

14 Non-Aboriginal heritage

This chapter provides a summary of the non-Aboriginal heritage impact assessment undertaken by Biosis. A full copy of the assessment report is provided as Technical Report 8 – Historical heritage assessment and statement of heritage impact. The report was written to address the relevant SEARs which are outlined in Appendix A.

14.1 Assessment approach

14.1.1 Methodology

14.1.1.1 Study area

The study area considered heritage features and areas of archaeology within around 500 metres from the project site and the proposed location of signalling upgrades.

14.1.1.2 Key tasks

The assessment involved:

- a review of existing literature such as previously prepared heritage studies
- a review of statutory framework, guidance and implications to the project, including:
 - EPBC Act
 - *NSW Heritage Act 1977*
 - Fairfield City Wide Development Control Plan 2013 and Cabramatta Town Centre Development Control Plan 2014
 - Liverpool Development Control Plan 2008
 - Assessing Heritage Significance (Heritage Office, 2001)
 - Australia ICOMOS Charter for Places of Cultural Significance, (Burra Charter, 2013).
- a review of Heritage Schedules:
 - Fairfield Local Environmental Plan 2013, Liverpool Local Environmental Plan 2008 and other relevant planning instruments
 - Section 170 Register
 - State Heritage Register
 - National Heritage Register
 - Commonwealth Heritage Register.
- developing a photographic inventory and historical context of the project site
- carrying out a field inspection
- assessing the archaeological potential and significance of heritage features
- assessing the potential impacts of the project, and preparing the Statement of Heritage Impact, in accordance with the guidelines listed above.

A detailed description of the assessment methodology is provided in section 3 of Technical Report 8.

14.1.2 Risks identified

The preliminary environmental risk assessment undertaken for the project included potential risks associated with non-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.

The assessed risk level for the majority of potential non-Aboriginal heritage risks was medium. Risks with an assessed level of medium or above included:

- impacts to listed heritage items or items with heritage values due to demolition, altered historical arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment
- damage to heritage items from vibration during construction and operation
- disturbance of known or unidentified items or places of non-Aboriginal heritage significance
- design that detracts from the heritage significance of a nearby items.

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).

14.1.3 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 non-Aboriginal heritage impacts have been avoided/minimised where possible by:

- developing a construction methodology that avoided demolition of heritage structures, altering historical arrangements and access, landscape and vistas, curtilage, or activities which could result in subsidence
- preventing vibration impacts on heritage sites from the proposed signalling works (Villawood Railway Station Group and Liverpool Railway Station Group). Works will be located outside of vibration buffer distances.

The new bridge structures have been designed to minimise impacts on heritage through the following:

- the form, abutment and pier locations of bridges will match the existing SSFL bridges.
- the height will not exceed the height of the heritage listed bridges in order to minimise visually dominating the bridges.
- they will be built on the eastern side of the SSFL, as not to further block the view of the heritage listed bridges.

14.2 Existing environment

14.2.1 Historical context

The timing for the human occupation of the Sydney Basin is still uncertain. Archaeological evidence of Aboriginal occupation of the Cumberland Plains indicates that the area was intensively occupied from approximately 4,000 years before present. Aboriginal land ownership in the area is not clearly recorded within early historical references and would have changed through time, particularly after the arrival of Europeans in Sydney Cove in 1788.

The earliest settlements in the colony were generally located in areas such as rivers and coastal areas which could be easily accessed by boat. The earliest land grants in the Liverpool region were made in 1798, and in the Fairfield area from 1803, focusing around the Georges River as agricultural plots. The project site is located within the township of Cabramatta, part of a 300 acre grant originally purchased by Andrew White in 1818 and then acquired by John Bloomfield in 1884. The area of Fairfield was first developed around 1789–1806 and Liverpool 1799–1810.

In 1857, the single-track railway line from Granville to Liverpool, which formed part of the Main South railway line to Goulburn, was completed, with the Liverpool station opening in 1856. The timber beam bridge across Cabramatta Creek was replaced with brick arch bridges in 1891, using locally made bricks. These bridges were the first instances of the major use of brick arch bridges by the Railways network. With 17 spans, the Cabramatta Creek viaduct was the longest of these brick arch bridges. Around 2012, an additional bridge was constructed adjacent to the brick arch bridge to support a new track and associated infrastructure built for the South Sydney Freight Line.

14.2.2 Heritage listed items

There are multiple items within and adjacent to the project site which are listed either on the State Heritage Register created under the *Heritage Act 1977*, Section 170 New South Wales (NSW) State Agency Heritage Register or LEPs. A description of the items is provided in and below Table 14.1 and their locations are shown on Figure 14.1.

Table 14.1 Heritage items

Site number	Site name	Address / Property description	Listings - Individual item	Significance	Location
110	Federation cottage	132 Broomfield Street, Lot 11, section 6, DP 1656	Fairfield LEP 2013	Local (Fairfield LEP)	On the boundary of the project site
119	Cabramatta (Cabramatta Creek), Railway Parade & Sussex Street Underbridge	Railway Parade and Sussex Street (Cabramatta Creek)	Fairfield LEP 2013 RailCorp Section 170 Register	Local (Fairfield LEP, Section 170 register)	Within project site
1103	Villawood Railway Station Group	19 Villawood Road	Fairfield LEP 2013	Local (Fairfield LEP)	Near to project site
72	Liverpool Railway Station Group	Bigge Street (off), Lot 31, DP 859887; Part Lot 5, DP 226933	State Heritage Register Liverpool LEP 2008	State and local (Liverpool LEP)	State items near the project site, local items within project site

Federation cottage - The house has burned down since the heritage listing was updated in 2009. However the site of this heritage item is directly adjacent to the development and is listed as having local significance as a very good example of a Federation period, weatherboard farm or workers cottage. It was one of the oldest houses at Cabramatta. It is situated where the rail corridor is to be widened along Broomfield Street. As there has been no development on the lot there is a high potential for archaeological remains associated with the Federation cottage such as structural foundations and occupation deposits.

Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge - These two heritage items are listed together on RailCorp's Section 170 Register. The Cabramatta (Cabramatta Creek) Underbridge and the Railway Parade and Sussex Street Underbridge represent the earliest examples of brick arched underbridges built by NSW Railways from the 1890s using local building materials. With their original structure and fabric intact they are significant as fine examples of their type constructed by the NSW Railways.

Villawood Railway Station Group - This heritage item is listed as having local significance. Villawood is a typical roadside 1920s standard lineside island platform building without many subsequent changes. It is typical of many suburban buildings until 1924, after which the style was modified as on the East Hills line.

Liverpool Railway Station Group, - The Liverpool Railway Station Group consists of a locally listed area, and adjacent to the state listed group of buildings which includes the station building, goods shed and jib crane. Liverpool station building is a good example of a third class station building in the centre of a large scale redevelopment of the site. It indicates the change in technology and approach to railway construction. Liverpool goods shed is a rare brick structure on the State system which is substantially intact with platforms and jib crane. It is located in an historic town and is the last remnant of the early station and yard complex at the site. It is rare as one of the last two surviving brick goods sheds in the State.

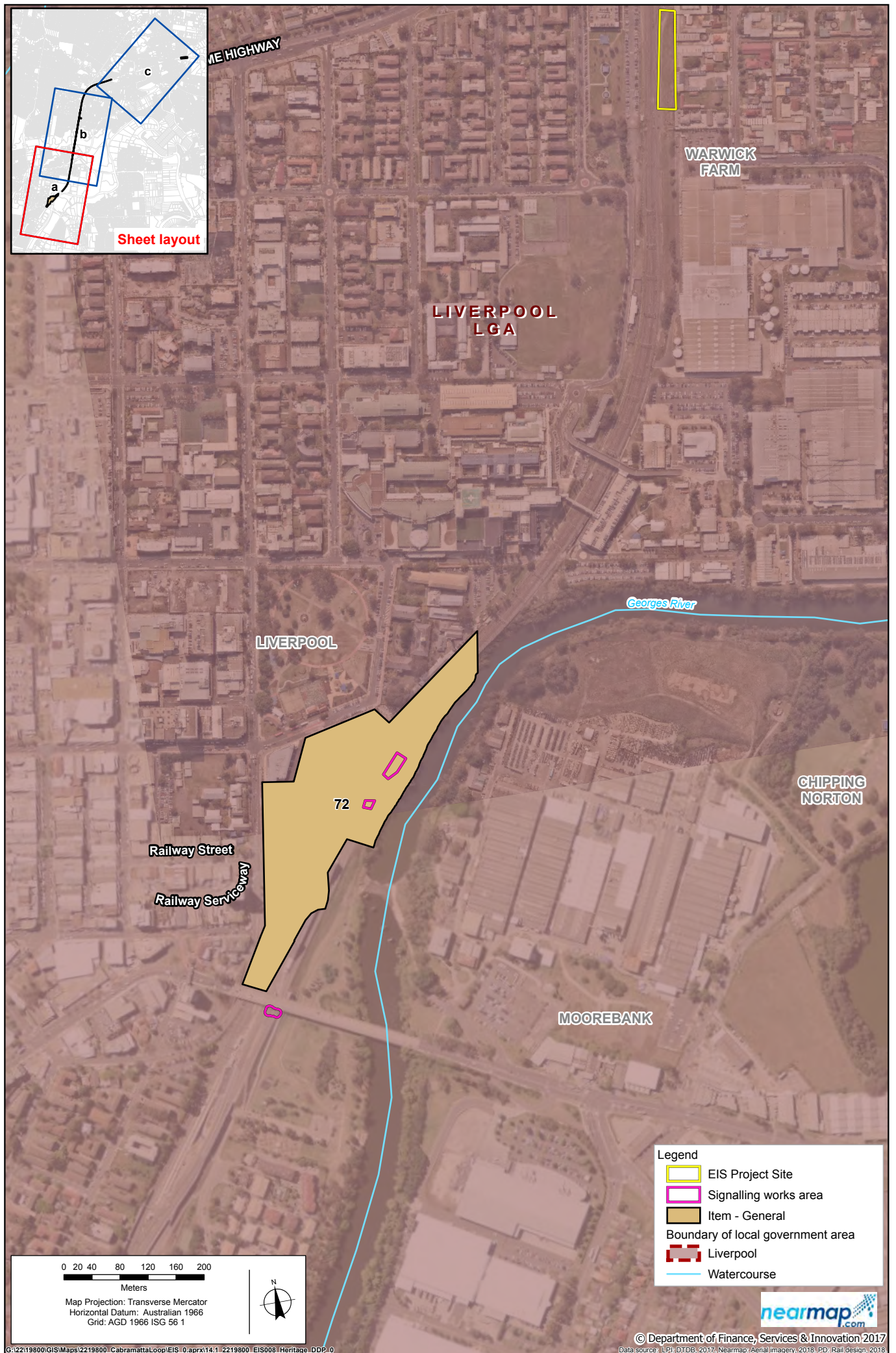


Figure 14.1a Listed heritage items

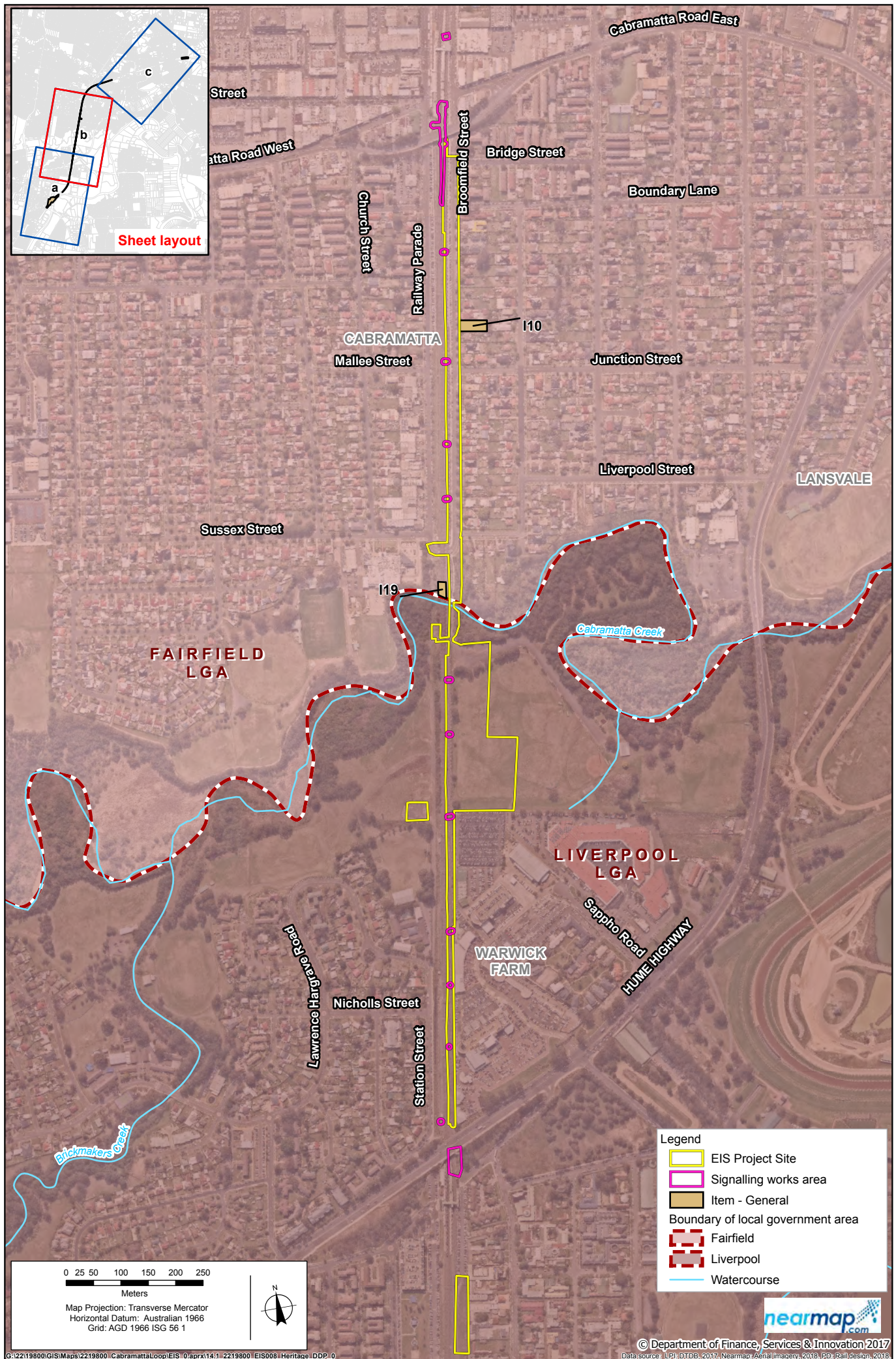


Figure 14.1b Listed heritage items



Figure 14.1c Listed heritage items

14.2.3 Archaeological sites and potential

The project site has been utilised for a range of different uses. These vary from agriculture and animal husbandry to more modern uses such as rail tracks and large areas of vacant public spaces. This assessment has identified that there may be archaeological material present within the project site related to the early ownership and use of the land for agricultural and animal husbandry purposes. This could include evidence of land clearance, plough lines, agricultural marks, post holes from fence lines and rubbish pits. Evidence of later use as a railway corridor could include evidence of crossings such as gate and fence post holes, impressions or post holes of the foundations of a timber bridge, post holes of gates and sandstone or sandstock bridge drain structures and infrastructure related to the 1857 railwayline.

Due to the ephemeral nature of the early remains and the subsequent upgrade of the rail line, the archaeological potential has been assessed as low. The archaeological materials have also been assessed as not holding heritage significance.

The project site has been continually updated and the installation of the infrastructure for electrifying the track in 1929 and construction of the SSFL would have also disturbed any subsurface remains which were present. While there may be disturbed and undisturbed archaeological material associated with these activities within the project site, it is unlikely that any remains would provide further information regarding to agriculture, pastoralism and transport that could not be derived from any other source and which contributes to the archaeological significance of the site.

The assessment of archaeological potential for the project site has been categorised as having low archaeological potential for all site features as summarised in Table 14.2.

Table 14.2 Assessment of archaeological potential

Designation	Description	Probable feature(s)	Possible construction date	Archaeological potential
1	Crossing	Gate or fence post holes	1884	Low
2	Crossing	Gate or fence post holes	1884	Low
3	Railway line	Trenches for tracks or track bedding	1857	Low
4	Timber bridge	Impressions or post holes of the foundations	1867	Low
5	Gates	Post holes	1867	Low
6	Drains	Sandstone or brick structural remains	1867	Low
7	Cabramatta Creek Underbridge	n/a	1891	Still present
8	Railway Parade and Sussex Street Underbridge	n/a	1891	Still present
9	Southern Sydney Freight Line	n/a	2012	Still present

14.2.4 Significance assessment

An assessment of heritage significance encompasses a range of heritage criteria and values. The heritage values of a site or place are broadly defined as the 'aesthetic, historic, scientific or social values for past, present or future generations'. This assessment is based on seven criteria outlined in the guidance document *Assessing Heritage Significance* (Heritage Office, 2001).

Much of the possible potential archaeological resource relating to the agriculture and animal husbandry period described in section 14.2.3, is ephemeral in nature, likely to be disturbed and unlikely that any remains would provide further information.

Remains relating to the construction of the railway would have likewise been disturbed by the constant upgrading of the tracks and the SSFL which was constructed in 2012. The possible archaeological remains relating to construction of the railway within the project site, would have no significance and do not satisfy any of the significance assessment criteria. The archaeological potential for this is also low.

The Cabramatta (Cabramatta Creek), Railway Parade & Sussex Street Underbridge satisfies two of the seven criteria outlined in the guidance document *Assessing Heritage Significance* (Heritage Office, 2001).

Criteria C: An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area) - The bridges have aesthetic and technical significance at a local level as they exemplify the particular brick arch viaduct design employed by the NSW Railways during the period from the 1890s to the 1920s. The bridges are aesthetically distinctive and have landmark qualities because of their size and setting. The viaduct over Cabramatta Creek is especially significant due to the large number of spans and the use of sandstone in the arch imposts. The new adjacent bridges partially obstruct views to the bridges on one side impacting their aesthetic and landscape values. The Cabramatta (Cabramatta Creek), Railway Parade & Sussex Street Underbridge satisfies this criterion at a local level.

Criterion G: An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places, or cultural or natural environments. (or a class of the local area's cultural or natural places, or cultural or natural environments) - The two bridges at Cabramatta have a high level of integrity and are good representatives of this type of arched brick viaduct which were constructed by NSW Railways from the 1890s to the 1920s and which were the first examples of their type. The bridge over Cabramatta Creek has significance as it utilises sandstone in the arch impost in place of the brick which has been used in much of the other viaducts. This bridge particularly is an outstanding example because of its picturesque natural setting over Cabramatta Creek and the number of arches and long length of the structure, making it the longest of 1890s brick viaducts on this section of the line. The Cabramatta (Cabramatta Creek), Railway Parade & Sussex Street Underbridge satisfies this criterion at a local level.

This assessment has not identified any information which would lead to an alteration in the assessment of significance for this item, and its statement of significance is as it appears on the State Heritage Inventory.

14.3 Assessment of construction impacts

14.3.1 Impact on archaeological potential

Construction works have the potential to directly impact archaeological potential through ground works such as piling, excavations for relocating services and activities relating to establishing compound sites such as temporary drainage works. This can result in the direct destruction or damage to an item.

Archaeology could also be impacted by vibration or compaction of the ground surface from heavy plant and construction vehicles. This could result in shifting or compaction of soils damaging or destroying buried artefacts.

This assessment has identified that there may be archaeological material present within the project site related to the early ownership and use of the land for agricultural and animal husbandry purposes and evidence of later use as a railway corridor.

Due to the ephemeral nature of the early remains and the subsequent disturbance during upgrades of the rail line, the archaeological potential has been assessed as low. The archaeological materials have also been assessed as not holding heritage significance.

Therefore impacts to archaeological material present or archaeological potential is considered to be low.

14.3.1.1 Liverpool Railway Station Group (72) and Villawood Railway Station Group (I103)

The signalling work has the potential to be either within or adjacent to these heritage items or their curtilage. Vibration impacts and earthworks from the signalling works could affect archaeological resource within the locally listed area of these items. The signalling works involve minor earth works and the construction of signalling equipment and associated infrastructure which may disturb buried archaeological resources. Vibration could also cause shifting or compaction of soils which may damage buried artefacts. The works are proposed within the existing rail corridor and there is the potential to move the new signalling locations to areas outside of vibration buffer distances or areas with archaeological potential, to avoid impacts.

14.3.1.2 Federation cottage (I10)

The heritage listed Federation Cottage has burnt down. There is the potential for archaeological remains to still exist within the Federation Cottage (I10) heritage site, therefore the project may indirectly impact the heritage site through vibrations from the construction works, disturbing buried artefacts. However, the potential for these impacts is likely to be low. Additionally, while this item is located outside the project site the project has the potential to directly impact archaeological remains within the heritage site if utilities relocation works are undertaken at this location.

Impacts to archaeological remains would be adequately managed through the mitigation measures provided in Table 14.3. Vibration impacts to archaeological remains would be adequately managed through the mitigation measures provided in Table 9.17.

14.3.2 Impacts on heritage items

No heritage items would be removed, altered or demolished as a result of the project therefore there would be no direct impacts to heritage items within the project site.

Heritage listed items within or adjacent to the project could be indirectly impacted due to alterations to the environment or setting of a heritage item which will result in a loss of heritage value. This may include permanent or temporary visual, noise or vibration impacts caused during construction and after the completion of works.

The following sites have the potential to be indirectly impacted during the construction phase:

- Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19)
- Federation cottage (I10).

Minor works in the form of new signalling works would be installed at a number of locations within the rail corridor. Indicative locations for the signalling works are shown in Figure 14.1 however the exact locations would be determined during detailed design. This signalling work has the potential to be either within or adjacent to two heritage items or their curtilage. There is the potential however, to move the location of the signalling work to avoid any potential indirect impacts to heritage features. These items are:

- Liverpool Railway Station Group (72)
- Villawood Railway Station Group (I103).

14.3.2.1 Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19)

The project would include new bridges being built near to the existing heritage rail bridges (with the SSFL situated between the proposed bridge and the heritage listed item). The design of the new bridges would match the existing SSFL bridges and the new bridges would be structurally independent from, and would not be connected to the existing bridges (refer to section 6.2 for further detail).

Vibration from equipment, groundworks and construction activities could result in vibration compromising the structural integrity of the bridge structure. This could result in cosmetic damage detracting from the visual appeal of the structure. The development may also effect the technical significance of the item, if damage prevented or changed the original use of the item, where that use is part of the heritage value.

Bridge works and road alignment works at Sussex Street will be undertaken near this heritage item and would include the use of excavators, piling (bored) and other equipment that has the potential to cause impact to this

heritage item if used within their relative vibration safe working distances (refer to section 9.3.6). Therefore, a detailed review of work methods and equipment selection would be undertaken. A dilapidation survey would also be required to confirm whether the structure is considered structurally unsound. If this heritage item is still located inside the vibration safe working buffer distances after review of the construction methodology, equipment with lower vibration emissions should be considered. If this is deemed unfeasible, then a long term monitoring and alarm system may be required to warn operators in real time when vibration levels are approaching the allowable limits.

14.3.2.2 Federation cottage (I10)

The proposed works along Broomfield Street would include groundworks, construction of new structures, roadworks and removal of a number of trees. It would also include a number of utilities and services to be adjusted.

These works would result in a change to the existing setting of the area adjacent to the heritage listed Federation Cottage. The aesthetic significance of the house is no longer present as it has burnt down.

14.3.2.3 Liverpool Railway Station Group (72) and Villawood Railway Station Group (I103)

The signalling works have the potential to impact on the local and State listed Liverpool Railway Station Group and the locally listed Villawood Railway Station Group. The proposed works may be located within the local listings and near the State listed items.

The signalling works would involve ground disturbance and use of equipment which may cause vibration. This could indirectly impact structures within the station group, through cosmetic damage detracting from the visual appeal of structures. Vibration may also effect the technical significance of the items, if damage prevents or changes the original use of the items, where that use is part of the heritage value. The equipment proposed for this work includes the use of excavators, handheld equipment and light and heavy vehicles. The conservative vibration safe working distance for an excavator is six metres, therefore use of an excavator within this distance has the potential to cause vibration impacts.

Where possible, the proposed signalling work would be located outside of the heritage items. If following detailed design, the proposed works are located inside the vibration safe working buffer distances (refer to section 9.3.6) of the heritage items, equipment with lower vibration emissions should be considered. If this is not possible a dilapidation survey should be undertaken to confirm the structural integrity of the items and monitoring may be required.

Construction impacts to heritage items would be adequately managed through the mitigation measures provided in Table 14.3. Vibration impacts to heritage items during construction would be adequately managed through the mitigation measures provided in Table 9.17.

14.3.3 Cumulative impacts

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

There are no other known construction projects proposed in the vicinity of the project site. Therefore no cumulative impacts with other projects are predicted.

During scheduled possession periods there may be other rail maintenance work being conducted within the Sydney Trains rail corridor next to the SSFL, including in the vicinity of the Cabramatta (Cabramatta Creek), Railway Parade & Sussex Street Underbridge. This may result in vibration from construction works being exacerbated during this period. Vibration from these activities would be managed with standard mitigation measures to avoid where possible and minimise impacts to heritage structures.

14.4 Assessment of operation impacts

14.4.1 Impact on archaeological potential

No impacts on archaeological potential are predicted during operation of the project.

14.4.2 Impacts on heritage items

The following sites have the potential to be impacted during the operational phase:

- Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19)
- Liverpool Railway Station Group (72)
- Villawood Railway Station Group (I103).

14.4.2.1 Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19)

The presence of the proposed bridges near the heritage listed Cabramatta Creek and Sussex Street underbridges could alter the setting of this listed item. This could include the existing aesthetic and technical significance and the characteristics of local cultural places that give this item its heritage value. However, given that the bridges would be located on the eastern side of the existing SSFL bridges and the design of the proposed bridges would match the SSFL bridges this impact is considered minor.

There is the potential for vibration impacts during operation due to an increase in train volumes. However, given the existing use of the heritage bridges by Sydney Trains and the use of the adjacent SSFL this impact is difficult to quantify. A dilapidation survey would be undertaken during construction to assess the structural integrity of the heritage listed bridges. If this survey notes there is structural damage to the bridges then there may be a need for a structural assessment to be undertaken to assess potential impacts due to vibration from trains.

14.4.2.2 Liverpool Railway Station Group (72) and Villawood Railway Station Group (I103)

The Liverpool Railway Station Group consists of a state listed group of buildings which includes the station building, goods shed and jib crane within a locally listed area. The Villawood Railway Station Group is a item of local significance consisting of a typical roadside 1920s standard lineside island platform building. The project in these location would entail new signalling equipment, including a signalling location hut and axle counter at Liverpool Station and an axle counter at Villawood Station.

The aesthetic significance of these listings are unlikely to be impacted by the proposed infrastructure. The signalling location hut at Liverpool is located on the eastern side of the rail line, and will not block or impede views to the Liverpool Railway Station Group. To its east, it is visually screened by plantings along the banks of the Nepean River. From the surrounding Moore and Bigge Streets, works within the rail corridor are visually screened by extant structures and fencing. The hut will be located at a lower elevation than the station buildings to ensure that it does not visually dominate the landscape.

Smaller infrastructure consisting of axle counters and other items of a similar scale will also have a negligible visual impact at both Liverpool Station and Villawood Station and the proposed infrastructure is generally consistent with the existing rail infrastructure in the rail corridor.

Potential operational impacts to heritage items would be adequately managed through the mitigation measures provided in Table 14.3. Vibration impacts to heritage items during operation would be adequately managed through the mitigation measures provided in Table 9.17.

14.4.2.3 Federation cottage (I10)

The project would result in changes to the existing setting of the area adjacent to the heritage listed Federation Cottage due to the removal of street trees and the introduction of new structures. However, the aesthetic significance of the house is no longer present as it has burnt down. ARTC would consult with Council to request a revision to the heritage significance of this item given that there is no above ground structure present.

Potential operational impacts to heritage items would be adequately managed through the mitigation measures provided in Table 14.3. Vibration impacts to heritage items during operation would be adequately managed through the mitigation measures provided in Table 9.17.

14.4.3 Cumulative impacts

Operational impacts to heritage structures is predicted to be localised and relate to aesthetic and technical significance and principal characteristics of local cultural places. There are no other known construction projects

proposed in the vicinity of the heritage items or archaeological sites that would result in additional impacts. As such, no cumulative impacts are expected to occur.

14.5 Management of impacts

14.5.1 Approach

14.5.1.1 Approach to mitigation and management

ARTC is committed to minimising the environmental impact of the project and is investigating opportunities to reduce actual impact areas where practicable.

Measures to avoid impacts in the first instance have been addressed in the reference design and construction methodology (refer to section 14.1.3). The mitigation measures proposed have been formulated to respond to the heritage requirements of the SEARS and the significance of the site. They are guided by the ICOMOS Burra Charter with the aim of minimising impacts to the heritage significance of sites and to retain their cultural significance. Standard construction mitigation measures will be included in the project CEMP.

14.5.1.2 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 vibration impacts have been included in the reference design (refer to section 14.1.3). Further pre construction impacts will be avoided by attended vibration measurements of vibration generating equipment (e.g. bored piling, vibratory rolling works) being undertaken prior to works near heritage structures located inside the vibration impact zones (refer to details provided in section 9.6). This will confirm the minimum working distances or suitable equipment for vibration intensive activities to avoid and minimise potential impacts.

In addition vibration management measures will be included with the CEMP. The CEMP will be prepared during the detailed design stage of the project and applied to all construction processes throughout the project.

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.

14.5.2 List of mitigation measures

The mitigation measures that would be implemented to address potential non-Aboriginal heritage impacts are listed in Table 14.3. Additionally, mitigation measures to mitigate vibration impacts to non-Aboriginal heritage items are listed in Table 9.17.

Table 14.3 Mitigation measures

Stage	Impact	Measure
Design	Changes to aesthetic significance and views to/from Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19)	As per the current reference design, detailed design of the bridges will ensure the height, form, abutment and pier locations of both bridges matches the existing SSFL bridges.
	Changes to the aesthetic significance by the size and placement of the project, obscuring or blocking views to/from: - Liverpool Railway Station Group (72) - Villawood Railway Station Group (I103)	The visible infrastructure will be as small as possible to not obscure views to/from the item and not to visually dominate the landscape.

Stage	Impact	Measure
	Changes to the aesthetic significance of the Federation cottage (I10).	ARTC will consult with Council to request the heritage significance of this item is updated to reflect the fact that the cottage has burnt down.
Construction	Disturbance to possible archaeological remains within the curtilage of the Federation cottage (I10)	Works in the road corridor including utility works that need to be adjusted will not encroach on the curtilage of this heritage item so as not to disturb any possible archaeological remains.
	Impact to archaeological heritage	The CEMP will contain measures to protect non-Aboriginal archaeological relics. This will include an unexpected finds protocol and heritage induction materials to ensure all onsite staff can identify items with potential archaeological heritage significance. During pre-work briefings, onsite staff will be made aware of the unexpected finds procedure and obligations under the <i>Heritage Act 1977</i> .
	Impact to archaeological heritage	The unexpected finds protocol will include the following at a minimum: In the event that unexpected archaeological remains, relics, or potential heritage items are discovered during construction, all works in the immediate area would cease, and the remains and potential items would be assessed by a qualified archaeologist or heritage consultant. If necessary, the Heritage Division of OEH would be notified in accordance with the requirements of section 146 of the Heritage Act 1977.

14.5.3 Consideration of the interaction between measures

Mitigation measures to control impacts to the heritage items and archaeology from the project may replicate mitigation measures proposed for the control of impacts associated noise and vibration.

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.

14.5.4 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.

Minor residual impacts have the potential to occur during construction. These would relate predominantly to visual intrusion to the setting of heritage features from construction equipment and activities and from vibration. Impact from visual intrusion and vibration would be temporary and will be minimised through the implementation of relevant mitigation measures. Therefore these are not expected to be significant.

Residual impacts during operation relate to aesthetic and technical significance and principal characteristics of local cultural places to the Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19). This impact would be minor and arises from the new bridge structures and additional rail infrastructure. Opportunities to reduce these impacts through refinement of the design during detailed design, would continue to be investigated.

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 flood plains.

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.

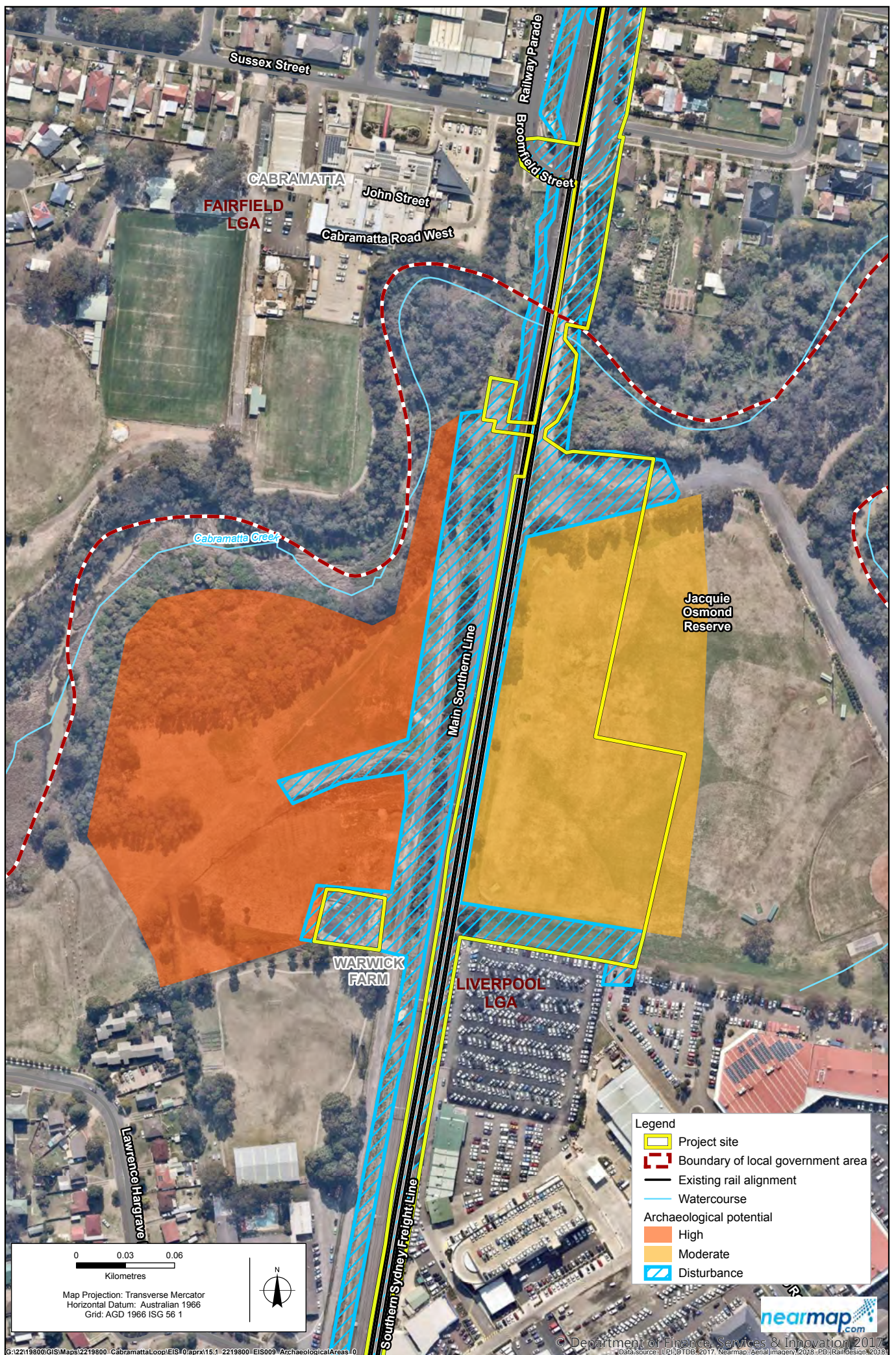


Figure 15.1 Areas of archaeological potential

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 Plains 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 Plains 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 <i>National Parks and Wildlife Act 1974</i> . 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 <i>NSW Skeletal Remains: Guidelines for Management of Human Remains</i> (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.

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK