evidence of some ground disturbance associated with the establishment of baseball playing fields, the field investigation and the background research conducted for the project area does not suggest that activities such as bulk earth works have occurred in this area.

Previous archaeological investigations in the region demonstrate that alluvial flats within close proximity to higher order waterways have high potential to contain subsurface archaeological deposits. It is therefore likely that Aboriginal objects exist within this area, however they are likely to be in a partially disturbed context.

15.2.4 Archaeological potential and significance

No previously unrecorded Aboriginal cultural heritage sites were identified during the field investigation.

The area to the west of the rail line within Warwick Farm Recreation Reserve was assessed as having high archaeological potential due to the presence of previously recorded AHIMS sites with demonstrated archaeological deposits, and low levels of previous ground disturbances observed. The area to the east of the existing rail line within Jacquie Osmond Reserve displayed higher levels of disturbance and was assessed with moderate archaeological potential. Areas of moderate and high Archaeological potential are shown on Figure 15.1. All remaining areas of the project site are assessed as disturbed areas only.

Figure 15.1 Areas of archaeological potential

In the event that archaeological remains did in fact exist in this area, the site types likely to be encountered, based predominantly on the location, land type and known history, are described in Table 15.1. All other sites types are considered to have a low potential for being within the project site.

Table 15.1 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	High: Stone artefact sites have been previously recorded in the region across a wide range of landforms including alluvial flats, and also within 50 metres of the project area; they have the high potential to be present in undisturbed areas within the project area.
Potential archaeological deposits (PADs)	Potential sub surface deposits of cultural material.	Moderate: PADs have been previously recorded in the region across a wide range of landforms including alluvial flats. PAD sites have been previously recorded within 50 metres of the project area. They have the potential to be present in undisturbed landforms.
Modified trees	Trees with cultural modifications	Moderate: Scarred trees are the second most common site type within the vicinity of the project area. Due to extensive vegetation clearance only a small number of mature native trees have survived within the project area.

The following archaeological significance assessment is based on Requirement 11 of the *Code of practice for archaeological investigation of Aboriginal objects in NSW* (DECCW, 2010) (the Code). Using the assessment criteria detailed in Scientific Values and Significance Assessment, an assessment of significance was determined and a rating for each site was determined. The results of the archaeological significance assessment are given in Table 15.2.

Table 15.2 Statements of scientific significance for archaeological sites recorded within the project area

Site Name	Statement of Significance	Scientific significance
AHIMS 45-5-3271/CC1	AHIMS 45-5-3271/CC1 is recorded as an isolated artefact, and PAD. No further information about this site is available but a review of AHIMS 45-5-3428 suggests it has been tested as part of an assessment undertaken in 2007. An inspection of the site during this assessment found that the site is in good condition. This site type occurs frequently throughout the Cumberland Plans region. The archaeological significance of this site has therefore been assessed as moderate.	4 - Moderate
AHIMS 45-5-3428/CC1	AHIMS 45-5-3428 /CC1 was recorded in 2007. A copy of this site card was obtained from the AHIMS database. The information contained within this site card indicates that Aboriginal archaeological test excavations were undertaken by Therin in 2007 within PAD site AHIMS 45-5-3271, and the surrounding area. Excavations within the area identified 27 subsurface Aboriginal artefacts across four test pits. Therin therefore registered AHIMS 45-5-3428 as an extension of AHIMS 45-5-3271. An inspection of the site during this assessment found that the site is in good condition. This site type occurs frequently throughout the Cumberland Plans region. The archaeological significance of this site has therefore been assessed as moderate.	4 - Moderate

15.3 Assessment of construction impacts

15.3.1 Impacts on listed and identified sites

The location of compound sites were selected to avoid impacts to known archaeological sites. Table 15.3 summarised the significance of the two known sites and the potential impacts identified.

Table 15.3 Summary of potential archaeological impacts

AHIMS site no.	Site name	Significance	Type of harm	Degree of harm	Consequence of harm
45-5-3271	CC1	Low	No harm	None	No loss of value
45-5-3428	CC1	Low	No harm	None	No loss of value

15.3.2 Impacts on Aboriginal archaeology

During construction the following activities could result in impacts to the ground surface from excavations and compaction:

- piling
- ground works
- heavy vehicles and plant driving across the surface and therefore compacting the ground surface
- utility works comprising new or moving existing underground infrastructure such as sewer and stormwater pipes.

The majority of works to construct the project have been confined to areas of existing disturbance.

Proposed compound sites and work sites within Warwick Farm Recreation Reserve have been sited to avoid impacts to areas of high archaeological potential and placed in areas previously disturbed.

Impacts to the area of moderate archaeological potential within Jacquie Osmond Reserve cannot be avoided as the utility works to move existing sewer and stormwater pipes are required. In addition access to the rail corridor would be required from this location to build a retaining wall alongside the existing rail corridor.

The establishment of a site compound (C3) is also proposed within Jacquie Osmond Reserve and as it lies on an area identified as moderate potential for archaeological items, it could result in impacts to potential Aboriginal sites. These works involve use of the area for storage of plant, equipment and site offices and facilities, as well as staff parking areas. Some minor utility adjustments may also be required to service the compound facilities to the various utilities. These uses will result in shallow disturbances to soils and disturbances as a result of compaction, therefore further assessment is required to confirm the potential for archaeological deposits.

Further assessment would be undertaken in the form of test excavations at this location. The aim of the test excavations would be to identify and understand the nature, extent and significance of any areas of potential archaeological deposit within Jacquie Osmond Reserve by exposing, processing and recording potential archaeological remains. A systematic approach would be undertaken involving excavating test pits in a grid pattern across the area of interest. Further detail regarding the methodology for the proposed test excavations is provided in Appendix 3 of Technical Report 9. Test excavations proposed in the area of moderate potential will further contribute to the understanding of Aboriginal archaeology in the area which can be accessed by future generations, thereby complying with the principles of intergenerational equity.

15.3.3 Cumulative impacts

Other projects that have the potential to occur at the same time as the project are described in Appendix E.

Direct impacts from ground disturbance or compaction from vehicles and equipment would be restricted to the project site. There are no other known construction projects proposed in the direct vicinity of the project site. Therefore no cumulative impacts with other projects are predicted.

15.4 Assessment of operation impacts

No significant operational impacts have been identified. Maintenance activities would take place within the rail corridor and would not therefore impact new areas.

15.4.1 Cumulative impacts

No significant operational impacts have been identified. There are no other known construction projects proposed within the project site or immediately adjacent to the site. Therefore no cumulative impacts with other projects are predicted.

15.5 Management of impacts

15.5.1 Approach

15.5.1.1 Approach to mitigation and management

Measures to avoid impacts in the first instance have been addressed in the reference design and construction methodology (refer to section 15.1.3).

Strategies to minimise impacts further have been developed based on the archaeological significance of cultural heritage relevant to the project site and influenced by:

- predicted impacts to Aboriginal cultural heritage
- the planning approvals framework including the National Parks and Wildlife Act 1974 and EPBC Act
- current best conservation practise
- ethos of the *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance*, (Australia ICOMOS, 2013)
- the Code.

Where impacts are unable to be avoided, standard construction mitigation measures are outlined in Table 15.4 and will be included in the CEMP.

Expected effectiveness

ARTC have experience in managing potential impacts to heritage items as a result of developments of similar scale and scope to this project.

Measures to avoid and minimise impacts have been included in the reference design (refer to section 15.1.3). The project site has been designed to minimise the amount of ground disturbance required. The location of compound sites have been proposed to avoid areas of high archaeological potential and minimise areas of moderate potential.

Mitigation measures are recommended where ground disturbance would be unavoidable in areas of moderate archaeological potential.

As such, the measures to avoid impacts during development of the reference design and measures to be outlined in the CEMP are considered to be proven effective in managing potential impacts heritage and archaeological features.

15.5.2 List of mitigation measures

The mitigation measures that would be implemented to address potential Aboriginal heritage impacts are listed in Table 15.4.

Table 15.4 Mitigation measures

Stage	Impact	Measure
Design	Potential impacts to areas of high archaeological potential	If works are proposed outside the current project footprint (such as utility relocations) and impacts could occur within areas of high archaeological potential, further assessment in the form of subsurface investigations (test excavations) prior to impacts will be required (refer to methodology provided in Appendix 3 of Technical Report 9 – Aboriginal and cultural heritage impact assessment)..
	Impacts to archaeological heritage with the area of moderate potential in Jacquie Osmond Reserve.	Further assessment will be carried out in Jacquie Osmond Reserve in the form of subsurface investigations (test excavations) prior to construction commencing (refer to methodology provided in Appendix 3 of Technical Report 9 – Aboriginal and cultural heritage impact assessment). Should any Aboriginal objects be encountered during investigation a long term care agreement setting out the obligations and methods of long term safekeeping will be developed in consultation with the RAPs.
Construction	Impact to archaeological heritage	The CEMP will contain measures to protect Aboriginal heritage. This will include an unexpected finds protocol and heritage induction materials to ensure all onsite staff can identify items with potential archaeological Aboriginal heritage significance. During pre-work briefings, onsite staff will be made aware of the unexpected finds procedure and obligations under the *National Parks and Wildlife Act 1974*. The unexpected finds protocol will be prepared and provided to all staff and contractors as part of a site induction.
	Impact to archaeological heritage	The unexpected finds protocol will include the following at a minimum: • If potential Aboriginal items are uncovered, works within 10 metres of the item will cease and the find should not be moved. The item would then be assessed and managed by qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations which may include notifying the OEH and Aboriginal stakeholders.
	Damage to artefact found	A long term care agreement for any artefacts found as part of the works will be developed in consultation with the RAPs.
	Impacts to archaeological heritage with the area of high potential in Warwick Farm Recreational Reserve.	Areas of high archaeological potential will be clearly marked and fenced off as exclusion zones to ensure these areas are not impacted on by the proposed works. If changes to the proposed works occur which will result in impacts to these areas, subsurface investigations (test excavations) will be required.
	Impacts to unexpected finds	Consistent with the *NSW Skeletal Remains: Guidelines for Management of Human Remains* (Heritage Office, 1998), if any suspected human remains are discovered during any activity the following will occur: 1. Immediately cease all work at that location and not further move or disturb the remains. 2. Notify the NSW Police and OEH's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location. 3. Not recommence work at that location unless authorised in writing by OEH.

15.5.3 Consideration of the interaction between measures

Mitigation measures to control impacts to the Aboriginal heritage items and archaeology may replicate mitigation measures associated with non-Aboriginal heritage items, noise and vibration impacts and soils and contamination.

All mitigation measures for the project would be consolidated and described in the CEMP. The plan would identify measures that are common between different aspects. Common impacts and common mitigation measures would be consolidated to ensure consistency and implementation.

15.5.4 Managing residual impacts

Residual impacts are defined as those impacts that remain following the implementation of mitigation measures.

A residual risk analysis was undertaken following the impact assessment summarised in this chapter. The results of the residual risk analysis are provided in Appendix D and summarised below.

It is expected that some limited residual impact will exist following completion of the proposed mitigation measures, which include archaeological investigation.

The scientific value of archaeological sites is linked to the physical information the sites contain. Although the loss of intrinsic Aboriginal cultural value of impacted sites cannot be offset through the proposed program of investigation, the information obtained would increase an understanding, strengthen the interpretations and improve ongoing and future management of Aboriginal heritage in the surrounding area. Moreover, the information recovered during the mitigation program would allow for informed management of the partially impacted sites, thereby achieving a positive result for Aboriginal heritage.

However while the proposed mitigation for impacted sites will contribute to our understanding, strengthen the interpretations and improve ongoing and future management of Aboriginal heritage in the surrounding area, the investigations would have a residual impact to the heritage value of sites by physically removing artefacts.

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16 Land use and property

This chapter provides the land use and property impact assessment of the project. It describes the existing environment, assesses the impacts of construction and operation on land use, and provides mitigation measures.

16.1 Assessment approach

16.1.1 Methodology

The assessment involved:

- describing the existing environment with reference to existing land uses and planning controls, based on a review of aerial photography, land use zones specified by applicable local environmental plans, and a site visit
- reviewing key strategic planning policies and documents relevant to the study area, to identify planned future priorities, including land uses and developments
- assessing the potential impacts of construction and operation on existing and likely future land uses, and properties within and around the project site
- identifying mitigation measures to avoid, minimise or manage potential impacts.

16.1.2 Risks identified

The preliminary environmental risk assessment undertaken for the project included potential risks associated with land use and property. Potential risks were considered according to the impacts that may be generated by the construction and/or operation of the project, pre-mitigation. The purpose of the preliminary environmental risk assessment was to inform the impact assessment. Further information on the preliminary risk assessment, including the approach and methodology is provided in Appendix D.

The assessed risk level for the potential land use and property risks ranged from medium to high. Risks with an assessed level of medium or above include:

- establishment of compound sites and relocation of utilities impacting access to properties
- establishment of compound sites within public recreation areas
- impacts on land use as a result of property acquisition
- severance of properties (Peter Warren Automotive) resulting in smaller lot sizes that may impact on use
- impacts to local amenity due to increased frequency of trains.

These potential risks and impacts were considered as part of the assessment. The assessment also considered matters identified by the SEARs and stakeholders, as described in Chapter 3 (Approval and assessment requirements) and Chapter 4 (Consultation).

16.1.3 How potential impacts have been avoided/minimised

As described in Chapter 6 (Project features and operation) and Chapter 7 (Construction), design development and construction planning has included a focus on avoiding and/or minimising the potential for environmental impacts during all key phases of the process.

Potential land use and property impacts have been avoided/minimised where possible by:

- designing the project to ensure project infrastructure is located within the existing rail corridor as far as practicable, to minimise the potential for impact to other land use and private property
- designing the project to maintain the existing functionality of Broomfield Street
- siting compounds in the same locations as those previously used for the SSFL project
- minimising the footprint of compound C3 in Jacquie Osmond Reserve to minimise potential impacts on use of the sports field and reserve.

16.2 Existing environment

A description of the project site for the purpose of the EIS is provided in Chapter 2 (Location and setting). Section 16.2.1 describes existing land uses and properties within and immediately surrounding the project site. Future land uses are described in section 16.2.2.

16.2.1 Existing land use and zoning

The project lies within the suburbs of Cabramatta and Warwick Farm within the City of Fairfield and City of Liverpool local government areas.

Land uses within the project site include:

- the existing rail corridor which is used for transport – rail and supporting infrastructure purposes
- the existing road corridor which is used for transport and parking (Broomfield Street and Sussex Street)
- open space recreational (Jacquie Osmond Reserve and Warwick Farm Recreation Reserve)
- commercial/industrial (southern end of the project site).

Land use zoning within and in the vicinity of the project site is set by the following environmental planning instruments:

- Liverpool LEP 2008
- Fairfield LEP 2013.

The majority of the rail corridor is zoned SP2 Infrastructure. Some sections of the rail corridor are also zoned as follows:

- B4 Mixed Use - at Cabramatta Station
- SP2 Infrastructure (Classified Road) – at Cabramatta Station
- IN1 General Industrial- north of Warwick Farm Station.

The areas located outside of the rail corridor consist of the following land zoning:

- Broomfield Street and Sussex Street and the shared path between Broomfield Street and Jacquie Osmond Reserve:
  - Land zoned R3- Medium Density Residential
  - Land zoned R2- Low Density Residential
  - Land zoned E2- Environmental Conservation.
- Warwick Farm Reserve and Jacquie Osmond Reserve:
  - Land zoned RE1- Public Recreation.

- Commercial/industrial land use adjacent to the eastern boundary of SSFL at the southern extent of the project site:
    - Land zoned IN1- General Industrial.

Land use zones in and around the project site are shown in Figure 16.1

The existing environment is distinctly urban in its setting with residential areas bordered by major roads. The Hume Highway runs to the east and south of the project site, Cabramatta Road runs through the north of the study area and the SSFL runs north-south through the centre of the project site. The project site is surrounded by a mix of land uses, including residential, commercial, industrial, and recreation/open space, with pockets of education and community uses. Further information on the location of key community facilities is provided in Chapter 18 (Socio-economic impacts).

To the north of the project site is Cabramatta Station and Cabramatta's commercial centre, with retail and food businesses located on both sides of the station and rail corridor.

The northern end of the project site is characterised by low density residential land use. On the eastern side of the rail corridor, within the project site lies Broomfield Street. The wide residential street includes a shared path that is part of the Liverpool to Parramatta Rail Trail and angled parking on the west and a grassed and tree lined verge on the east, beyond which is low to medium density residential housing, a Buddhist temple and cultural centre. Railway Parade is located on the western side of the rail corridor, beyond which are a mixture of residential and industrial properties.

The centre of the project site is characterised by recreational land, nature reserves and open space either side of the rail corridor. The shared path (part of the Liverpool to Parramatta Rail Trail) extends from Broomfield Street, across Cabramatta Creek (which runs east-west through the centre of the project site) to Jacquie Osmond Reserve on the eastern side of the project site. The main feature of the reserve is 12 baseball diamonds which are used for local, district and State competitions and local weekly training sessions by the Southern Districts Softball Association (SDSA).

On the western side of the rail corridor is Warwick Farm Recreation Reserve which is a large area of environmental conservation and public recreation, including parks and a number of sporting ovals. These include Stroud Park, which abuts the rail corridor to the west; Cabramatta Sportsground; Don Dawson Oval and Durrant Oval.

The southern end of the project site is characterised by industrial and commercial land uses on the eastern side of the rail corridor including Peter Warren Automotive and Warwick Farm Hometown which contains a number of businesses and fast food outlets. On the eastern side of the rail corridor is Lawrence Hargrave Special Education School and residential properties.

To the south of the project site is Hume Highway and Warwick Farm Station as well as a mixture of residential, commercial and industrial uses.

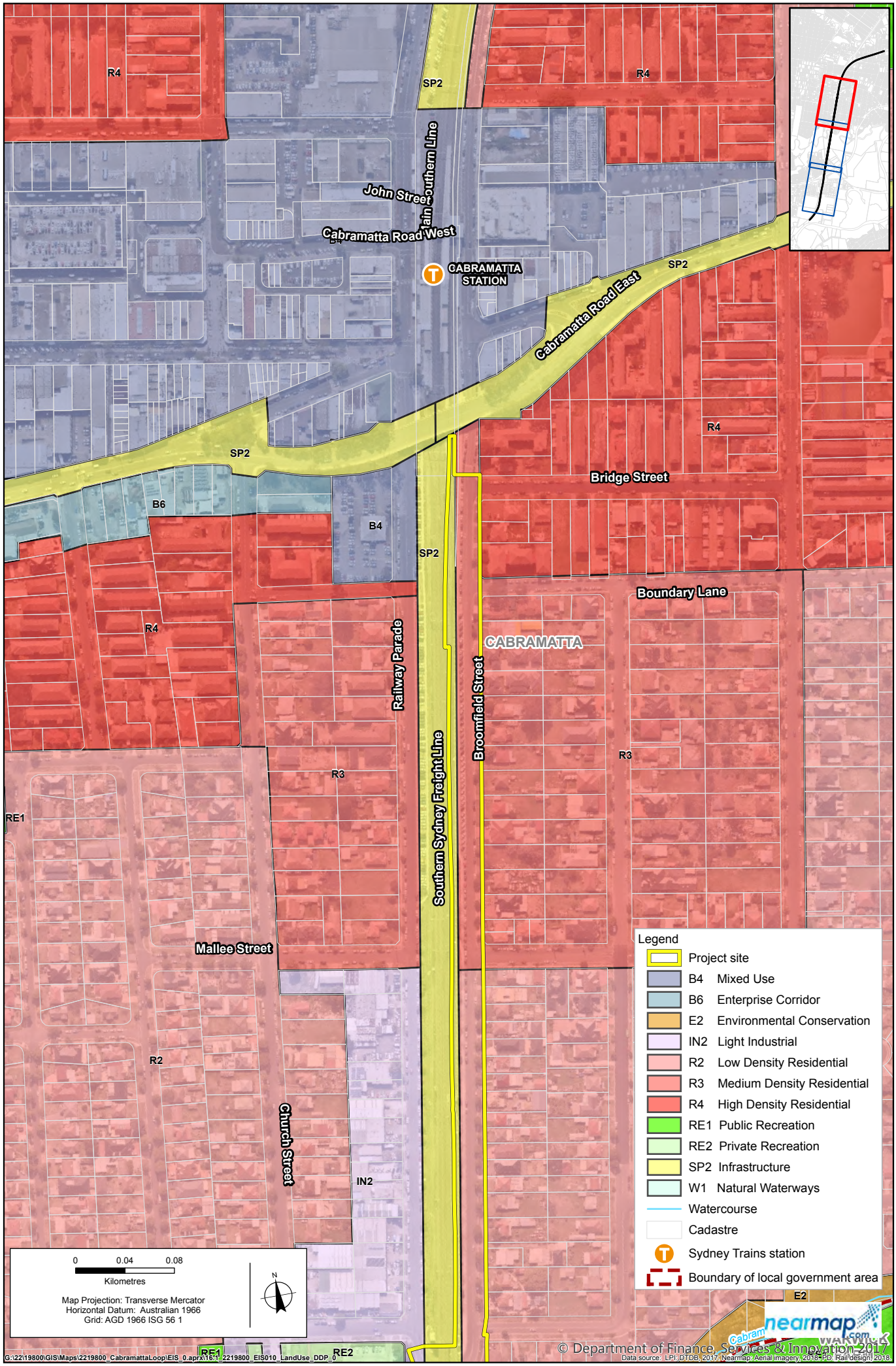

Figure 16.1a Land uses

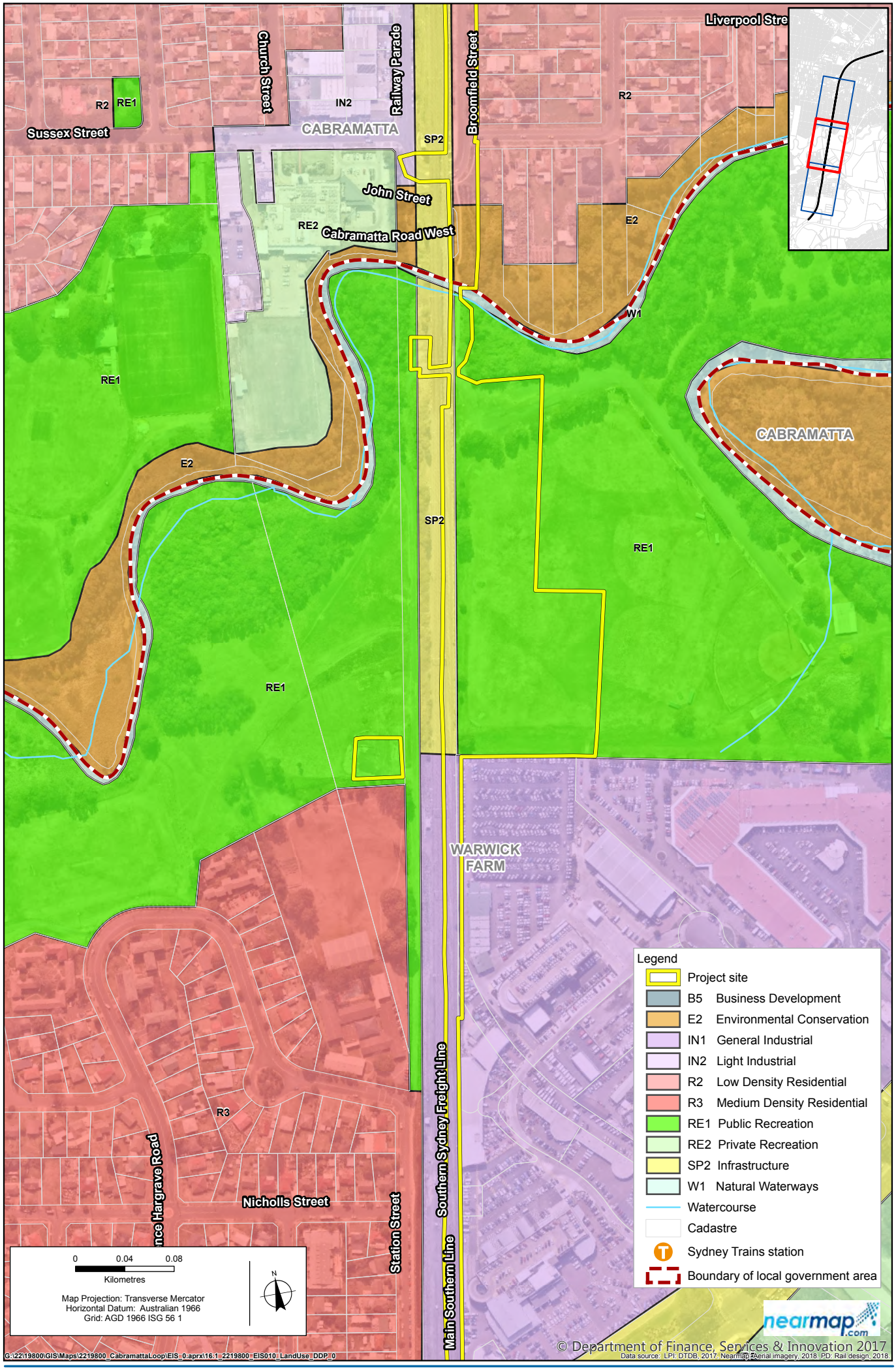

Figure 16.1b Land uses

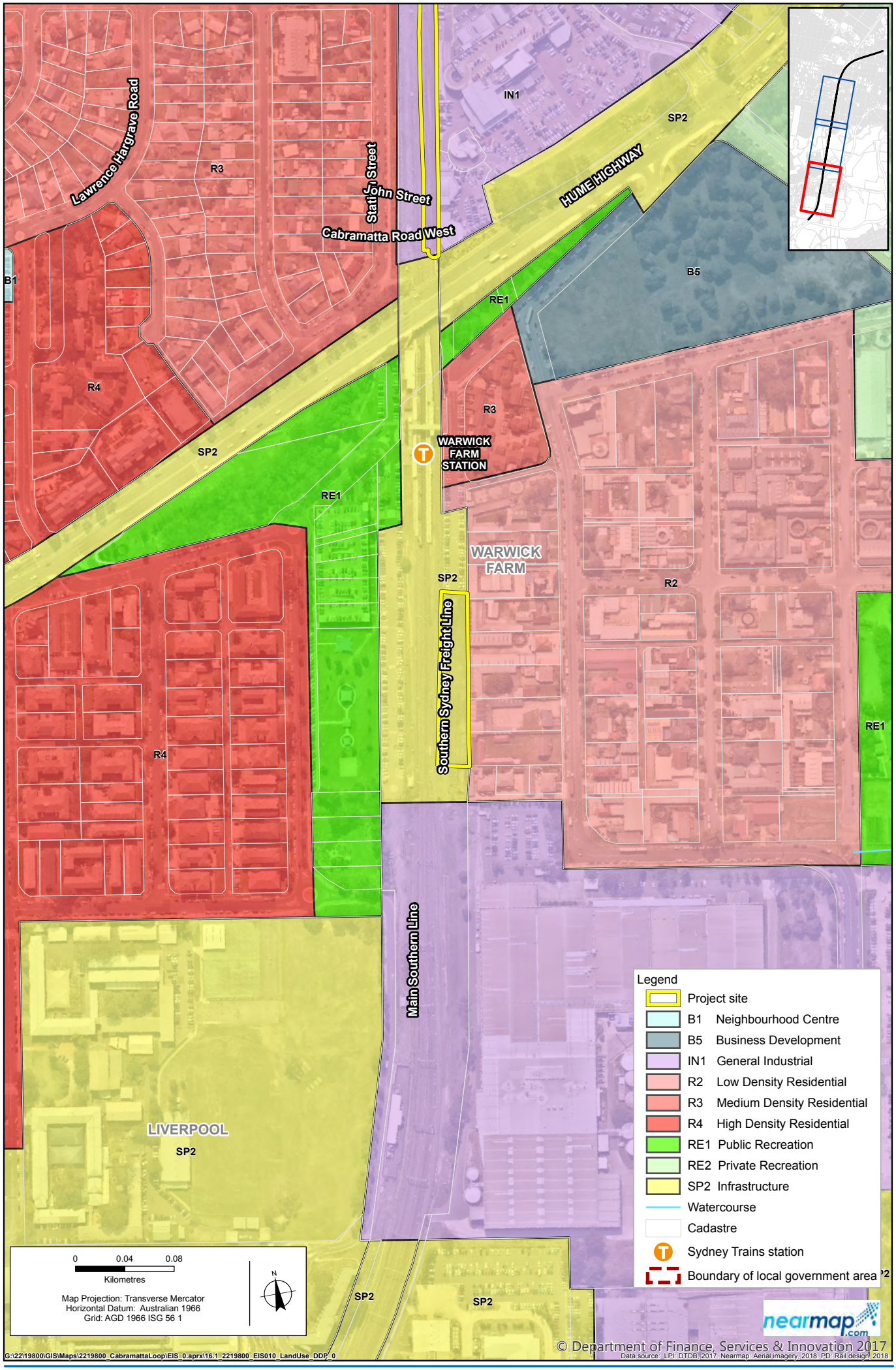

Figure 16.1c Land uses

16.2.2 Future land uses

16.2.2.1 Strategic Planning

Strategic planning for the region, including the study area has and is being undertaken by a number of agencies, including the Greater Sydney Commission and relevant councils. This strategic planning is separate to the planning and approval process for the project, however the project has been informed by the broader strategic planning context.

The main strategies relevant to future land use planning for the study area are summarised below.

A Metropolis of Three Cities – the Greater Sydney Region Plan

A Metropolis of Three Cities – the Greater Sydney Region Plan (Greater Sydney Commission, 2018a) sets a 40 year vision (to 2056) and establishes a 20 year plan to manage Greater Sydney's growth and change. The plan recognises that to have a well-connected and productive city, there is a need to co-locate jobs and services, improve transport efficiency and create more efficient freight networks.

The plan is built on a vision of three cities, where most residents live within 30 minutes of jobs, education, health facilities, and other services comprised of:

- Western Parkland City
- Central River City
- Eastern Harbour City.

The project is located in the Western Parkland City. The Western Parkland City is referred to as one of the key trade gateways for the City of Sydney with plans for dedicated road and rail trade networks to increase interconnectivity. Major new infrastructure will be required for the Westland Parkland City, where the focus will be on planning growth and sequencing new infrastructure and services to support shaping a new connected city. The Western Sydney Airport will be the economic catalyst to transform the Westland Parkland City as it will attract globally significant defence and aerospace activities and have significant freight and logistics strengths.

To support the economic growth of the Western Parkland City Objective 16 of the plan commits to providing a freight and logistics network that is competitive and efficient. Major improvements are being planned, including a dedicated freight rail connection from Port Botany to the Western Parkland City to increase the proportion of freight moved by rail. This will boost the economic potential of surrounding industrial precincts in Western Sydney. With this investment comes the need to maintain buffers to nearby residential areas and restrict further encroachment by residential uses. To optimise the efficiency and effectiveness of the freight handling network the following strategy is proposed which is of relevance to land use planning in the study area (Strategy 16.2):

- protect current and future freight corridors and shared freight corridors
- balance the need to minimise negative impacts of freight movement on urban amenity with the need to support efficient freight movements and deliveries
- identify and protect key freight routes
- limit incompatible uses in areas expected to have intense freight activity.

Western City District Plan – connecting communities

The Greater Sydney Commission's five district plans are a guide for implementing the *A Metropolis of Three Cities – the Greater Sydney Region Plan* at a district level. These 20 year plans are a bridge between regional and local planning. Their purpose is to inform local environmental plans, community strategic plans and the assessment of planning proposals.

The project is located in an area subject to the *Western City District Plan* (Greater Sydney Commission, 2018b), within the suburbs of Cabramatta and Warwick Farm.

The *Western City District Plan* (Greater Sydney Commission, 2018b) identifies the need to increase economic productivity and the critical role that new infrastructure plays in achieving this. It emphasises the importance of the

trade gateways – such as Western Sydney Airport and Port Botany for the economic corridor of the Western region, as well as Greater Sydney and NSW. A key action of relevance to the project is for councils and government agencies is to support and facilitate internationally competitive freight and logistics sectors.

With regards to future land use planning within the study area the plan recognises Cabramatta as an area of diversity and richness, also noting that street life is particularly evident in this suburb. Cabramatta is also recognised as a distinctive dining and night-time precinct. To achieve Objective 12 (Great places that bring people together) the plan notes that planning for places like Cabramatta needs to integrate site-specific planning proposals with precinct-wide place and public domain outcomes through place-based planning. Additionally the plan notes that street environments will need to allocate road space between footpaths, cycleways, public transport and vehicles that considers people's safety needs and balances movement and place functions in response to the type of street and local conditions.

The plan also identifies Collaboration Areas, which will be the main focus for access to goods and services, entertainment, leisure and recreational activities as well as cultural and arts experiences. One of these Collaboration Areas incorporates the Warwick Farm Precinct and the under construction Moorebank Intermodal Terminal. The Warwick Farm Precinct is directly south of the project site and the aim in this area is to undertake urban renewal and retain a social housing mix.

16.2.2.2 Adjacent to the project site

Other future development opportunities relevant to land in the vicinity of the project site include a proposed amendment to the Fairfield LEP which has been submitted to facilitate the future re-development of a 1.285 hectare precinct of land on the eastern side of Cabramatta Station (on the corner of Broomfield Street and Cabramatta Road East).

The precinct in question is currently zoned B4 Mixed Use and consists of 22 privately owned lots and a section of public laneway owned by Fairfield City Council. The purpose of the planning proposal is to increase the maximum building heights and floor space ratios for the subject site to facilitate the future development of the precinct for a mix of commercial and residential apartment development (up to 19 storeys and 582 dwelling) including basement car parking, overhead pedestrian bridge to Cabramatta Station, activated street frontages and reinvigorated public spaces to activate the commercial area east of the rail line. The amendment has been submitted to the Department of Planning, Industry and Environment for gateway determination. There would be no change in the existing zoning of the precinct.

No other proposed development opportunities or strategies were identified that may influence the future land use in the vicinity of the project site.

16.3 Assessment of construction impacts

16.3.1 Property impacts

16.3.1.1 Property and land requirements

As described in Chapter 7 (Construction), permanent land acquisition would involve acquisition of an approximately five metre strip of land to the east of the existing rail corridor to accommodate the passing loop, including:

- partial acquisition of the road corridor owned by Fairfield City Council (Broomfield Street and an area that currently accommodates the shared path between Sussex Street and Cabramatta Creek) in the northern end of the project site
- partial acquisition of one lot owned by the Department of Planning, Industry and Environment and operated by Liverpool City Council (Jacquie Osmond Reserve) in the centre of the project site
- partial acquisition of two privately owned commercial lots at the southern end of the project site on which a car dealership is located (Peter Warren Automotive)

- full acquisition of one lot and partial acquisition of another lot owned by Liverpool City Council at the southern end of the project site. Property and land acquisition requirements are summarised in Table 6.4. The location of these properties and the existing land uses/zoning is shown in Figure 6.8.

RailCorp would acquire the land on behalf of ARTC with ARTC leasing the land off RailCorp as per the SSFL rail corridor. RailCorp is bound by NSW Government legislation to act according to specific procedures when acquiring property. The acquisition of privately owned land would be managed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. This legislation encourages the acquisition of land by agreement rather than by compulsory acquisition wherever possible.

Independent valuers assess the current market value for each property being acquired. In addition to the market value of the property, assessment can be made of any additional costs that can reasonably be incurred as a result of an acquisition, such as stamp duty, professional costs (eg legal fees, valuation fees, etc.), relocation costs, losses resulting from severance, and losses relating to disturbance.

The valuation informs the offer made to the property owner. ARTC would work collaboratively with property owners to ensure that the acquisition process is fair, reasonable and as easy as possible.

16.3.1.2 Temporary acquisition or lease of property

As described in section 7.4, a number of compound areas and work sites would be required for temporary use during construction. These include sites within the rail corridor and outside it. Some areas of land would need to be temporarily leased or occupied to locate some of these compounds and work sites.

Additionally, as described in section 7.5.5, the temporary acquisition of land within three lots of a privately owned commercial property at the southern extent of the project site would also be required to facilitate the relocation of Sydney Water's assets currently running parallel to the rail corridor. As discussed in section 8.3.5, ARTC is also proposing to lease a vacant lot in close proximity to the project site and provide a temporary at-grade parking area during construction. There are four potential options available, all subject to negotiation.

16.3.2 Land use

Direct impacts on land use during construction would include temporary land take and the short term presence of construction equipment, plant, vehicles, compounds, and work sites within the project site. During construction, the use of the land would change from a shared path and public recreation space to a partial and temporary construction site.

Between the existing Sussex Street bridge and Jacquie Osmond Reserve, the project would have a temporary impact on use of the shared path and footbridge which crosses Cabramatta Creek as the existing land use would temporarily change due to the presence of work sites to facilitate construction of the new bridges.

Within Jacquie Osmond Reserve and Warwick Farm Recreation Reserve use of the land for public recreation purposes would be temporarily restricted due to the presence of construction compounds. At Jacquie Osmond Reserve this would impact on the usability of three of the existing twelve softball diamonds.

Along Broomfield Street the use of some existing on-street parking areas and access to residential properties would be temporarily restricted during construction. Impacts on parking and property access during construction are considered in Chapter 8 (Traffic, transport and access).

Table 16.1 provides a summary of the potential impacts of temporary construction sites on land uses. These impacts would be predominantly minor and short term and following construction these areas would be returned to their pre-existing condition and land use.

During construction, land subject to acquisition would also change from its existing use (commercial, public road and reserves) to a temporary construction site. Public access would be restricted.

Typically, the temporary use of land would be secured through a lease or a memorandum of understanding with the relevant land owner or manager which in this case would be the government (Fairfield City Council or Liverpool City Council).

Table 16.1 Impacts of temporary construction sites on land use

Site	Location	Temporary proposed use	Owner	Potential temporary impact on land use
C2	Warwick Farm Recreation Reserve	Construction compound	Public	Change from existing use (recreation) to construction compound
C3	Jacquie Osmond Reserve	Construction compound	Public	Change from existing use (recreation) to construction compound
W1	Access to compound site C3	Truck turning circle	Public	Change from existing use (recreation and shared path) to work site. Temporary alterations to pedestrian/cyclist access between Broomfield Street and Warwick Farm Recreation Reserve.
W2	Southern side of Cabramatta Creek bridge	Crane pads	Public	Change from existing use (shared path) to work site. Temporary alterations to pedestrian/cyclist access between Broomfield Street and Jacquie Osmond Reserve.
W3	Northern side of Cabramatta Creek bridge	Construction compound	Public	Change from existing use (shared path) to work site. Temporary alterations to pedestrian/cyclist access between Broomfield Street and Jacquie Osmond Reserve.
W3	Sussex Street bridge	Construction compound	Public	Change from existing use (shared path) to work site. Temporary alterations to pedestrian/cyclist access between Broomfield Street and Jacquie Osmond Reserve.

16.3.3 Impacts to utilities

As identified in Chapter 7 (Construction), it is likely that a number of utilities and services located within the project site, including power, water, wastewater and telecommunications would require protection, relocation or realignment as part of the construction of the project. This is particularly the case around areas of surface or shallow soil disturbance.

A preliminary assessment of impacts to major utilities identified the following key areas of interest:

- road works along Broomfield Street
- construction of the passing loop in Jacquie Osmond Reserve and Peter Warren Automotive.

The potential land use impacts in these areas are outlined in the following section.

16.3.3.1 Road works along Broomfield Street

It is proposed that all existing services located in both of the verges and the roadway of Broomfield Street, including overhead power lines, be relocated to the new Broomfield Street verges and roadway. This would have a negligible impact on land use given the existing services would be relocated to the same land use in a different location.

16.3.3.2 Construction of the passing loop in Jacquie Osmond Reserve and Peter Warren Automotive

The existing sewer rising main and gravity main located parallel to the rail corridor in Jacquie Osmond Reserve and Peter Warren Automotive would require relocation during construction of the passing loop. It is proposed to relocate this service about five metres to the east of its existing location. This relocation would not preclude use of the land within Jacquie Osmond Reserve however it would preclude planting of trees and any sort of building

development above it. Given the current use of the land within Jacquie Osmond Reserve as open space recreational, utility related land use impacts at this location are considered to be low.

Peter Warren Automotive would be temporarily impacted due to the relocation of Sydney Water assets. This would involve temporary acquisition for a period of up to six months of land within three lots of the car dealership (refer to section 7.5.5) for the purposes of a temporary Sydney Water easement. While the land to be temporarily acquired appears to currently be either vacant or used for car parking and does not contain any buildings, the land is located directly adjacent to buildings therefore the construction of the easement may limit access to and from these buildings.

There may be the need for utility relocations to be undertaken in areas directly adjacent to the project site. Utility relocation activities outside of the project site may result in the following potential impacts:

- traffic impacts, eg impacts associated with the presence of works within the road corridor and additional traffic movements
- property access impacts, eg impacts due to works restricting access
- noise and vibration impacts, eg from the use of construction equipment
- soil and waste management impacts, including the potential exposure and disposal of contaminated soils
- impacts to vegetation if clearance/pruning is required to undertake works
- air quality impacts due to the dust generation
- potential Aboriginal heritage impacts due to sub-surface disturbance
- hazard and risk impacts, eg impacts associated with welding or abrasive blasting
- potential non-Aboriginal impacts where heritage items are located in proximity to works.

The potential for the above impacts has been considered within this EIS and the specialist assessments appended to this EIS, within the context of the study areas defined by the specialist assessments. Where there is potential for impacts based on the assessments undertaken, or where the relocations would occur outside the assessed study area then the approach to design refinements described in section 22.5.2 would be adopted.

16.3.4 Cumulative impacts

Other projects that have the potential to occur at the same time as the project are described in Appendix E.

There may be the potential for cumulative impacts to utilities along Broomfield Street during construction, if the proposed development identified in section 16.2.2 is constructed at the same time as the project. The potential for cumulative impacts would be minimised through ongoing consultation with utility providers.

Any other impacts on land use would be short term and within the project site only, therefore they would not contribute to cumulative land use changes in the surrounding area.

16.4 Assessment of operation impacts

16.4.1 Property impacts

Property acquisition would occur during the project planning and pre-construction phases. Direct impacts to properties are not expected during operation.

16.4.2 Land use

16.4.2.1 Direct impacts to land use

Operation of the project would result in minimal direct impacts to land use. The rail corridor would continue to operate as a rail corridor, Jacquie Osmond Reserve and the shared path near Cabramatta Creek would continue to be accessed as public recreation space and Peter Warren Automotive would continue existing commercial

operations. Construction of the project would mean that the western edge of Broomfield Street (an average of five metres width) would change from the existing use of a road corridor, to a rail corridor. However, with the realignment of Broomfield Street, it would continue to operate as a road corridor with parking, a shared path and footpath, as per the existing situation, albeit elements of the road corridor would be narrower. The project including the proposed realignment of Broomfield Street would not change the existing functionality of Broomfield Street.

Direct operational impacts on land use related to the acquisition described in section 16.3.1 and occur at the construction stage of the project.

Land uses within the road corridor and shared path would not be impacted by the partial acquisition, as these areas would continue to be used for transport purposes and would be consistent with the current zoning. The project would affect parking along Broomfield Street, as the partial acquisition and reconfiguration of Broomfield Street would result in the permanent loss of up to 11 parking spots out of a total of 213 available parking spots (between Cabramatta Station and Sussex Street). The potential impacts on the availability of parking are considered in Chapter 8 (Traffic, transport and access).

The partial acquisition of Jacquie Osmond Reserve may require the movement of up to three of the existing softball diamonds up to ten metres to the east. However, based on a review of aerial images, this is considered unlikely to impact on the operation of the softball fields. The need to move the softball diamonds, would be further refined during detailed design and where there is the potential to impact on the existing operation of the softball fields ARTC would consult with Liverpool City Council and the Southern Districts Softball Association.

Some of the land proposed to be acquired from Liverpool City Council (Lot 10 DP 776165) and the private owner of Peter Warren Automotive (Lot 12 578199) in the southern end of the project site is currently used for overflow car parking of commercial vehicles. The council land is vacant and where Peter Warren Automotive use this land for parking there is no formal agreement in place. Acquisition of the privately owned land would reduce the amount of land available to Peter Warren for car parking.

With regards to the partial acquisition of Lot 3 DP 1013680 within Peter Warren Automotive this land consists of hardstand surfaces located adjacent to buildings including the machinery sheds and main dealership building. It is unknown what this land is currently used for. Acquisition of the land may also impact on the businesses ability to access the buildings adjacent to this land.

Consultation with the private owner of Peter Warren Automotive is currently underway to understand and manage any potential impacts associated with acquisition of this land.

16.4.2.2 Impacts on future land use

The acquisition of land for the project would potentially result in the reconfiguration of land owned by Peter Warren Automotive. This would be subject to consultation during the acquisition process.

The project would not directly impact any local urban release areas identified for future residential or employment land. Instead, the project would enable the increase in economic productivity and economic growth for the Western Parkland City by contributing to a freight and logistics network that is competitive and efficient. Further information regarding the project's consistency with future strategic planning is provided in Appendix C.

16.4.3 Cumulative impacts

The project would result in limited changes in land use in the long term and therefore would not contribute to any cumulative land use changes in the region.

16.5 Management of impacts

16.5.1 Approach

16.5.1.1 Approach to mitigation and management

Overall, the majority of potential construction related impacts on land use and property would be short term and temporary in nature. The potential for these impacts would be significantly reduced by:

- effective construction design and planning
- implementation of the mitigation measures provided in Table 16.2
- consultation with individual property owners and managers to identify individual concerns, and develop and document strategies (including actions and timeframes) to address these concerns
- ongoing communication with the broader community.

16.5.1.2 Expected effectiveness

ARTC have experience in managing potential impacts on local communities and businesses as a result of rail developments of a similar scale and scope to this project. Many of the mitigation measures outlined involve effective and ongoing communications with the community and affected land owners and managers.

The CEMP prepared prior to construction would also address the requirements of the project approvals, the environmental management measures outlined in the EIS and all applicable legislation. With regard to land use impacts, mitigation measures are expected to minimise and manage impacts on land use throughout the construction phase. The local and broader community would be notified in advance of construction activities, temporary arrangements, traffic management and pedestrian/cyclist access arrangements and any special construction activities of short duration. As such, impacts to land use during construction are expected to be relatively minor and temporary, and would be effectively managed through the mitigation measures proposed.

With regards to property impacts, any acquisition would be undertaken in accordance with relevant NSW regulatory requirements, including the *Land Acquisition (Just Terms Compensation) Act 1991,* ensuring a fair, reasonable and as easy as possible acquisition process.

It is expected that these recommendations, along with any relevant requirements of the project approval, best practice guidelines and applicable legislation would be developed into the CEMP prepared to manage the relevant phases of the project. Routine auditing of the effectiveness of the implementation of the CEMP requirements will be undertaken to ensure that management measures remain adequate, effective and fit for purpose.

16.5.2 List of mitigation measures

The mitigation measures that would be implemented to address potential land use and property impacts are listed in Table 16.2.

Table 16.2 Mitigation measures

Stage	Impact	Measure
Design	Property acquisition	All acquisitions/adjustments will be undertaken in consultation with landowners and relevant acts.
	Impacts to services and utilities	Utility and service providers will continue to be consulted during detailed design to identify possible interactions and develop procedures to minimise the potential for service interruptions and impacts on existing land uses.
	Temporary land use impacts on Council and privately owned land	Individual property agreements/licenses will be developed in consultation with the relevant council and land owners. These will detail any restoration requirements and relocation of impacted infrastructure as required.
	Temporary land use impacts on Council and privately owned land	The overall disturbance footprint will be refined during detailed design to identify areas where the footprint could be minimised to reduce impacts on existing public recreation land uses and privately owned land. Detailed construction staging of the project will also be considered further during detailed design and will aim to minimise the time that affected land uses are impacted during construction.

Stage	Impact	Measure
Construction	Temporary use	Temporary use areas, including public open space, will be restored to their pre-existing condition (as a minimum) as soon as practicable following completion of construction. This will be undertaken in consultation with the relevant council.

16.5.3 Consideration of the interaction between measures

Mitigation measures in other chapters that are relevant to the management of potential land use and property impacts include:

- Chapter 8 (Traffic, transport and access), particularly with respect to the management of traffic and property access during construction
- Chapter 18 (Socio-economic impacts) with respect to management of impacts to the community during construction.

Together, all these measures would minimise the potential land use and property impacts of the project.

16.5.4 Managing residual impacts

A residual risk analysis was undertaken following the impact assessment summarised in this chapter. The results of the residual risk analysis are provided in Appendix D and summarised below.

Residual land use and property impacts following implementation of the mitigation measures described in Section 16.5.2 are predicted to include the partial acquisition of five lots and a section of the road corridor, including two commercial lots, and subsequent change in land use to transport from commercial, road, and open space/recreation uses.

On balance, the residual impacts described above would result in minimal direct impacts to land use.

17 Landscape and visual amenity

This chapter provides a summary of the landscape and visual impact assessment undertaken by GHD. A full copy of this report is provided as Technical Report 10 – Landscape and visual impact assessment. The report was written to address the relevant SEARs which are outlined in Appendix A.

17.1 Assessment approach

17.1.1 Methodology

17.1.1.1 Study area

The study area for the landscape and visual impact assessment (LVIA) has been defined as land within one kilometre of the project site. This has been determined based on considering both landform and land cover, relevant guidelines and an analysis of the Zone of Theoretical Visibility mapping which considers how visible the project is from surrounding areas.

17.1.1.2 Key tasks

The LVIA involved the following initial tasks:

- preliminary analysis of the potential landscape and visual impacts of the project which involved:
    - a desktop analysis of relevant publically available data on landscape character and visual impact at a national, regional and local level for the study area
    - a site inspection on the 23 November 2018 to verify the desktop study, allow characterisation of the landscape, identify sensitive visual receivers and observe how receivers might view the landscape.
- developing urban design principles and objectives for the project based on the preliminary landscape and visual analysis, the existing urban environment for the project and a review of relevant policies and guidelines
- undertaking an arboricultural assessment of trees that have the potential to be impacted by the project (refer to Appendix B of Technical Report 10 for further information regarding the arboricultural assessment methodology).

Following completion of the above initial tasks a detailed LVIA commenced in conjunction with an iterative design process that was undertaken by the project's urban design team. This involved further refining the reference design to produce a landscape concept that addressed impacts identified as part of the preliminary landscape and visual analysis as well as the outcomes of ongoing consultation with the relevant councils. This landscape concept is described in section 17.3 and informed the project description which the detailed landscape and visual impact assessment was based on.

The detailed LVIA involved the following key tasks:

- identifying potentially sensitive visual receptors and representative viewpoints
- undertaking a landscape character assessment (see further information below)
- visual impact assessment (see further information below)
- developing mitigation measures to minimise the potential for negative impacts and enhance the potential for positive impacts.

Technical Report 10 provides further information on how the impact, sensitivity, and level of significance were assigned.

17.1.1.3 Landscape impact assessment

Landscape refers to the overall character and function of a place. It includes all elements within the public realm and the interrelationship between these elements and the people who use it.

Landscape character considers common landscape character zones defined by typical features and characteristics identified during the desktop assessment and site inspection. Defining landscape character zones identifies areas sharing the same homogenous environmental or cultural qualities or pattern such as topography, vegetation, hydrology, land use and settlement, built form scale and character, cultural and recreational characteristics.

Landscape character impacts refer to the relative capacity of the landscape to accommodate changes to the physical landscape through the introduction of new features or loss/modification of existing features. This is assessed through defining the sensitivity of the landscape and the magnitude of impact on that landscape. The sensitivity and magnitude of landscape effects address the following specific criteria:

- sensitivity of landscape to proposed change (high to negligible), based on the susceptibility to change, and the value of landscape
- magnitude of landscape effect (high to negligible), based on the size or scale of change, the geographical extent of effects, and the duration and reversibility of effects.

17.1.1.4 Visual impact assessment

This visual impact assessment considers visual amenity as experienced by the users of the site and surrounds. It aims to identify the range of views to the site which may be impacted, including views from residential areas, commercial areas, parks and streets.

The potential sensitivity of receivers to change was determined and rated (from negligible to high). Sensitivity depends on the location of receivers, the importance of their view, land uses, the extent of existing screening and if viewing durations are prolonged (ie from a residence) or transient (from a vehicle passing by).

Sensitive visual receivers and the sensitivity criteria include:

- **High** - Occupiers of residential properties within close proximity to the project, communities that place value upon the urban landscape and enjoyment of views of their setting
- **Moderate** - Outdoor workers, viewers at schools, occupiers of residential properties at a distance from or screened from the study area
- **Low** - Road users in motor vehicles, trains or on transport routes that are passing through or adjacent to the study area and therefore have short term views; Viewers indoor at their place of work, schools or similar.
- **Negligible** - Viewers from locations where there is screening by vegetation or structures.

The magnitude of change to views and visual amenity (from high to negligible) depends on the nature, scale and duration of the change that is expected to occur.

The significance of potential visual impacts was determined by assessing the magnitude of impacts in combination with the sensitivity of the receiver.

Impacts were assessed from representative viewpoints and rated (from negligible to high).

17.1.2 Risks identified

The preliminary environmental risk assessment undertaken for the project included potential risks associated with landscape and visual amenity. Potential risks were considered according to the impacts that may be generated by the construction and/or operation of the project, pre-mitigation. The purpose of the preliminary environmental risk assessment was to inform the impact assessment. Further information on the preliminary risk assessment, including the approach and methodology is provided in Appendix D.

The assessed risk level for the majority of potential landscape and visual risks was low. Risks with an assessed level of medium or above include:

- adverse impacts on landscape character during construction, particularly in Jacquie Osmond Reserve
- impacts on visual amenity due to the introduction of built elements, including the noise wall, retaining wall and embankments.

These potential risks and impacts were considered as part of the assessment. The assessment also considered matters identified by the SEARs and stakeholders, as described in Chapter 3 (Approval and assessment requirements) and Chapter 4 (Consultation).

17.1.3 How potential impacts have been avoided/minimised

As described in Chapter 6 (Project features and operation) and Chapter 7 (Construction), design development and construction planning has included a focus on avoiding and/or minimising the potential for environmental impacts during all key phases of the process.

Potential landscape and visual impacts have been avoided/minimised where possible by:

- minimising clearance of trees and vegetation where possible through the selection of construction compounds in locations already cleared
- undertaking an iterative design process whereby the landscape concept for the project, as described in section 17.3, was informed by the preliminary landscape and visual impact analysis and consultation with relevant councils.

17.2 Existing environment

17.2.1 Existing urban condition

The urban landscape of the project site consists of several discreet areas. These areas are generally consistent with the landscape character zones described in section 17.2.2 and are described further below.

17.2.1.1 Broomfield Street

This urban landscape consists of a rail corridor that sits at elevation above the adjoining roads and is delineated from the adjacent road corridors by a vegetated batter on the western side and a retaining wall and noise wall on the eastern side. On the eastern side of the rail corridor car parking is present as is a line of street trees which occur along the southern end of Broomfield Street towards Cabramatta Creek.

This area is used by road users, shared path users (cyclists and pedestrians), residents and people who park in this area from either the Cabramatta Town Centre or Cabramatta Station, and is consistent with the description of landscape character zone 1 and landscape character zone 2.

17.2.1.2 Commercial/industrial

This area is defined by the commercial and light industrial areas adjacent to the rail corridor, including Peter Warren Automotive and Hometown Warwick Farm located between the rail corridor and Hume Highway. Currently a chain link fence runs south from Jacquie Osmond Reserve on the eastern boundary for approximately 210 metres. This then transitions to the outer shells of industrial buildings.

Users of this area include workers within the commercial and industrial facilities, and people who visit those locations for retail purposes and is consistent with the description of landscape character zone 3.

17.2.1.3 Passive recreation

This area directly interfaces with Cabramatta Creek and the wetland area to the western side of the rail corridor. The rail corridor continues to run north-south and is suspended over dense riparian vegetation. In

parallel and at a lower grade, a shared path makes provision for pedestrians and cyclists to connect from Cabramatta to Jacquie Osmond Reserve, crossing over Cabramatta Creek via a small footbridge.

This area is used predominantly by users of the shared path and is consistent with landscape character zone 4.

17.2.1.4 Active recreation

This area is largely defined by active recreation, facilitated by Jacquie Osmond Reserve which is an oval that is located to the east of the rail corridor. Currently the oval's functions are buffered from the rail corridor by a number of trees, a chain link fence, a landscape setback zone and retaining wall with railing.

This area is used by people who use the parks for recreational purposes on a casual basis as well as sporting organisations, and is consistent with the description of landscape character zone 5.

As described in section 17.1.1 the preliminary landscape and visual impact analysis and the existing urban landscape described in this section informed the urban design principles and objectives for the project. These are provided in section 6.4.

17.2.2 Landscape character

The existing environment is distinctly urban in its setting with residential areas bordered by major roads. The Hume Highway runs to the east and south of the study area, Cabramatta Road runs through the north of the study area and the SSFL runs north-south through the centre of the study area.

The existing landform is gently undulating with a high point in the north of the study area along Cabramatta Road. The landform slopes gently down to Cabramatta Creek which runs east-west through the centre of the study area, with the parklands and commercial area to the south of Jacquie Osmond Reserve on low lying land.

The vegetation cover consists of established street trees within the surrounding residential areas. Vegetation in the vicinity of the Cabramatta Creek corridor comprises of a combination of Cumberland Riverflat Forest ecological community adjacent to the watercourse, with areas of planted native species adjacent and along the rail corridor edges.

Five Landscape Character Zones (LCZs) were identified in the study area and are described below and shown on Figure 17.1.

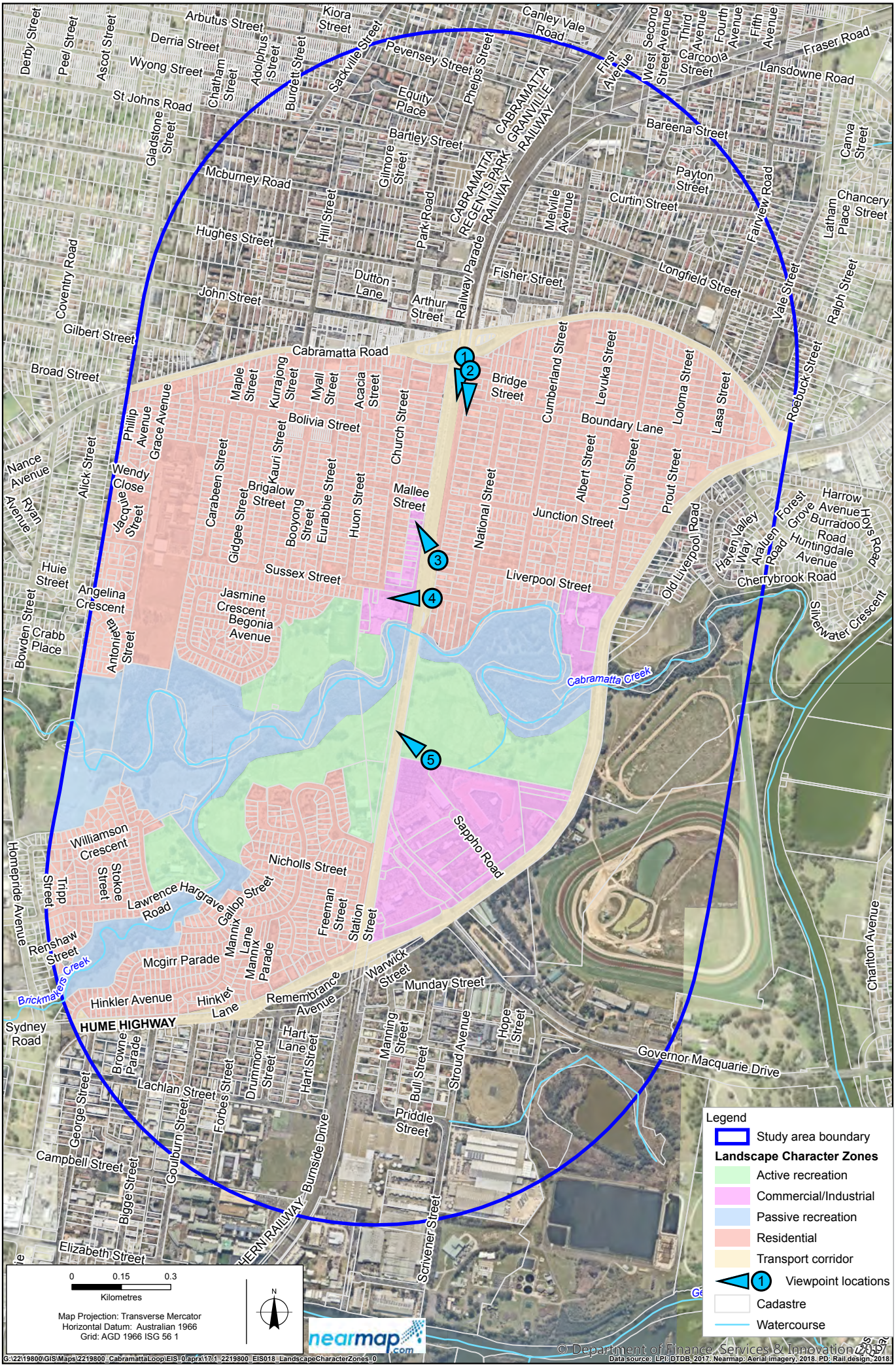

Figure 17.1 Landscape character zones and viewpoints

17.2.2.1 Landscape character zone 1 (LCZ1) – Transport corridor

LCZ1 is defined by linear transport infrastructure including the rail corridor, and major roads including the Hume Highway and Cabramatta Road. The existing conditions are shown in Photo 17.1 and Photo 17.2.

Photo 17.1 Rail corridor

Photo 17.2 Cabramatta Road

17.2.2.2 Landscape character zone 2 (LCZ2) – Residential

LCZ2 is defined by the residential areas on either side of the rail corridor, including to the north of the study area in Cabramatta, and an area to the south west in Warwick Farm, including Lawrence Hargrave School. The existing conditions are shown in Photo 17.3 and Photo 17.4.

Photo 17.3 Residential properties

Photo 17.4 Residential properties

17.2.2.3 Landscape character zone 3 (LCZ3) – Commercial/light industrial

LCZ3 is defined by the commercial and light industrial areas adjacent to the rail corridor. This includes the cluster of auto sales caryards and Warwick Farm shopping area between the rail corridor and the Hume

Highway; the row of smaller scale auto services on Railway Parade with adjacent Rugby League Club to the west of the rail line; and The Warwick and Holiday Inn.

The existing conditions are shown in Photo 17.5 and Photo 17.6.

Photo 17.5 Railway Parade

Photo 17.6 Sappho Road

17.2.2.4 Landscape character zone 4 (LCZ4) – Passive recreation

LCZ4 is defined by the passive recreation and riparian areas within the Cabramatta Creek corridor. The existing conditions are shown in Photo 17.7 and Photo 17.8.

Photo 17.7 Shared use path along Cabramatta Creek

Photo 17.8 Shared use path adjacent to Cabramatta Creek

17.2.2.5 Landscape character zone 5 (LCZ5) – Active recreation

LCZ5 is defined by the active recreation areas on either side of the rail corridor adjacent to Cabramatta Creek. This includes Jacquie Osmond Reserve, Warwick Farm Recreation Reserve, Cabramatta Sportsground, Don Dawson Oval, and the Cabramatta Rugby League Club fields.

The existing conditions are shown in Photo 17.9 and Photo 17.10.

Photo 17.9 Jacquie Osmond Reserve

Photo 17.10 Warwick Farm Recreation Reserve

17.2.3 Visual environment and sensitive viewpoints

17.2.3.1 Existing visual environment

The existing visual environment consists of an urban setting with residential areas to the east and west of the SSFL, the densely vegetated Cabramatta Creek and sporting fields running east-west through the centre of the study area. The southern portion of the study area is defined by a light industrial/commercial area in the east and a suburban residential areas to the west.

Due to the topography within the study area the visual environment varies, with long views from Cabramatta Road East overbridge to vegetated ridgelines in the distance and Cabramatta Creek forming the backdrop to the rail corridor and suburban residential setting. Within the residential areas and low lying sporting fields surrounding Cabramatta Creek, short enclosed views to the SSFL and surrounding built form and vegetation are available.

17.2.3.2 Representative viewpoints

Sensitive visual receivers within the study area include residents of the residential properties surrounding the SSFL, users of the Cabramatta Creek corridor and surrounding sporting fields, pedestrians and cyclists within the streets surrounding the SSFL and workers within Peter Warren Automotive and Hometown Warwick Farm shopping centre. Residential visual receivers would generally have long viewing periods and visual receivers such as cyclists and pedestrians would have short term transient viewing periods.

The following viewpoints (shown on Figure 17.1) were identified as representative viewpoints for sensitive receivers in the study area:

- Viewpoint 1 – Cabramatta Road East (looks south from Cabramatta Road East overbridge). This view is representative of views from pedestrians, cyclists and road users using the Cabramatta Road East overpass.

- Viewpoint 2 – Corner of Broomfield Street and Bridge Street. This view is representative of views from residents in adjacent residential properties as well as pedestrians and cyclists along Broomfield Street.
- Viewpoint 3 – Broomfield Street. This view is representative of views from residents in adjacent residential properties as well as pedestrians and cyclists along Broomfield Street.
- Viewpoint 4 – Corner Broomfield Street and Sussex Street. This view is representative of views from residents in adjacent residential properties as well as pedestrians and cyclists along Broomfield Street.
- Viewpoint 5 – Jacquie Osmond Reserve. This view is representative of views from users of Jacquie Osmond Reserve such as softball players, spectators and people using the reserve for other recreational purposes.

17.2.4 Trees in and adjacent to the project site

Appendix B of Technical Report 10 provides an arboricultural assessment of trees within and adjacent to the project site.

The trees assessed comprise a mixture of native species indigenous to the locality, non-indigenous native species and exotic ornamental specimens. Trees within or adjoining the project site are most likely all planted, occurring within school grounds, private gardens, parkland and roadside nature strips. No remnant trees occur within the project site, although there are several specimens which are most likely greater than 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.

17.3 Landscape concept

As described in section 17.1.1 a landscape concept was prepared as part of the reference design through an iterative design process that considered the urban landscape as well as the findings of the preliminary landscape and visual impact analysis.

The landscape concept for the project considers landscaping along Broomfield Street, adjacent to Cabramatta Creek and within Jacquie Osmond Reserve and is described in further detail below. A schematic of the landscape concept is shown in Figure 17.2.

17.3.1 Broomfield Street

Replacement street trees would be provided on the eastern side of Broomfield Street. To the north of the intersection with Junction Street the street trees would be planted in-lane, in alignment with the car parking bays. While to the south of the Junction Street intersection the street trees would be planted within the grassed verge.

On the western side of Broomfield Street compact native grasses would be planted within a narrow garden bed located between the noise wall and shared path. To the south of the intersection with Boundary Lane a catenary system with climbers would be attached to the noise wall and retaining wall. The retaining wall would be constructed to match the colour and look of the noise wall, where possible. Panels from the existing wall would be reused where practicable, particularly those with art work, the design of which the local community had input into (refer to Chapter 18 (Socio-economic impacts)). This catenary system would only be affixed to the blank noise wall panels, with the panels with art work to be left uncovered.

17.3.2 Cabramatta Creek

The shared path would be reinstated in a similar position to the existing shared path. Areas of Cabramatta Creek disturbed during construction would be revegetated.

17.3.3 Jacquie Osmond Reserve

The form of the embankment is described in section 6.3. As per consultation with Liverpool City Council, the embankment would be grassed, as the provision of trees or other plantings on the embankment would potentially cause safety issues (branches in the rail corridor and hard distances near the softball field) and/or require additional maintenance.

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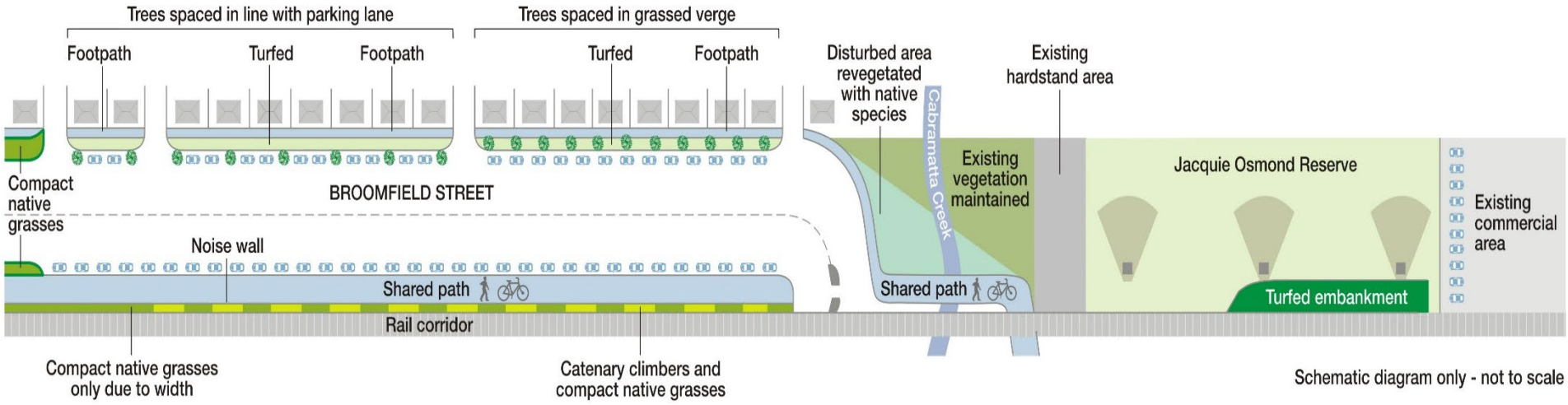

Figure 17.2 Indicative landscape concept for project site (not to scale)

17.4 Assessment of construction impacts

17.4.1 Landscape impacts

The significance of the impact of the project during construction is predicted to be moderate to low for residential areas and areas of active recreation and low to negligible to other areas.

The sensitivity of a landscape to change and the magnitude of that potential change are categorised from negligible to high. The condition of existing structures is also assessed as being in poor, average or in good condition.

The predicted impacts for all areas are summarised in Table 17.1 and discussed further below.

Table 17.1 Summary of construction impacts

Landscape character area	Sensitivity to change	Magnitude of change	Significance of impact
LCZ1 – Transport corridor	Negligible	Low	Low to negligible
LCZ2 – Residential	Low	Moderate	Moderate to low
LCZ3 – Commercial/light industrial	Low	Negligible	Low to negligible
LCZ4 – Passive recreation	Moderate	Moderate	Moderate
LCZ5 – Active recreation	Moderate	Moderate	Moderate

17.4.1.1 Landscape character zone 1– Transport corridor

The predicted impacts to LCZ1 during construction are assessed in Table 17.2.

Table 17.2 LCZ1 - Transport corridor description and impact assessment

Landscape character zone 1	
Anticipated change to LCZ	During construction works areas would be located to the east of the existing tracks.
Sensitivity to change	The sensitivity of the landscape represented by LCZ1 is considered to be **negligible** due to the existing elements being in below average condition and not particularly distinctive local features.
Magnitude of change	During construction the magnitude of change to LCZ1 during construction is considered to be **low.** This is due to the proposed works areas not being out of character with the existing landscape.
Significance of impact	During construction the significance of impact for LCZ1 during construction is therefore **low to negligible** as the works areas and machinery associated with the proposed works may be new but are in keeping with the existing landscape character and are temporary in nature.

17.4.1.2 Landscape character zone 2 – Residential

The predicted impacts to LCZ2 during construction are assessed in Table 17.3.

Table 17.3 LCZ2 - Residential description and impact assessment

Landscape character zone 2	
Anticipated change to LCZ	During construction the reconfiguration of Broomfield Street would affect traffic, cyclist and pedestrian access and use of the street. The existing vegetation would be removed and there would be partial closure of the street. Partial access would be maintained for the period of works but would be restricted to the eastern or western side of the street depending on the stage of works. Machinery, site fencing, construction lighting and increased activity from vehicles would be present during the construction period.
Sensitivity to change	The sensitivity of the landscape represented by LCZ2 is considered to be **low**. This is due to the landscape character elements being in average condition and a development of this type would be unlikely to have an adverse effect on the landscape character that could not be mitigated.
Magnitude of change	During construction the magnitude of change is considered to be **moderate**. This is due to there being discernible change in the landscape character due to the removal of existing vegetation and the partial closure of Broomfield Street during the reconfiguration works.
Significance of impact	During construction the significance of impact for LCZ2 is therefore **moderate to low** due to the removal of vegetation and partial closure of the street.

17.4.1.3 Landscape character zone 3 – Commercial/light industrial

The predicted impacts to LCZ3 during construction are assessed in Table 17.4.

Table 17.4 LCZ3 - commercial/light industrial description and impact assessment

Landscape character zone 3	
Anticipated change to LCZ	During construction the proposed works would be limited to the track duplication, realignment, and retaining wall works between Peter Warren Automotive and the existing rail corridor. This would comprise acquisition of a strip of land around five metres in width. There would be no works within a majority of this LCZ.
Sensitivity to change	The sensitivity of receivers represented by LCZ3 is considered to be **low**. This is due to the landscape character elements being in average condition and a development of this type would be unlikely to have an adverse effect on the landscape character that could not be mitigated.
Magnitude of change	The magnitude of change to LCZ3 is considered to be **negligible** during construction. This is due to the imperceptible change to the existing landscape elements.
Significance of impact	The significance of impact for LCZ3 is therefore **low** to **negligible** during construction as the proposed new track and retaining wall would be in keeping with the existing landscape character.

17.4.1.4 Landscape character zone 4 – Passive recreation

The predicted impacts to LCZ4 during construction are assessed in Table 17.5.

Table 17.5 LCZ4 Passive recreation description and impact assessment

Landscape character zone 4	
Anticipated change to LCZ	During construction, the changes to LCZ4 would include the diversion of the shared path from between Sussex Street and the Cabramatta Creek footbridge and the addition of works areas to the east and west of the existing rail corridor for the proposed new bridge over Cabramatta Creek. There would be some vegetation removal within the proposed works area. The existing embankment and chain mesh fence adjacent to the shared use path would be removed and replaced with a retaining wall around three metres high.
Sensitivity to change	The sensitivity of LCZ4 is considered to be **moderate**. This is due to the extent of vegetation cover and passive recreation opportunities the character area provides to the surrounding urban environment.
Magnitude of change	The magnitude of change to LCZ4 is considered to be **moderate** during construction. This is due to the introduction of machinery, site fencing, lighting and removal of vegetation being out of character with the existing landscape. These changes would be temporary.
Significance of impact	The significance of impact for LCZ4 is therefore **moderate** during construction. This is due to the introduction of new elements which are out of character with the existing landscape.

17.4.1.5 Landscape character zone 5 – Active recreation

The predicted impacts to LCZ5 during construction are assessed in Table 17.6.

Table 17.6 LCZ5 Active recreation description and impact assessment

Landscape character zone 5	
Anticipated change to LCZ	During construction there would be construction works associated with the additional track, new retaining wall and embankment and the removal of the existing trees in front of the railway corridor on the east side of the SSFL rail corridor. There would be site fencing to the rail corridor boundary along the western edge of Jacquie Osmond Reserve. A portion of Jacquie Osmond Reserve would be occupied during construction for use as a construction compound. Machinery, site fencing, construction lighting and increased activity from vehicles would be present during the construction period.
Sensitivity to change	The sensitivity of LCZ5 is considered to be **moderate**. This is due to the active recreation opportunities the character area provides to the surrounding urban environment.
Magnitude of change	During construction the magnitude of change to LCZ5 is considered to be **moderate**. This is due to the removal of vegetation and softball nets on the east side of the SSFL rail corridor, addition site fencing and machinery which would result in a discernible change within LCZ5.
Significance of impact	During construction the significance of impact for LCZ5 is therefore **moderate**.

17.4.2 Visual impacts

The significance of the impact on principal viewpoints during construction is predicted to be high to moderate for the residential areas around Broomfield Street and moderate to low for other areas.

The predicted impacts for all areas are summarised in Table 17.7 and discussed further below.

Table 17.7 Summary of construction impacts

Landscape character area	Sensitivity to change	Magnitude of change	Significance of impact
View point 1 – Cabramatta Road	Low	Low	Low
View point 2 – Corner Broomfield Street and Bridge Street	High	Moderate	High to moderate
View point 3 – Broomfield Street	High	Moderate	High to moderate
View point 4 – Corner Sussex Street and Broomfield Street	High	Moderate	High to moderate
View point 5 – Jacquie Osmond Reserve	Moderate	Moderate	Moderate

17.4.2.1 Viewpoint location 1 – Cabramatta Road East

The predicted impacts to VP1 during construction are assessed in Table 17.8.

Table 17.8 VP1 description and visual assessment

Viewpoint location 1 (VP1)	
	
Photograph of existing view south along the SSFL	
Anticipated change to view	During construction, the view would be of the construction works associated with the removal of the existing retaining wall, noise wall and street trees along Broomfield Street, the addition of new track and signalling and the reconfiguration of Broomfield Street. There would be construction machinery, fencing and site compounds.
Sensitivity to change	The sensitivity of receivers represented by VP1 is considered to be **low**. This is due to the type of sensitive receivers and their experience of this view, which includes pedestrians, cyclists and road users along Cabramatta Road.
Magnitude of change	During construction the magnitude of change to VP1 is considered to be **low**. This is due to the construction works introducing new elements into the view but these would be contained to the rail corridor and Broomfield street and would be temporary.
Significance of impact	During construction the significance of impact for VP1 is therefore **low** due to the widening of the rail corridor and loss of vegetation along Broomfield Street introducing new infrastructure into the existing view where the SSFL rail corridor is a key feature.

17.4.2.2 Viewpoint location 2 - Corner Broomfield Street and Bridge Street

The predicted impacts to VP2 during construction are assessed in Table 17.9.

Table 17.9 VP2 description and visual assessment

Viewpoint location 2 (VP2)	
	
Photograph of existing view south along Broomfield Street	
Anticipated change to view	During construction, the existing noise wall would be removed and the rail corridor would have construction works for the new track and noise wall. Broomfield Street would be temporarily closed in stages with one lane of access always available. The existing vegetation along Broomfield Street would be removed. The overhead power lines would be relocated east within the verge. The removal of the existing noise wall during construction would temporarily open up views to the rail corridor. Machinery, site fencing, construction lighting and increased activity from vehicles would be present during the construction period.
Sensitivity to change	The sensitivity of receivers represented by VP2 is considered to be **high**. This is due to the type of sensitive receivers and their experience of this view, which includes residents of the adjacent residential properties and pedestrians (who would have a moderate sensitivity) along Broomfield Street. Both types of visual receiver would be in close proximity to the project.

Viewpoint location 2 (VP2)	
Magnitude of change	During construction the magnitude of change to VP2 is considered to be **moderate**. This is due to proposed construction works with machinery, construction fencing and the removal of vegetation being out of scale with the existing view which currently consists of a residential street with the built form elements consisting of a concrete noise wall and residential properties. The removal of the existing noise wall temporarily opening up views to the rail corridor.
Significance of impact	During construction the significance of impact for VP2 is therefore **high to moderate**. This is due to the amount of construction activity that would be occurring in close proximity to the residents along Broomfield Street.

17.4.2.3 Viewpoint location 3 - Broomfield Street

The predicted impacts to VP3 during construction are assessed in Table 17.10.

Table 17.10 VP3 description and visual assessment

Viewpoint location 3 (VP3)	
	
Photograph of existing view north along Broomfield Street	
Anticipated change to view	During construction the existing noise wall would be removed and the rail corridor would have construction works for the additional track, noise wall and retaining wall. The existing vegetation along Broomfield Street would be removed. The overhead power lines would be relocated east within the verge. Broomfield Street would be temporarily closed in stages with one lane of access always available. During construction there would be site fencing, machinery and increased activity within and surrounding the project site. The removal of the existing noise wall during construction would open up views to the rail corridor. Machinery, site fencing, construction lighting and increased activity from vehicles would be present during the construction period.

Viewpoint location 3 (VP3)	
Sensitivity to change	The sensitivity of receivers represented by VP3 is considered to be **high**. This is due to the type of sensitive receivers and their experience of this view, which includes residents of the adjacent residential properties and pedestrians along Broomfield Street. Both types of visual receiver would be in close proximity to the project and the residential receivers would have long uninterrupted viewing periods.
Magnitude of change	During construction the magnitude of change to VP3 is considered to be **moderate**. This is due to proposed construction works with machinery, construction fencing and the removal of vegetation being out of scale with the existing view and the removal of the existing noise wall temporarily opening up views to the rail corridor.
Significance of impact	During construction the significance of impact for VP3 is therefore **high to moderate**. This is due to the presence of construction works along Broomfield Street creating discernible changes in the view in close proximity to residents, although these changes would be temporary.

17.4.2.4 Viewpoint location 4 – Corner Sussex Street and Broomfield Street

The predicted impacts to VP4 during construction are assessed in Table 17.11.

Table 17.11 VP4 description and visual assessment

Viewpoint location 4 (VP4)	
	
Photograph of existing view south-west towards SSFL	
Anticipated change to view	During construction the view would be to the construction of the new rail bridge over Cabramatta Creek, temporarily realigned shared use path between Sussex Street and Cabramatta Creek and the removal of some of the creek vegetation. The existing embankment and chain mesh fence adjacent to the shared use path would be removed and replaced with a retaining wall around three metres high.
Sensitivity to change	The sensitivity of receivers represented by VP4 is considered to be **high**. This is due to the type of sensitive receivers and their experience of this view, which includes residents of the adjacent residential properties and pedestrians along Broomfield Street. Both types of visual receiver would be in close proximity to the project.
Magnitude of change	During construction the magnitude of change to VP4 is considered to be **moderate**. This is due to the introduction of construction works including machinery, fencing and removal of vegetation being discernible changes to the existing view. These would be temporary changes to the view.

Viewpoint location 4 (VP4)	
Significance of impact	During construction the significance of impact for VP4 is therefore **high to moderate** as the construction works would result in a discernible change to the existing view for visual receivers in close proximity to the works, although the changes would be temporary.

17.4.2.5 Viewpoint location 5 – Jacquie Osmond Reserve

The predicted impacts to VP5 during construction are assessed in Table 17.12.

Table 17.12 VP5 description and visual assessment

Viewpoint location 5 (VP5)	
Anticipated change to view	During construction the view would be towards the construction works associated with the additional track, new retaining wall and the removal of the existing trees in front of the railway corridor. There would be site fencing to the rail corridor boundary along the western edge of Jacquie Osmond Reserve.
Sensitivity to change	The sensitivity of receivers represented by VP5 is considered to be **moderate**. This is due to the type of sensitive receivers and their experience of this view, which includes users of Jacquie Osmond Reserve who are in close proximity but would have limited viewing periods with their attention on the game or sport and not the setting.
Magnitude of change	During construction, the magnitude of change to VP5 is considered to be **moderate**. This is due to the construction works associated with the additional track, retaining wall and batter resulting in the removal of existing trees and softball nets and the location of a construction compound within the reserve resulting in a noticeable change to the view.
Significance of impact	During construction the significance of impact for VP5 is therefore **moderate** as the construction works would result in a noticeable change to the existing view for visual receivers in close proximity to the works, although the change would be temporary.

17.4.3 Construction lighting impacts

Construction activities would not substantially increase the extent or intensity of artificial lighting above current background artificial light levels associated with the rail corridor, pedestrian and bike track across Cabramatta Creek, street lighting and sports fields in Jacquie Osmond reserve.

Lighting for construction works undertaken at night has the potential to cause light spill into residential properties. The use of lighting towers during any night work may result in light spill impacting adjoining properties and residents. Impacts can be minimised through appropriate siting and use of directional lights to avoid light spill (refer to section 17.6.2).

17.4.4 Tree removal

Construction would result in the unavoidable removal of a number of trees. The majority of these comprise street trees along Broomfield Street and trees adjacent to the rail corridor in Jacquie Osmond Reserve. An arboricultural assessment (Appendix C of Technical Report 10) has assessed the number and quality of trees that would require removal as a result of the project. The project would result in the removal of 43 planted trees which are indigenous to the Fairfield and Liverpool LGAs and 77 exotic specimens.

The landscape concept described in this chapter has been developed to minimise the impacts associated with tree removal. In addition, mitigation measures to minimise impacts to trees within or adjacent to the project site that will be retained are provided in Appendix C of Technical Report 10.

17.4.5 Cumulative impacts

Other projects that have the potential to occur at the same time as the project are described in Appendix E.

The majority of landscape changes and visual impacts from the project during construction relate to work activities such as lighting, construction of the project and the compounds sites. There are no other known construction projects proposed in the vicinity of the project site that would result in additional changes to the views or landscape character identified for this project.

17.5 Assessment of operation impacts

17.5.1 Overview of operational impacts

The project would comprise a widened rail corridor with the addition of new track, fences, retaining walls, two new bridges over Sussex Street and Cabramatta Creek and replacement of the Broomfield Street noise wall. Outside of the rail corridor would be new planting, an embankment in Jacquie Osmond Reserve and minor changes to the configuration of Broomfield Street including parking and the shared path. These new structures and planting would change the existing landscape and views around the project site.

17.5.2 Landscape character impacts

The significance of the impact of the project during operation is predicted to be moderate to low for residential areas and areas of active recreation and low to negligible to other areas. The predicted impacts for each area is summarised in Table 17.13 and discussed further below.

Table 17.13 Summary of construction impacts

Landscape character area	Sensitivity to change	Magnitude of change	Significance of impact
LCZ1 – Transport corridor	Negligible	Negligible	Negligible
LCZ2 – Residential	Low	Low	Low
LCZ3 – Commercial/light industrial	Low	Negligible	Low to negligible
LCZ4 – Passive recreation	Moderate	Low	Moderate to low
LCZ5 – Active recreation	Moderate	Low	Moderate to low

17.5.2.1 Landscape character zone 1– Transport corridor

The predicted impacts to LCZ1 during operation are assessed in Table 17.14.

Table 17.14 LCZ1 - Transport corridor description and impact assessment

Landscape character zone 1	
Anticipated change to LCZ	During operation the LCZ would see the addition of a new portion of track and realignment of 450 metres of existing track between Cabramatta Station and the Hume Highway along the existing SSFL. The rail corridor would be widened by about five metres to the east with a new replacement fence and/or retaining wall and a relocated noise wall along Broomfield Street. Two new bridges would be added over Sussex Street and Cabramatta Creek to the east of the existing concrete bridges. The new bridges would be similar in size and materiality to the existing concrete bridges. Modifications and upgrades to signalling and overhead wires would occur for the length of the SSFL between Warwick Farm Station and Cabramatta Station.
Sensitivity to change	The sensitivity of the landscape represented by LCZ1 is considered to be **negligible** this is due to the existing elements being in below average condition and not particularly distinctive local features.

Landscape character zone 1	
Magnitude of change	During operation the magnitude of change to LCZ1 is considered to be **negligible**. This is due to the addition of new rail track and bridges but these elements are in keeping with the existing landscape character elements.
Significance of impact	During operation the significance of impact for LCZ1 is therefore **negligible** as although the existing rail corridor would be widened and there would be the addition of new track and two new bridges, these elements are in keeping with the existing landscape character.

17.5.2.2 Landscape character zone 2 – Residential

The predicted impacts to LCZ2 during operation are assessed in Table 17.15.

Table 17.15 LCZ2 - Residential description and impact assessment

Landscape character zone 2	
Anticipated change to LCZ	During operation, changes to LCZ2 would occur along Broomfield Street to the east of the SSFL. The expansion of the rail corridor would result in the removal of the existing street trees and reconfiguration of the street. The reconfiguration of Broomfield Street would include parallel parking on both sides of the street between Bridge Street and Sussex Street, the realignment of the shared path and the relocation of the existing noise walls. The street trees would be replaced along the eastern edge with in-lane trees to the north of Junction Street and within the grassed verge to the south of Junction Street. Compact native grasses would be planted between the shared path and realigned noise wall. Climbers on a catenary system would be grown where room allows on the blank noise wall panels,
Sensitivity to change	The sensitivity of the landscape represented by LCZ2 is considered to be **low**. This is due to the landscape character elements being in average condition and a development of this type would be unlikely to have an adverse effect on the landscape character that could not be mitigated.
Magnitude of change	During operation the magnitude of change to LCZ2 is considered to be **low**. This is due to the reconfiguration of Broomfield Street being in keeping with the local character.
Significance of impact	During operation, although a portion of the LCZ2 along the western edge of the rail corridor would become part of LCZ1, the significance of impact for LCZ2 would be **low**. This is due to the reconfiguration of Broomfield Street being in keeping with the local character and the loss of a portion of the LCZ2 along the western edge would not result in a change to the LCZ's key characteristics. The edge of LCZ2 would remain similar to existing, with key features such as the noise wall and street trees replaced. The addition of the catenary climbers would be a positive new element within the LCZ.

17.5.2.3 Landscape character zone 3 – Commercial/light industrial

The predicted impacts to LCZ3 during operation are assessed in Table 17.16.

Table 17.16 LCZ3 - commercial/light industrial description and impact assessment

Landscape character zone 3	
Anticipated change to LCZ	During operation, a strip of land around five metres in width along the eastern boundary of Peter Warren Automotive would be required to accommodate the additional track. There would be a new retaining wall to the boundary of the Peter Warren Automotive and the rail corridor.

Landscape character zone 3	
Sensitivity to change	The sensitivity of receivers represented by LCZ3 is considered to be **low**. This is due to the landscape character elements being in average condition and a development of this type would be unlikely to have an adverse effect on the landscape character that could not be mitigated.
Magnitude of change	The magnitude of change to LCZ3 is considered to be **negligible** during operation. This is due to the imperceptible change to the existing landscape elements.
Significance of impact	The significance of impact for LCZ3 is therefore **low** to **negligible** during operation as the proposed new track and retaining wall would be in keeping with the existing landscape character.

17.5.2.4 Landscape character zone 4 – Passive recreation

The predicted impacts to LCZ4 during operation are assessed in Table 17.17.

Table 17.17 LCZ4 Passive recreation description and impact assessment

Landscape character zone 4	
Anticipated change to LCZ	During operation the project would see the addition of a new rail bridge over Cabramatta Creek adjacent to the existing bridge and the reinstatement of the existing shared use path in its current location. There would be a retaining wall around three metre high adjacent to the eastern edge of the shared path. There would be revegetation of the creek corridor where vegetation was removed
Sensitivity to change	The sensitivity of LCZ4 is considered to be **moderate**. This is due to the extent of vegetation cover and passive recreation opportunities the character area provides to the surrounding urban environment.
Magnitude of change	The magnitude of change to LCZ4 is considered to be **low** during operation. This is due to the minor loss of vegetation and although the addition of the new rail bridge would introduce a new element into the landscape, it would be on the edge of the LCZ adjacent to the existing rail bridge and would be in keeping with the existing landscape character. The vegetation would be replaced where practicable and a majority of the vegetation within the LCZ4 would be retained. The proposed three metre high retaining wall would introduce a new element but this would be softened over time with the reestablishment of vegetation.
Significance of impact	The significance of impact for LCZ4 is therefore is **moderate to low** as the project would be in keeping with the existing landscape character and the vegetation loss would be minor. Although the three metre high retaining wall would be a new element, it would be softened over time as the vegetation re-establishes.

17.5.2.5 Landscape character zone 5 – Active recreation

The predicted impacts to LCZ5 during operation are assessed in Table 17.18.

Table 17.18 LCZ5 Active recreation description and impact assessment

Landscape character zone 5	
Anticipated change to LCZ	During operation the change would include an additional track and new retaining wall with chain mesh fencing on top and a grassed embankment in front on the east side of the SSFL rail corridor. The existing trees on the east side of the track would be removed. The softball nets would be reinstalled. Proposed changes would be limited to Jacquie Osmond Reserve with the rest of LCZ5 remaining untouched.

Landscape character zone 5	
Sensitivity to change	The sensitivity of LCZ5 is considered to be **moderate**. This is due to the active recreation opportunities the character area provides to the surrounding urban environment.
Magnitude of change	During operation the magnitude of change to LCZ5 is considered to be **low**. This is due to the removal of existing trees and taken down and re-installed of the softball nets on the east side of the SSFL rail corridor which would result in a minor loss of key landscape character elements in LCZ5.
Significance of impact	During operation the significance of impact for LCZ5 is therefore **moderate to low**. The removal of the existing trees within Jacquie Osmond Reserve would be a minor change and the general landscape character would be maintained.

17.5.3 Visual impacts

The significance of the impact on principle viewpoints is predicted during operation to be high to moderate for the residential areas around Broomfield Street and moderate to low to other areas. The predicted impacts for all areas are summarised in Table 17.19 and discussed further in the following sections.

Table 17.19 Summary of construction impacts

Landscape character area	Sensitivity to change	Magnitude of change	Significance of impact
View point 1 – Cabramatta Road	Low	Low	Low
View point 2 – Corner Broomfield Street and Bridge Street	High	Low	Moderate
View point 3 – Broomfield Street	High	Moderate	Moderate
View point 4 – Corner Sussex Street and Broomfield Street	High	Moderate	High to moderate
View point 5 – Jacquie Osmond Reserve	Moderate	Low	Moderate to low

17.5.3.1 Viewpoint location 1 – Cabramatta Road East

The predicted impacts to VP1 during operation are assessed in Table 17.20.

Table 17.20 VP1 description and visual assessment

Viewpoint location 1 (VP1)	
	
Photograph of existing view south along the SSFL	
Anticipated change to view	During operation the view would be to a widened rail corridor with an additional track to the east and associated overhead signalling wires. The retaining wall and noise wall would be moved a few metres to the east. There would be a new concrete noise wall to the eastern edge of the rail corridor and Broomfield Street would be reconfigured with the street trees removed.
Sensitivity to change	The sensitivity of receivers represented by VP1 is considered to be **low**. This is due to the type of sensitive receivers and their experience of this view, which includes pedestrians, cyclists and road users along Cabramatta Road.
Magnitude of change	During operation the magnitude of change to VP1 is considered to be **low** as the widening of the rail corridor and removal of vegetation within Broomfield Street would be visible but not uncharacteristic within the existing view.
Significance of impact	During operation the significance of impact for VP1 is therefore **low** due to the widening of the rail corridor and loss of vegetation Broomfield Street introducing new infrastructure into the existing view where the SSFL rail corridor is a key feature.

17.5.3.2 Viewpoint location 2 - Corner Broomfield Street and Bridge Street

The predicted impacts to VP2 during operation are assessed in Table 17.21.

Table 17.21 VP2 description and visual assessment

Viewpoint location 2 (VP2)	
	
Photograph of existing view south along Broomfield Street	
Anticipated change to view	During operation the view would be towards the relocated noise wall around five metres closer to the viewpoint and similar height to the existing. This would include the retaining of noise wall panels with artwork, the design of which the community had an input into. The view would also include parallel car parking on both sides of the street and a reduced verge on the east side of the street. The street trees would be replaced along the eastern edge and would be planted in-lane. Along the western edge compact native grasses would be planted between the shared path and noise wall. To the south of Boundary Lane climbing plants on a catenary system would be installed on the blank noise wall panels,
Sensitivity to change	The sensitivity of receivers represented by VP2 is considered to be **high**. This is due to the type of sensitive receivers and their experience of this view, which includes residents of the adjacent residential properties and pedestrians (who would have a moderate sensitivity) along Broomfield Street. Both types of visual receiver would be in close proximity to the project.
Magnitude of change	During operation the magnitude of change to VP2 is considered to be **low**. This is due to the relocated noise wall and car parking being visible new elements but not out of scale with the existing view and the climbers on the catenary system being a positive new element.
Significance of impact	During operation the significance of impact for VP2 is therefore **moderate**. This is due to the close proximity to the residents to the project along Broomfield Street.

17.5.3.3 Viewpoint location 3 - Broomfield Street

The predicted impacts to VP3 during operation are assessed in Table 17.22.

Table 17.22 VP3 description and visual assessment

Viewpoint location 3 (VP3)	
	
Photograph of existing view north along Broomfield Street	
	
Photomontage of Broomfield Street showing landscape concept	
Anticipated change to view	During operation the view would be towards the new retaining wall and relocated noise wall along the rail corridor edge. The noise wall would be approximately five metres closer to the view point with the realigned shared path in front. Parallel parking would be on both sides of the street and the verge on the eastern side of the street would be reduced. The street trees along the eastern edge would be replaced within the grassed verge. Along the western edge compact native grasses would be planted between the noise wall and shared path. Where there are blank panels on the noise wall there would be climbers on a catenary system. The panels with art work would be left uncovered.
Sensitivity to change	The sensitivity of receivers represented by VP3 is considered to be **high**. This is due to the type of sensitive receivers and their experience of this view, which includes residents of the adjacent residential properties and pedestrians along Broomfield Street. Both types of visual receiver would be in close proximity to the project and the residential receivers would have long uninterrupted viewing periods.

Viewpoint location 3 (VP3)	
Magnitude of change	During operation the magnitude of change to VP3 is considered to be **low**. This is due to the relocated noise wall and car parking being visible new elements but not out of scale with the existing view. Although the trees have been removed, the climbers and compact native grasses would be a positive new element.
Significance of impact	During operation the significance of impact for VP3 is considered to be **moderate.** This is due to the close proximity to the residents to the project along Broomfield Street

17.5.3.4 Viewpoint location 4 – Corner Sussex Street and Broomfield Street

The predicted impacts to VP1 during construction are assessed in Table 17.23.

Table 17.23 VP4 description and visual assessment

Viewpoint location 4 (VP4)	
 **Photograph of existing view south-west towards SSFL**	
Anticipated change to view	During operation the view would be to the new concrete rail bridge to the east of the existing concrete bridge, the shared use path over Cabramatta Creek reinstated in its current location and re-established vegetation. There would be a retaining wall around three metres high next to the eastern edge of the shared use path.
Sensitivity to change	The sensitivity of receivers represented by VP4 is considered to be **high**. This is due to the type of sensitive receivers and their experience of this view, which includes residents of the adjacent residential properties and pedestrians along Broomfield Street. Both types of visual receiver would be in close proximity to the project and have uninterrupted views to the project.
Magnitude of change	During operation the magnitude of change to VP4 is considered to be **moderate**. This is due to the removal of vegetation and the addition of the proposed three metre high retaining wall adjacent to the shared use path. The new bridge would be in keeping with the existing view.
Significance of impact	During operation the significance of impact for VP4 is therefore **high** to **moderate** as although the new bridge would be in keeping with the existing view and the vegetation would be re-established where possible, the proposed three metre high retaining wall would be a dominant visual element until the vegetation re-establishes.

17.5.3.5 Viewpoint location 5 – Jacquie Osmond Reserve

The predicted impacts to VP5 during operation are assessed in Table 17.24.

Table 17.24 VP5 description and visual assessment

Viewpoint location 5 (VP5)	
	
Photograph of existing view north-west towards SSFL	
	
Photomontage of Jacquie Osmond Reserve showing proposed landscape concept	
Anticipated change to view	During operation the view would be towards the new track and retaining wall with chain mesh fencing on top and a grassed batter in front. The softball nets on the east side of the track would be reinstated along with planting of trees where practicable.
Sensitivity to change	The sensitivity of receivers represented by VP5 is considered to be **moderate**. This is due to the type of sensitive receivers and their experience of this view, which includes users of Jacquie Osmond Reserve who are in close proximity but would have limited viewing periods with their attention on the game or sport and not the setting.
Magnitude of change	During operation the magnitude of change to VP5 is considered to be **low**. This is due to the addition of the track and new retaining wall with chain mesh fence being in keeping with the existing view, although, the removal of the existing trees and softball nets would be a minor change, some of the trees would be replaced.

Viewpoint location 5 (VP5)	
Significance of impact	During operation, the significance of impact for VP5 is therefore **moderate to low** as the additional track, new retaining wall, chain mesh fence and grassed batter would be generally consistent with the existing view whilst some of the removed vegetation and softball nets would be reinstated.

17.5.4 Cumulative impacts

Given the low profile and horizontal form of most of the project, the level of visual modification would be confined to a distance relatively close to the area subject to change. There are no other known projects currently proposed in the vicinity of the project site that would result in additional vegetation clearance or changes to the views or landscape character identified for this project.

17.6 Management of impacts

17.6.1 Approach

17.6.1.1 Approach to mitigation and management

Overall, the majority of potential construction related landscape and visual impacts would be short term and temporary in nature. The potential for these impacts would be significantly reduced by:

- effective construction design and planning
- implementation of the mitigation measures provided in Table 17.25
- ongoing communication with the relevant councils and the broader community.

As part of the detailed design an urban design and landscape plan would be developed, which would build on the existing landscape concept, be informed by the urban design principles and objectives and would consider the mitigation measures provided in Table 17.25.

17.6.1.2 Expected effectiveness

ARTC have experience in managing potential urban design, landscape character and visual impacts as a result of developments of a similar scale and scope to this project.

ARTC has in the first instance, aimed to avoid impacts where possible through design of the project and selection of location of compounds sites and work sites where possible (refer to section 17.1.3).

Secondly, urban design outcomes have been incorporated into the reference design and would be further refined during detailed design of the project as part of the urban design and landscape plan development. The urban design outcomes have been guided by existing policies and procedures (such as *Beyond the Pavement*), which commit to providing excellent outcomes for the people of NSW, governed by over-arching urban design principles that include both physical outcomes and performance based principles. The object is to produce a design outcome that will maintain the existing quality of the urban environment in the long term (once vegetation has established) and identifies improvements where possible, in line with SEARs requirements.

In addition, a range of mitigation measures are recommended for incorporation into the project to minimise construction impacts which are unable to be designed out of the project.

As such, the measures to avoid impacts during development of the design and measures outlined in the CEMP are considered to be proven effective in managing potential impacts to visual amenity and landscape character.

17.6.2 List of mitigation measures

The mitigation measures that would be implemented to address potential landscape and visual impacts are listed in Table 17.25.

Table 17.25 Mitigation measures

Stage	Impact	Measure
Design	Visual impacts due to addition of new structures and removal of vegetation	An urban design and landscape plan will be developed as part of the detailed design with the objective of maintaining and improving pedestrian and cycling connectivity, reinstating vegetation where possible and, ensuring constructed elements improve on existing design and materiality. It will build on the existing landscape concept and consider the urban design principles and objectives and the mitigation measures provided in this table. The urban design and landscape plan will be developed in consultation with Fairfield and Liverpool City Councils.
	Vegetation clearance	The urban design and landscape plan will include a planting pallet consistent with the existing area. Native species selected will be of local significance, from the relevant ecological vegetation community and will be sourced from nurseries in the local area, where possible.
	Vegetation clearance	Where revegetation of riparian areas and bank stabilisation is required, the design will be prepared in consultation with an experienced waterway rehabilitation consultant and Fairfield and Liverpool City Councils.
	Visual impact from new bridges	The design and materiality of the bridges will integrate with the existing built form in accordance with *Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW* (RMS, 2012*).* The bridge design will minimise visual clutter where possible, through incorporating cabling and barriers into a single bridge façade. The bridge design will be in accordance with ARTC's requirements to ensure bridge structures can be visually monitored as part of ongoing maintenance.
	Visual impacts from noise wall	The noise walls along Broomfield Street will be reused in the project due to the existing value placed on them by the local community. Where vegetation screening is implemented views to the artwork panels will be retained. Along Broomfield Street where retaining walls are to be replaced, colour is to match existing noise wall. High quality materials, textured and graffiti resistant surfaces will be used, where possible, on retaining walls along Broomfield Street and Jacquie Osmond Reserve to deter graffiti, particularly at lower levels of the walls. The design will be finalised following consultation with maintenance stakeholders.
	Light spill	Permanent lighting will be designed in accordance with AS 4282-1997 Control of obtrusive effects of outdoor lighting. This will avoid light spill into residential properties along Broomfield Street and surrounding residential streets and ecologically sensitive areas along Cabramatta Creek.

Stage	Impact	Measure
Construction	Visual impact from construction compounds and worksites	Construction compounds located within Jacquie Osmond Reserve, Warwick Farm Recreation Reserve and within the rail corridor should, where possible, have screening measures implemented such as hoarding or temporary vegetation. Where equipment or stockpiles are to be located in a visually prominent location for any reasonable period of time, screening measures and practices will be incorporated to ensure sites are kept tidy.
	Temporary light spill	Temporary lighting required during the construction period will be sited and designed to avoid light spill into residential properties along Broomfield Street and surrounding residential streets and ecologically sensitive areas along Cabramatta Creek.
	Vegetation to be retained	Existing vegetation will be protected and retained where possible, particularly mature canopy trees. Tree removal and protection measures for trees to be retained, will be carried out as stated in the Arboricultural assessment provided in Appendix B of Technical Report 10 – Landscape and visual impact assessment.

17.6.3 Consideration of the interaction between measures

Mitigation measures to control impacts to the landscape character of the project sites and visual impacts may replicate mitigation measures proposed for the control of impacts associated with biodiversity in relation to tree and vegetation clearance (Chapter 11 (Biodiversity)).

All mitigation measures for the project would be consolidated and described in the CEMP. The plan would identify measures that are common between different aspects. Common impacts and common mitigation measures would be consolidated to ensure consistency and implementation.

As per Chapter 9 (Noise and vibration) noise operational impacts would be mitigated through the replacement of the existing noise wall. This mitigation has been considered as part of the landscape and visual impact assessment (refer section 17.5.3 of this chapter).

17.6.4 Managing residual impacts

A residual risk analysis was undertaken following the impact assessment summarised in this chapter. The results of the residual risk analysis are provided in Appendix D and summarised below.

Residual impacts during construction of the project are expected to be minor, with the exception of vegetation removal. Minor short-term residual impacts would be associated with the establishment and operation of construction sites and ancillary facilities which would be visible from by surrounding land users and residents. For the most part the proposed temporary compounds during construction would be established in areas without trees, and where tree removal is already required for the project. Areas would be progressively restored on completion of construction works where practicable. Therefore residual impacts during construction (with the exception of vegetation removal) are expected to be minor and short-term.

Despite measures taken to avoid and mitigate impacts, the project would result in some unavoidable residual adverse impacts on some elements of the landscape and views from surrounding areas. The proposed new structures would be visible from surrounding areas. There would be a loss of some trees within Jacquie Osmond Reserve and street trees along Broomfield Street.

The potential for residual impacts would be minimised as far as possible during detailed design, with further consideration of landscaping opportunities.

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