

A decorative graphic consisting of several horizontal rectangles of different colors (green, blue, dark brown, light beige) arranged in a staggered, overlapping pattern across the upper and middle sections of the page.

PART C

SYNTHESIS AND CONCLUSION

**CABRAMATTA
LOOP PROJECT**

—
ENVIRONMENTAL
IMPACT STATEMENT

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

22 Approach to environmental management and mitigation

This chapter, together with Chapter 23 (Project justification and conclusion), provides a synthesis of the EIS. This chapter compiles the key potential impacts that have not been avoided, and the measures proposed to avoid, minimise, manage or offset the impacts identified in Part B. The chapter also provides the outcomes the proponent is seeking to achieve through the implementation of the mitigation measures.

22.1 Compilation of impacts

Part B of the EIS provides an assessment of the potential impacts of the project during construction and operation. The key potential impacts requiring mitigation and management (that is, the impacts that have not been avoided) are summarised in Table 22.1.

Impacts would be mitigated by implementing the environmental management procedures and plans described in section 22.2, and the mitigation measures compiled in section 22.3.

Table 22.1 Summary of key potential impacts

Issue	Key potential impacts
Traffic, transport and access	During construction there would be local traffic disruptions and short-term access restrictions and detours for road users, pedestrians and cyclists during road and bridge works. Access diversions would be in place for pedestrians and cyclists during works on Cabramatta Creek bridge. There may be temporary access restrictions to properties along Broomfield Street due to utility works. Up to about 46 on-street parking spaces (consisting of both formalised angled parking and informal kerbside parallel parking) would be unavailable during construction works on Broomfield Street, however options are being considered to provide an accessible temporary at-grade parking area during construction with provision for about 40 parking spaces within 800 metres of Cabramatta Station. Once operational, the project would result in the loss of some parking spaces on the western side of the road as a result of angled parking converted to parallel parking. Up to 11 spaces are anticipated to be impacted.
Noise and vibration	Given the nature and duration of works and close proximity of receivers, airborne noise during construction is expected to exceed noise management levels along the alignment. Receivers located along Railway Parade, Broomfield Street, Station Street, Lawrence Hargrave Road, Todman Road and Sappho Road would be expected to experience the worst-case noise impacts as they are located directly adjacent to the construction works. Construction works would be required outside standard construction hours, due to the need to minimise impacts on the road network. During the night time period, airborne noise levels are expected to exceed the criteria at some locations during certain activities. Residential receivers within 140 metres of vibration intensive works have the potential to experience impacts on human comfort. However, this assessment is considered conservative and the construction vibration would be intermittent. The existing noise wall would be replaced as part of the project. The predicted noise levels would be exceeded for one sensitive receiver with the replacement noise wall in place during operation. This receiver will be considered for mitigation.

Issue	Key potential impacts
Air quality	In general, air quality impacts are expected to be minor and manageable through established mitigation and management measures. Potential impacts would result from the generation of dust from construction works and the movement of equipment and machinery. Once operational, the increase in the number of diesel freight trains has the potential to increase levels of pollutants such as nitrogen oxides and particulate matter.
Biodiversity	The project would remove small areas of native vegetation which could provide some nesting and foraging habitat anticipated to total about half a hectare. This would not result in a significant impact on threatened species.
Hydrology, flooding and water quality	The majority of construction activities and the presence of construction compounds and work sites have the potential to impact local overland flows and flood behaviour. Runoff or rainfall within the project site has the potential to cause localised flooding issues and adverse downstream impacts. There may be impacts on downstream water quality as a result of key activities such as earthworks. The inclusion of structures such as the bridges will increase flood levels by up to 75 mm during a PMF flood event. This would only be in areas where the rail formation is predicted to be flooded by several metres depth. Works to the drainage design along Broomfield Street have the potential to increase existing flooding levels at a number of properties along Broomfield Street. The design of Broomfield Street would be refined during detailed design with the aim of not worsening the existing flooding conditions.
Soils and water quality	Erosion and sedimentation during construction could result in the contamination of soils and surface waters. This may impact on downstream water quality. Leaks and spills during construction and operation may cause contamination impacts to soil and water. During the operation of the project, maintenance and repair activities may require excavation and ground disturbance, which could result in short-term impacts such as exposure of soil to runoff and wind.
Heritage	During construction, there is potential for vibration impacts to two locally listed bridges adjacent to the proposed bridges (Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19) and the archaeological remains of a locally listed federation cottage (Federation cottage (I10)). There is also the potential for disturbance to possible archaeological remains of the Federation cottage (I10) due to construction vibration. Impacts to the area of moderate archaeological potential within Jacquie Osmond Reserve cannot be avoided as utility works are required.

Issue	Key potential impacts
Land use and property	Within the project site, some areas of land would need to be temporarily leased or occupied to locate some of the proposed compounds and work sites and to relocate the Sydney Waters main. As a result, the use of this land would change from its existing use (mainly transport and public recreation) to use as a partial and temporary construction site. Where the compound and work sites are proposed, the recreational use of Jacquie Osmond Reserve and Warwick Farm Recreation Reserve would be temporarily restricted during construction. The partial acquisition of land at the southern extent of the project may impact on the businesses ability to access buildings adjacent to the acquired land. Additionally, the partial acquisition of Jacquie Osmond Reserve and construction of the embankment may require the movement of up to three of the existing softball diamonds up to ten metres to the east. This would be further refined during detailed design.
Landscape and visual amenity	Adverse impacts during construction and operation would occur where the project is located within or adjacent areas of landscape or visual sensitivity, such as heritage or natural landscapes (such as Cabramatta Creek), open spaces (such as Jacqui Osmond Reserve) or key urban landscapes (such as along Broomfield Street). In most cases this impact is due to the loss of established trees or vegetation. Urban design responses through plantings and selection of finishes to be determined during detailed design, would minimise the permanent impacts on landscape and visual setting; however, some adverse impacts would remain.
Socio-economic	Changes in existing access arrangements and connectivity along Broomfield Street, Sussex Street and the shared path could result in a temporary increase in the distance travelled, increased travel times, inconvenience and delays for some community members. There may be impacts on the amenity of the local community as a result of an increase in noise levels, traffic movements and congestion, dust, and changes in visual outlook. There are beneficial impacts of the project during construction. This includes employment (an estimated average workforce of 220 people), and flow on local and regional economic benefits. Once the project is in operation, there will be changes to access and connectivity due to parking losses along Broomfield Street. There may be potential impacts on the amenity of the local community due to the increased train volumes. There may also be potential impacts to the use of the softball fields in Jacquie Osmond Reserve.
Health safety and hazards	Adjustments or protection works would be carried out with the involvement of the asset owner, and potential impacts are manageable through established mitigation and management measures. During construction, there would be public health and safety risks due to the proximity of sensitive receivers to the project site. This may result in traffic confusion, injury, potential exposure to contaminated land, access issues, air quality impacts and noise and vibration impacts. During construction and operation, the storage and handling of dangerous goods and hazardous materials could cause leaks and spills, with resultant contamination and health impacts. Once operational, there may be potential security risks associated with unauthorised access to the rail corridor.

22.2 Approach to environmental management

The approach to environmental mitigation and management for the project involves:

- Project design – as described in section 6.1.2, the project incorporates measures to avoid and minimise impacts.
- Environmental performance outcomes – establishes the intended outcomes to be achieved by the project. The environmental performance outcomes are provided in section 22.4.
- Mitigation measures – mitigation measures provided in Chapters 8 to 21 are identified as an outcome of the environmental impact assessment, and are consolidated in section 22.3.
- Engagement of suitably qualified and experienced Environmental Representative (ER) who is independent from the design and construction personnel for the project and those involved in the delivery of it. The ER would:
 - receive and respond to communication from the Secretary of the Department of Planning, Industry and Environment in relation to the environmental performance of the project
 - consider and recommend to ARTC any improvements that may be made to work practices to avoid or minimise adverse impact to the environment and the community
 - review the EMPs for enabling works, and the CEMP (and associated sub-plans) for the main construction works.
- ARTC's Site EMP(s) for enabling works– ARTC's existing Site EMP template will be used to guide the approach to environmental management during the enabling works, as described in section 22.2.1. The Site EMP(s) would:
 - detail how the mitigation measures detailed in the EIS and as relevant to the enabling works would be implemented to project personnel
 - show (using a graphical tool) where environmental controls will be located and how they will be used
 - document processes for environmental monitoring to demonstrate compliance.
 - be reviewed and approved by the independent ER prior to commencement of the relevant enabling works
- Project specific CEMP– prepared to guide the approach to environmental management during the main construction works, as described in section 22.2.1. The CEMP would:
 - outline the environmental management practices and procedures to be followed
 - detail how the mitigation measures and performance outcomes would be implemented and achieved during construction
 - document processes for demonstrating compliance with the commitments made in this EIS, the submissions/preferred infrastructure report (to be prepared), and relevant approval conditions
 - be prepared in consultation with relevant agencies and in accordance with the *Guideline for the Preparation of Environmental Management Plans* (DIPNR, 2004).
- Community and stakeholder engagement plan – The plan would aim to detail the approach to communicate between ARTC and its Construction Contractor(s), and the community and government authorities.

- ARTC's Environmental Management System – ARTC's Environmental Management System is a structured framework for the consideration, evaluation, management, regulatory compliance and reporting of environmental issues associated with its activities. The Environmental Management System supports ARTC's environment policy and outlines processes to guide compliance with environmental laws, statutes, regulations and corporate policies while managing potential environmental impacts.

The principal benefits of operating the ARTC Environmental Management System is that it provides clear definition of the corporate environmental goals, documented policies and procedures to prevent or minimise environmental damage and achieve legal compliance, improved management of environmental risks, documented roles and responsibilities and improved community relationships.

Given that the operation of the project would be consistent with the adjacent existing operating line, environmental issues and impacts which occur during operation and maintenance, would be managed under ARTC's Environmental Management System, which accommodates relevant management measures to the operation phase identified in this EIS.

22.2.1 Site EMP(s)

The Site EMP(s) for enabling works would include:

- key project information relevant to the relevant enabling works being undertaken including:
 - a description of the relevant activities as per the approved EIS
 - timeframes and hours of work for the tasks being undertaken (including any out of hours works and restriction on high noise-generating activities).
- contact details for key project personnel (including after hours) and community response line (Enviroline) contact number
- consultation requirements as it relates to the relevant activities proposed
- a site plan with a north point, legend and scale that shows:
 - the worksite layout and boundary, including entry/exit points, internal and adjacent roads, adjoining land use and nearest noise sensitive receivers
 - contours/elevation points and/or direction of slope/s
 - existing major services that may be in conflict or high risk
 - key environmental risk issues and the specific mitigation measures that apply to the enabling works as identified in the EIS including:
 - location and type of sediment and erosion control measures,
 - dust control measures
 - location of monitoring equipment (eg dust, noise, vibration monitors) and frequency of monitoring/inspections
 - location of environmentally sensitive areas (eg threatened species, critical habitat, contaminated areas, heritage zones, etc)
 - location of the construction compound, waste management facilities and worker car parking (including any parking restrictions)
 - vegetation and trees to be protected or removed, with any actions required prior to felling
 - location of known heritage (Aboriginal or non-Aboriginal) items

- location of spill containment and clean-up equipment
- location of stormwater drainage and watercourses leading to/from the worksite.
- document control and approval details.

The Site EMP(s) would be reviewed and approved by the independent ER. They would be reviewed regularly, in response to changes such as activities and environmental conditions, to ensure ongoing environmental management. The Site EMP(s) would be used in project inductions and tool box talks and would be placed in central locations for reference by all project personnel.

22.2.2 CEMP

Developed prior to commencement of main construction works, the CEMP would include:

- ARTC's environmental policy, objectives, and performance targets for construction
- relevant sub-plans as specified by the mitigation measures provided in Chapters 8 to 21
- reference to all relevant statutory and other obligations, including consents, licenses, approvals, and voluntary agreements required
- management policies, procedures, and review processes to assess the implementation of environmental management practices and the environmental performance of the project against the objective and targets
- requirements and guidelines for management in accordance with:
 - the conditions of approval for the project
 - the mitigation measures specified in this EIS
 - relevant construction management guidelines (including those provided in Chapters 8 to 21).
- requirements in relation to incorporating environmental protection measures and instructions in all relevant standard operating procedures and emergency response procedures
- roles and responsibilities of all personnel and contractors to be employed on site
- incident and contingency management procedures
- procedures for complaints handling and ongoing communication with the community
- a monitoring and auditing program, as defined by this EIS.

The CEMP would be adaptive, establishing a continuous cycle of monitoring, assessment, investigation and corrective actions. This process would be used to continuously evaluate and monitor the effectiveness of the environmental management measures proposed in this EIS and identify the corrective actions to be carried out should such measures be identified as being ineffective.

Compliance monitoring would be undertaken in the form of audits, including site audits as undertaken by ARTC and the ER. Frequency and reporting parameters would be identified in the CEMP.

Prior to commencement of main construction works, a compliance tracking and reporting program would be developed as part of the CEMP and implemented by the Construction Contractor(s). It would aim to monitor compliance with this EIS, relevant conditions of approval, licences and permits.

22.2.3 Community and Stakeholder Engagement Plan

A community and stakeholder engagement plan would be prepared prior to the commencement of main construction works, and would be developed in consultation with Fairfield City Council and Liverpool City Council. The plan would aim to detail the approach to communicate between ARTC and its Construction

Contractor(s), and the community and government authorities. The community and stakeholder engagement plan would:

- identify people, organisations and government authorities to be consulted during the works,
- set out procedures and mechanisms for the regular distribution of accessible information to keep the community and stakeholders informed in accordance with the measures outlined in this EIS
- set out the procedures and mechanisms for consulting with relevant councils and government authorities including procedures for nil responses
- describe the method for advertising the 24 hour response line and email address for enquiries
- set out procedures and mechanisms for response to enquiries and feedback
- include a complaints management system which outlines parameters for recording information on all complaints received during main construction work
- set out procedures and mechanisms to resolve any issues and disputes that might arise in relation to environmental management associated with the project.

22.3 Compilation of mitigation measures

Table 22.2 to Table 22.4 provide a compilation of the measures proposed to mitigate and manage the potential impacts of the project, as detailed in Part C. The measures listed may be revised in response to submissions raised during public exhibition of the EIS and/or any design changes made following exhibition. The final list of mitigation measures would be provided in the submissions/preferred infrastructure report.

If the project is approved, the project would be undertaken in accordance with the conditions of approval and the final list of mitigation measures.

The measures are broadly grouped according to the main stage of implementation. However, it is noted that the implementation of some measures may occur across a number of stages.

Table 22.2 **Compilation of mitigation measures for detailed design**

Ref	Issue	Mitigation measures
D1	Noise and vibration	
D1.1	Vibration impacts on heritage sites: Villawood Railway Station Group and Liverpool Railway Station Group	The signalling works near Liverpool Railway Station and Villawood Railway Station will be located outside of vibration buffer distances, where possible.
D2	Hydrology, flooding and water quality	
D2.1	Stormwater runoff	Where feasible and reasonable, detailed design will result in no net increase in stormwater runoff rates in all storm events, unless it can be demonstrated that increased runoff rates as a result of the project would not increase downstream flood risk.
D2.2	Scour potential	Any existing rip rap that is impacted or removed during construction would be reinstated. This would include the provision of rip rap around the piers and abutments of Cabramatta Creek bridge. The design of the rip rap will take into consideration the size, quantity and type of rip rap with the aim of not causing additional impacts to water quality.

Ref	Issue	Mitigation measures
D2.3	Water quality	The project will be designed to ensure there is minimal potential for water quality impacts, including incorporating water sensitive urban design elements.
D2.4	Groundwater	A water license will be obtained as necessary in accordance with Part 5 of the <i>Water Act 1912</i> if dewatering of excavations is required.
D2.5	Flooding	Further assessment and design refinement will be undertaken during detailed design with the objective of not exceeding the following flooding characteristics during the one per cent AEP event: ■ a maximum increase in time of inundation of one hour in a one per cent AEP event ■ a maximum increase in 50 mm in inundation at properties where floor levels are currently not exceeded ■ a maximum increase in 10 mm in inundation at properties where floor levels are currently exceeded. In the event this cannot be met further mitigation would be proposed in consultation with the relevant councils.
D3	<i>Non-Aboriginal heritage</i>	
D3.1	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.
D3.2	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.
D3.3	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.
D4	<i>Aboriginal heritage</i>	
D4.1	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)..
D4.2	Impacts to archaeological heritage with the area of moderate potential in	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

Ref	Issue	Mitigation measures
	Jacquie Osmond Reserve.	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.
D5	Land use and property	
D5.1	Property acquisition	All acquisitions/adjustments will be undertaken in consultation with landowners and relevant acts.
D5.2	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.
D5.3	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.
D5.4	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.
D6	Landscape and visual amenity	
D6.1	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.
D6.2	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.
D6.3		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.
D6.4	Visual impact from new bridges	The design and materiality of the bridges will integrate with the existing built form in accordance with <i>Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW</i> (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.
D6.5	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.

Ref	Issue	Mitigation measures
		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.
D6.6	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.
D7	Socio- economic impacts	
D7.1	Socio-economic impacts	ARTC will continue to work with stakeholders and the community to ensure they are informed about the project and have opportunities to provide feedback to the project team. The existing community contact and information tools will remain in place throughout the duration of the project. Consultation prior to and during construction will involve the use of appropriate tools, including, but not limited to, tools such as community information sessions, briefings, and displays; distribution of project materials in a variety of languages; door knocks; and site signage.
D7.2	Community facilities	Prior to construction, consultation will be undertaken with community facilities and event organisers (Cabramatta Moon Festival and Chinese New Year's) with the potential to be impacted by the project, including the cultural centres along Broomfield Street, Fairfield City Council, Liverpool City Council, the SDSA and Lawrence Hargrave Special Education School. Consultation will aim to identify and develop measures to manage the specific construction impacts for individual community facilities and events. These measures would be incorporated into the relevant management plans.
D7.3	Community facilities	During design development consultation will be undertaken with Liverpool City Council and the SDSA to minimise impacts on use of the softball fields due to the presence of the embankment and passing loop.
D7.4	Community facilities	During design development consultation will be undertaken with Lawrence Hargrave Special Education School regarding existing and future construction noise impacts to identify appropriate mitigation measures.
D7.5	Amenity impacts	The community will be given the opportunity through implementation of the existing Stakeholder Engagement Strategy (refer Chapter 4 (Consultation) to provide comment on design and project features which provide local community benefits.
D8	Waste	
D8.1	Excess waste generation	Detailed design will include measures to minimise excess spoil generation during construction of the project. This will include a focus on optimising the design to minimise spoil volumes, and the reuse of material on-site.
D9	Health, safety and environment	

Ref	Issue	Mitigation measures
D9.1	Public health and safety	A hazard analysis will be undertaken during the detailed design stage to identify further risks to public safety from the project, and how these will be mitigated through safety in design and construction methodology.
D9.2	Public safety from collapse of structures, embankments or walls	All structures such as the retaining wall in Jacquie Osmond Reserve and the noise wall on Broomfield Street will be designed to meet appropriate standards, with sufficient tolerances to loads and wind gusts to prevent collapse.
D9.3	Safety of road, pedestrian and cycle connections under the widened Sussex Street bridge	Lighting design under the Sussex Street bridge will consider the Crime Prevention Through Environmental Design principles.
D10	Climate change and greenhouse gases	
D10.1	Design development changing climate change risk	ARTC will: • apply the climate change risk assessment and its existing control measures as incorporated into the reference design, in implementing the project, or • in the event of design changes, during detailed design, review the climate change risks identified in this assessment in order to amend existing control measures or identify additional control measures to reduce the climate change related risks to the project with no 'very high' or 'high' residual climate related risks remaining.
D10.2	Risks from climate change	ARTC will implement all potential adaptation measures identified in Table 21.5 so far as is reasonably practicable to reduce climate change risk.
D10.3	Improvements in climate change projections	In the event of significant new scientific climate change projections becoming available during detailed design, ARTC will review the relevant climate change risks and control measures identified in this assessment in order to confirm that there are no 'very high' or 'high' residual climate related risks remaining.
D10.4	Reduction in greenhouse emissions	Opportunities to reduce greenhouse gas emissions will be investigated during detailed design. This will include: • opportunities for low emission construction materials • locally sourced materials to reduce travel related emissions • use of recycled material options (eg asphalt).

Table 22.3 Compilation of mitigation measures for construction

Ref	Issue	Mitigation measures
C1	Traffic, transport and access	
C1.1	General impacts of construction activities on traffic, transport, access, pedestrians and cyclists	A construction traffic management plan will be prepared by the contractor and implemented as part of the CEMP. It will include measures to minimise the potential for impacts on the community and the operation of the surrounding road and transport environment, including those listed in this EIS. The construction traffic management plan will be developed in consultation with relevant emergency services, Liverpool City Council, Fairfield City Council, Roads and Maritime Services, and public transport/bus operators.
C1.2	Traffic delays	Oversized vehicles will use designated heavy vehicle routes or routes approved by Roads and Maritime Services.

Ref	Issue	Mitigation measures
		Oversized traffic movements will be carried out, where possible, outside of peak road network periods, minimising the impacts on the road network. Should oversized vehicles be required, the contractor will be responsible for obtaining necessary permits/approvals, where required. Where possible, major road networks such as Cabramatta Road East and the Hume Highway will be used for access to the site by heavy vehicles.
C1.3	Temporary parking space loss	Where parking spaces are lost or access is impeded, particularly for extended periods, alternative parking will be provided wherever feasible and reasonable. This will include consideration of other privately owned (or vacant) land within close proximity to Cabramatta Station.
C1.4	Delays to Emergency services	A minimum lane width of about 3.5 m will be provided along Broomfield Street during construction to facilitate the access of emergency service vehicle.
C1.5	Parking space loss	The project site will be managed to minimise construction worker parking on surrounding streets. A worker car parking strategy will be developed in consultation with the relevant local council to identify measures to reduce the impact on the availability of on street and off street parking. The strategy will identify potential mitigation measures including alternative parking locations. The strategy will encourage contractor staff to: • park within compound sites • use public transport • car share.
C1.6	Traffic impacts	Where possible, heavy vehicle activity will be avoided, during school pick-up and drop-off periods (8:00 am to 9:30 am and 2:30 pm to 4:00 pm school days) in the vicinity of schools, when pedestrian and vehicle activity is generally greater.
C1.7	Traffic impacts	The extent and duration of temporary road closures along Broomfield Street and Sussex Street will be minimised to reduce the impact on local traffic, with diversions in place to the adjoining road network.
C1.8	Traffic impacts	Work areas will provide safe clearances from through traffic lanes in line with Roads and Maritime's Traffic Control at Works Sites Manual. Should road works speed zones be required, the contractor will develop necessary plans and obtain approvals by the governing authority (Roads and Maritime) in consultation with the local council.
C1.9	Residential access	Driveway and pedestrian access to properties adjoining the works is to be maintained. Where disruptions to access cannot be avoided, consultation will be undertaken with the owners and occupants of affected properties, to confirm their access requirements and to discuss alternatives. Potentially affected property owners and residents will be contacted before the commencement of works. Residents will be notified via door knocks, newsletters or letter box drops providing information on the proposed works, working hours and a contact name and number should any enquiries wish to be registered. Open trenches will be filled or covered using road plates at the end of each day to minimise impacts on vehicular access to properties, where necessary.
C1.10	Access to Jacquie Osmond Reserve	The contractor will consult with Liverpool City Council and the relevant sporting associations to minimise potential conflicts between vehicles, pedestrians and cyclists at the reserve, particularly during weekend periods when sporting activities are likely to occur.
C1.11	Informal parking within Jacquie Osmond Reserve	The contractor will consult with Liverpool City Council and the relevant sporting associations with regards to scheduling and access arrangements when works are being undertaken on Cabramatta Creek bridge, to minimise the potential impacts associated with the loss of access to informal parking in Jacquie Osmond Reserve.

Ref	Issue	Mitigation measures
C1.12	Heavy vehicles damaging local roads	A dilapidation survey will be undertaken of the Fairfield City Council and Liverpool City Council owned/managed roads within the proposed haulage routes prior to works commencing and provided to the relevant council.
C1.13	Temporary closure of shared path	The Western Sydney cycling network will be notified prior to the proposed closure and/or diversion of the Parramatta to Liverpool Rail Train Cycleway within the project site.
C2	Noise and vibration	
C2.1	General impacts of construction activities on sensitive receivers	A construction noise and vibration management plan will be prepared by the contractor and implemented as part of the CEMP. It will include measures to minimise the potential for noise and vibration impacts on the community, including those listed in this EIS. It will also consider relevant noise mitigation measures and notification procedures outlined in ARTC's EPL #3142. The construction noise and vibration management plan will be developed in consultation with Liverpool City Council, Fairfield City Council, and the EPA.
C2.2	Noise impacts during out of hours work	An out of hours protocol will be developed as part of the construction noise and vibration management plan. It will at a minimum: • provide a process for the consideration of out of hours work against the relevant noise and vibration criteria • document procedures to manage potential impacts • identify responsibilities for implementation and management including managing complaints.
C2.3	Vibration impacts on structures including heritage items.	Strategies to minimise the vibration of construction activities will be considered during construction planning. This will include a detailed review of work methods and equipment selection with the aim of avoiding the use of equipment within the relevant vibration safe working buffer distances. Where this is not possible, attended vibration measurements of vibration generating equipment (eg bored piling, vibratory rolling works) will be undertaken prior to works near the sensitive structures located within the vibration buffer distances identified in Figure 4-12 and Figure 4-13 provided in Technical Report 2 – Noise and vibration impact assessment. This will confirm the project specific minimum working distances for vibration intensive activities.
C2.4	Vibration impacts on structures including heritage items.	Building dilapidation surveys will be carried out on all structures located within the vibration buffer distance prior to major project construction activities with the potential to cause property damage.
C2.5	Vibration impacts from the increase number of trains passing by Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge (I19).	If following a dilapidation survey of the heritage items the structures are found to be unsound, then a structural engineer will advise if there is a risk from increasing operational train numbers and identify strategies to avoid risks.
C2.6	Noise impacts during sensitive periods	Where feasible and reasonable, construction will be carried out during the standard daytime working hours. The use of highly intensive noise and vibration generating equipment (such as jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling) less sensitive times (eg the middle of the day).
C2.7	Noise impacts from continuous activities.	Highly intensive noise and vibration generating equipment (such as jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling) will

Ref	Issue	Mitigation measures
		only be used in continuous blocks not exceeding three hours each, with a minimum respite period of one hour between each block. 'Continuous' includes any period during which there is less than one hour respite between ceasing and recommencing any of the work. Additionally, this equipment will not be used for more than two consecutive nights over any seven day period adjacent to the same sensitive receivers.
C2.8	Noise impacts from worker activities	All employees, contractors and subcontractors are to receive an environmental induction. The induction will include at least: • all relevant project specific and standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on noise generating activities with special audible characteristics • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries). • environmental incident procedures.
C2.9	Noise impacts from worker activities	While on site, construction workers will refrain from: • swearing or unnecessary shouting or loud stereos/radios on site • dropping of materials from height, throwing of metal items and slamming of doors • excessive revving of plant and vehicle engines • uncontrolled release of compressed air.
C2.10	Construction traffic noise	Traffic flow, parking and loading/unloading areas will be planned to minimise reversing movements within the site.
C2.11	Construction traffic noise	To reduce the impact of noise from construction traffic the following mitigation measures will be implemented: • Loading and unloading of materials/deliveries will occur as far as possible from sensitive receivers. • Site access points and roads will be selected as far as possible away from sensitive receivers. • Dedicated loading/unloading areas will be shielded if close to sensitive receivers, where reasonable and feasible. • Delivery vehicles will be fitted with straps rather than chains for unloading, wherever possible. • Vehicle movements will be scheduled away from sensitive receivers and during less sensitive times, where possible. • The speed of vehicles within and approaching construction compounds will be reduced

Ref	Issue	Mitigation measures
		- The use of engine compression brakes during night time periods will be avoided, where possible - On-site storage capacity will be maximised to reduce the need for truck movements during sensitive times. - Vehicles will be fitted with a maintained original equipment manufacturer exhaust silencer that complies with the National Transport Commissions <i>National Stationary Exhaust Noise Test Procedures for In-service Motor Vehicles</i> (2006).
C2.12	Construction noise and vibration	Quieter and less vibration emitting construction methods and equipment will be used where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
C2.13	Construction noise and vibration	Where practicable, materials will be pre-fabricated and/or prepared off-site to reduce noise with special audible characteristics occurring on site. Materials can then be delivered to site for installation.
C2.14	Noise from construction equipment	The noise of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the allowable noise levels.
C2.15	Noise from construction equipment	To reduce the impact of noise from construction equipment the following mitigation measures will be implemented: - The offset distance between noisy plant and adjacent sensitive receivers will be maximised. - Plant used intermittently will be throttled or shut down. Noise-emitting plant will be directed away from sensitive receivers
C2.16	Noise from construction equipment	Non-tonal reversing beepers (or an equivalent mechanism) will be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work, including delivery vehicles.
C2.17	Noise from construction equipment	Noise from mobile plant will be reduced where possible, through additional fittings including: - residential grade mufflers - damped hammers such as 'City' Model Rammer Hammers - air parking brake engagement silenced.
C2.18	Noise impact from compound (C1)	Use of the construction compound (C1) near Warwick Farm Station will where practicable, be limited to standard hours only with the exception of plant storage and material delivery.
C2.19	Noise from construction compounds	Stationary noise sources on construction compounds will be enclosed or shielded where practicable, to ensure that the occupational health and safety of workers is maintained. Appendix F of AS 2436:1981 lists materials suitable for shielding.

Ref	Issue	Mitigation measures
C2.20	Noise from construction compounds	Structures will be used to shield residential receivers from noise where practicable such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when siting plant.
C2.21	Construction noise resulting in highly intrusive levels	A noise monitoring program will be carried out for the duration of works at sensitive receivers identified as experiencing highly intrusive noise levels and as a result of complaints received, in accordance with the CEMP.
C2.22	Vibration impacts on heritage sites: Cabramatta (Cabramatta Creek), Railway Parade and Sussex Street Underbridge	Where building dilapidation surveys indicate that the heritage listed bridges are unsound, then the conservative criteria of 3.0 mm/s provided by DIN 4150-3 will be used for construction equipment used within the vibration buffer distances, where practicable.
C3	Air quality	
C3.1	Dust deposition and decrease in receptor amenity – minor and temporary	Dust suppression will be undertaken as required using water sprays, water carts or other media on: • unpaved work areas subject to traffic or wind • sand, spoil and aggregate stockpiles • the loading and unloading of dust generating materials.
C3.2	Vehicle emissions	Plant and equipment will be maintained in good condition and in accordance with manufacturer's specifications to minimise spills and air emissions that may cause nuisance.
C3.3	Dust deposition and decrease in receptor amenity – minor and temporary	If the works are creating levels of dust which significantly impact on residential amenity, the works will be modified or stopped until the dust hazard is reduced to an acceptable level.
C3.4	Dust deposition and decrease in receptor amenity – minor and temporary	The size of stockpiles will be minimised, where possible.
C3.5	Dust deposition and decrease in receptor amenity – minor and temporary	Construction vehicles with potential for loss of loads (such as dust or litter) will be covered when using public roads
C4	Biodiversity	
C4.1	Vegetation clearance	Impacts to <i>Acacia pubescens</i> will be avoided. The locations of <i>Acacia pubescens</i> will be marked on plans, outlined in the CEMP, fenced on site, and avoided. Signage will be placed on relevant fencing to inform of prohibited activities in that area as part of the works.
C4.2	Vegetation clearance	Disturbance of vegetation will be limited to the minimum necessary to construct works. Micro-siting of infrastructure will be undertaken during detailed design where practicable to minimise or avoid impacts on planted native species.

Ref	Issue	Mitigation measures
C4.3	Vegetation clearance	Where the project site adjoins native vegetation, the limits of clearing will be marked and temporary fencing or flagging tape installed around the vegetated area prior to the commencement of construction activities to avoid unnecessary vegetation and habitat removal or damage.
C4.4	Vegetation clearance	Equipment storage and stockpiling of resources will be restricted to designated areas within compound sites in cleared land.
C4.5	Vegetation clearance	The design and placement of any associated ancillary works such as utilities or signalling outside of the project site will avoid impacts to <i>Acacia pubescens</i> or other biodiversity values. These works will affect only cleared land or exotic vegetation.
C4.6	Revegetation	Following removal of the temporary shared path between Sussex Street and Cabramatta Creek, revegetation will be undertaken to stabilise the site. Opportunities to work with local groups such as the Fairfield Creeks and Wetlands Group will be explored where possible. Revegetation will aim to be consistent with the pre-existing vegetation and surrounding vegetation.
C4.7	Weeds	Weed management actions will be included in the CEMP to manage weeds in accordance with the NSW Weed Control Handbook (DPI, 2018). This will include the management and disposal of the weeds that were recorded within the project site including priority weeds in accordance with the biosecurity duties under the <i>Biosecurity Act 2015</i> .
C4.8	Weeds	Vehicles and other equipment to be used within the rail corridor will be cleaned to minimise seeds and plant material entering the project site to prevent the introduction of further exotic plant species or disease. This will include the use of vehicle wash bays or portable vehicle wash equipment such as high pressure wash units, shovels, crow bars or stiff brushes.
C4.9	Fauna habitat	The CEMP will include the locations of potential roost sites as identified in this report (eg. hollow-bearing trees, disused buildings, bridges and culverts). The CEMP will include measures to manage potential impacts to roost sites such as: - Any potential roost sites that will be removed or modified will be checked for roosting bats immediately prior to work. - Culverts are to remain open on at least one side at all times to allow any roosting bats to fly in or out. - Habitat to be identified for the release of microbats or any fauna encountered during clearing surveys - Habitat trees will be felled using equipment that allows the trees to be lowered to the ground with minimal impact (eg claw extension) - Animals that emerge from felled trees will be captured, inspected for injury, then relocated to pre-determined habitat identified for fauna release. Where the presence or potential presence of roosting bats is noted then management measures for managing bats will be implemented in accordance with the CEMP.
C4.10	Fauna habitat	An unexpected finds procedure will be developed specifying measures for the management of any threatened biota or habitat resources identified during construction. The unexpected finds procedure will include the requirement for work to stop immediately if any threatened fauna is encountered and the Construction Environmental Manager to be notified. Work will recommence only

Ref	Issue	Mitigation measures
		once relevant approvals have been obtained as required. The species will be included in subsequent toolbox talks.
C4.11	Fauna habitat	Protocols to prevent introduction or spread of chytrid fungus will be implemented following OEH Hygiene protocol for the control of disease in frogs (DECC, 2008b).
C4.12	Fauna habitat	A suitably qualified person will be present during the removal of potential fauna habitat (ie the hollow-bearing tree in Jacqui Osmond Reserve and areas of planted native species) to avoid impacts on resident fauna and to salvage habitat resources as far as is practicable. Clearing surveys will include: • inspections of vegetation for resident fauna and/or nests or other signs of fauna occupancy • capture and relocation or captive rearing of less mobile fauna (such as nestling birds) by a trained fauna handler and with assistance from Wildlife Information Rescue and Education Service (WIRES) as required • inspection and identification/marketing of hollow-bearing trees or other habitat resources adjacent to the project site to help ensure against accidental impacts • salvage of habitat features such as mature tree trunks and woody debris within the project site and placement within revegetation areas as far as is practicable (eg if vegetated areas are not separated by fences).
C5	Soils and contamination	
C5.1	General soil and erosion management	A soil and water management plan will be prepared as part of the CEMP for the project and implemented for the duration of construction, in accordance with <i>Soils and Construction - Managing Urban Stormwater Volume 1</i> (Landcom, 2004) and Volume 2D (DECC, 2008a) (commonly known as 'the Blue Book') The soil and water management plan will include but not be limited to: • a primary erosion and sedimentation control plan and a maintenance schedule for ongoing maintenance of temporary erosion and sediment controls. The erosion and sedimentation control plan will include site-specific details for managing sediment and erosion near Cabramatta Creek and associated drainage lines • measures and controls for the management of disturbed and stockpiled soils, including surface stabilisation of disturbed ground, covering of stockpiles where appropriate and implementation of clean-water diversions • an incident emergency spill procedure which will include measures to avoid spillages of fuels, chemicals, and fluids onto any surfaces or into any adjacent/nearby waterways.
C5.2	Acid sulfate soils	A field pH testing and field peroxide pH testing regime will be undertaken prior to piling work around Cabramatta Creek, in accordance with the <i>Acid Sulfate Soils Assessment Guidelines</i> (ASSMAC, 1998). Should ASS or potential ASS be identified during the testing, then measures to manage the potential impacts associated with encountering ASS or potential ASS will need to be developed and implemented in accordance with the <i>Acid Sulfate Soils Assessment Guidelines</i> (ASSMAC, 1998).
C5.3	Unexpected contamination	An unexpected findings protocol pertaining to contamination will be included in the soils and water management plan. The protocol will include procedures for

Ref	Issue	Mitigation measures
		the assessment and management of unexpected contamination encountered (if any) during construction.
C5.4	Unexpected contamination	Awareness training will be provided for all onsite staff to assist in the identification of potentially contaminated material. In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area will cease, and the finds will be managed in accordance with the unexpected contamination finds protocol.
C5.5	Contamination of soils	Prior to the acceptance of any imported fill onsite (regardless of volume), the following actions will be taken to reduce the risk of receiving contaminated material: • all fill used will be checked to confirm it is virgin excavated natural material (VENM) (eg clay, gravel, sand, soil or rock) or excavated natural material (ENM) (eg naturally occurring rock and soil) that is not mixed with any other waste • the supplier will provide formal certification that the fill material is clean VENM or ENM • the supplier will provide information on what activities previously occurred onsite where their fill was sourced • signs of contamination will be checked for, such as odours (chemical/petrol), staining from chemicals, and rubbish such as bricks, timber, and masonry • the delivery of the material will be supervised to check the material received matches the material ordered. • all required documents and records will be maintained.
C5.6	Contamination incident management	Spill containment kits will be present and maintained on site during all activities
C5.7	Contamination incident management	All staff will be inducted about incident and emergency procedures in accordance with the incident emergency spill procedure and made aware of the locations of spill containment kits. Information regarding the correct and safe storage and handling of fuels and chemicals will be communicated to personnel.
C6	<i>Hydrology, flooding and water quality</i>	
C6.1	Flooding, changes to surface water and water quality	A flood management procedure will be prepared as part of the soil and water management plan. It will include specific controls to be implemented during wet weather or forecasts of heavy rainfall for works undertaken near Cabramatta Creek and Jacqui Osmond Reserve and appropriate monitoring strategies following the flood to verify design performance and impact predictions It will also include a flood warning and evacuation procedure for emergency management of flooding up to the PMF event. Development of a flood warning and evacuation procedure for the project will be undertaken in consultation with stakeholders including Liverpool City Council and Fairfield City Council and the NSW SES.

Ref	Issue	Mitigation measures
C6.2	Flooding	The site layout and staging of construction activities will: • avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required • consider how the works will affect the existing stormwater network such that alternatives are in place prior to any disconnection or diversion of stormwater infrastructure.
C6.3	Flooding	Detailed construction planning will consider flood risk for compounds and work sites near Jacquie Osmond Reserve and Cabramatta Creek. This will include identification of measures to not worsen existing flooding characteristics. Not worsen is defined as: • a maximum increase in flood levels of 50 mm in a one per cent AEP event • a maximum increase in time of inundation of one hour in a one per cent AEP event • no increase in the potential for soil erosion and scouring from any increase in flow velocity in a one per cent AEP flood event.
C6.4	Watercourse impacts	Works within or near Cabramatta Creek will be undertaken with consideration given to the NSW Department of Primary Industries (Water) <i>Guidelines for controlled activities on waterfront land – Riparian corridors</i> (2018).
C6.5	Water quality	Dewatered groundwater will be stored and reused on site for wetting down and reducing dust in disturbed areas (within existing erosion and sediment controls), or for irrigation in grassed areas. Requirements for testing will be included in the soils and water management plan and will include the following at a minimum: • No visible sheen or odour is noted. • Water pH is between 6.5 and 8.5. • Total suspended solids are less than 60 mg/L (approximately equivalent to a turbidity level of 50 NTU). Water may be dosed with gypsum, alum or a similar product to reduce sediment levels if required. • All litter and debris must be filtered out and removed prior to reuse. • Pump-out events are supervised at all times, and the pump is positioned to prevent reuse of sediment-laden water settled at the bottom of the trench or tank. • Sludge from the bottom of the trench or tank can be placed in a shallow pit lined with heavy duty plastic sheeting to dry out (evaporation pit). Once the sludge has dried out sufficiently to allow it to be spaded this waste can be stored with excess excavated spoil and disposed in accordance with the findings of the preliminary waste classification assessment (refer to Technical Report 6 – Soils and contamination impact assessment).
C6.6	Water quality	A water quality monitoring program will be developed and implemented, to monitor water quality due to the proximity of construction activities to surface water receiving environments. The program will include relevant water quality objectives, parameters, and criteria and specific monitoring locations identified in consultation with DPI (Water) and the EPA.

Ref	Issue	Mitigation measures
C7	Non-Aboriginal heritage	
C7.1	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.
C7.2	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> .
C7.3	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.
C8	Aboriginal heritage	
C8.1	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.
C8.2	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.
C8.3	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.
C8.4	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.
C8.5	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.

Ref	Issue	Mitigation measures
		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.
C9	<i>Land use and property</i>	
C9.1	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.
C10	<i>Land use and visual amenity</i>	
C10.1	Visual impact from construction compounds and work sites	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.
C10.2	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.
C10.3	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.
C11	<i>Socio-economic impacts</i>	
C11.1	Economic benefits	Local suppliers will be identified and approached for procurement of goods and services where practicable.
C11.2	Community facilities	Access to community facilities and infrastructure will be maintained during construction. Where alternative access arrangements need to be made, these would be developed in consultation with relevant service providers, and communicated to users.
C12	<i>Waste</i>	
C12.1	Waste generation and recycling	A recycling target of at least 90 per cent will be adopted for the project. Where possible and fit for purpose; materials will be reused within the project before off-site reuse or disposal options are pursued
C12.2	Waste management	A waste management procedure will be prepared and implemented as part of the CEMP. It will include measures to minimise the potential for impacts on the local community and environment, including those listed in Table 19.5.
C12.3	Waste segregation	A waste segregation bin scheme will be included in the CEMP and will include locations of segregated bins within compounds, to facilitate segregation and prevent cross contamination.
C12.4	Materials	Material quantities will be recorded to monitor usage during each stage of construction.

Ref	Issue	Mitigation measures
C12.5	Waste and spoil management	Spoil will be managed in accordance with the spoil management hierarchy provided in Table 19.3.
C12.6	Waste and spoil management	A reusable spoil target of 90 percent will be adopted for the project. Where possible and fit for purpose, spoil will be beneficially reused within the project before off-site reuse or disposal options are pursued.
C12.7	Waste and spoil management	Construction waste will be minimised by accurately calculating materials brought to the site and limiting materials packaging.
C12.8	Waste and spoil management	All waste will be assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (EPA, 2014a) and waste would be managed in accordance with <i>The Australian Rail Track Corporation excavated material order 2019</i> .
C12.9	Waste and spoil management	Waste segregation bins will be located at various locations within the project area, if space permits, to facilitate segregation and prevent cross contamination.
C13	<i>Health, safety and environment</i>	
C13.1	Public safety from, fires, explosions, flooding and inundation	The CEMP will include emergency response procedures in consultation with relevant stakeholders. It would include measures to minimise the potential for health and safety impacts on the local community and environment such as fire management procedures.
C13.2	Public safety from collapse of structures, embankments or walls	Construction methodology will be selected to ensure collapse of partially built structures so not occur during construction. The CEMP will include emergency response procedures in consultation with relevant stakeholders. It would include measures to minimise the potential for health and safety impacts on the local community and environment should an incident occur.
C13.3	Rupture or damage to services and utilities	The location of utilities, services, and other infrastructure will be identified prior to construction to determine requirements for access to, diversion, protection and/or support. This will include as required, undertaking utilities investigations, including intrusive investigations, and consultation with service providers.
C13.4	Anxiety, confusion and safety concerns from changes to roads, footpaths and cycle routes	A construction traffic management plan will be prepared as part of the CEMP as per mitigation measure C1.1. This will detail the actions and infrastructure needed to ensure a continuous, safe and efficient movement of traffic for both the general public and construction workers. This will include defined routes, diversions, signage, safe crossing points for pedestrians and cyclists and where needed, traffic management staff.
C13.5	Public health and safety from falling items contact with construction sites.	An appropriate layout of compounds sites, construction methodology and hoardings to will be established to prevent any construction items exiting the site in an uncontrolled manner. This will meet all relevant requirements of NSW workplace safety laws.
C13.6	Reduced health benefits from changes to areas of public recreation and active transport routes	Public consultation will be carried out prior and during construction to inform the public about the routes to access and the availability of public reserves and softball area. Signage will be provided to identify access points to reach areas of public recreation and active transport routes.

Ref	Issue	Mitigation measures
		Consultation with key stakeholders such as Southern Districts Softball Association will be carried out to ensure the active lifestyle of members could be maintained at this location.
C13.7	Unauthorised access to the project site resulting in injury or fatalities	NSW workplace safety laws which require construction sites to have adequate site security, such as appropriate fencing will be followed. Appropriate actions or security devices will be used to prevent construction plant and equipment being activated by unauthorised people.
C13.8	Reduced public use of Jacquie Osmond Reserve and Warwick Farm Recreation Reserve	All public areas will be returned to their pre-construction condition and the same public access routes to these areas. The existing 12 softball diamonds within Jacquie Osmond Reserve will be reinstated to pre-construction condition in consultation with the Southern Districts Softball Association.
C14	<i>Climate change and greenhouse gases</i>	
C14.1	Emission of greenhouse gases	The CEMP will include the following requirements: • All plant and equipment used during the construction works will be regularly maintained to ensure fuel efficiency. • Sustainable procurement practices will be adopted where feasible • Plant and equipment will be switched off when not in constant use and not left idling. • Air conditioning and lights in site compound buildings will be turned off when not in use. • Energy efficient vehicles or equipment will be selected where available.

Table 22.4 **Compilation of mitigation measures for operation**

Ref	Issue	Mitigation measures
O1	Noise and vibration	
O1.1	Impacts to second floor of 106 Broomfield Street	Receiver at 106 Broomfield Street will be consulted regarding potential noise mitigation. This may include a review of the existing internal acoustic properties of the building and identification of where improvements can be made to reduce the exceedance of the trigger level.
O2	Air quality	
O2.1	Emissions - Negligible	The project will be managed in accordance with ARTC's existing EPL (EPL #3142) and ARTC's standard operating procedures including those within the Environmental Management System.
O3	Biodiversity	
O3.1	Weeds	Maintenance activities within the rail corridor and weed management during operation will be undertaken in accordance with ARTC's standard operating procedures and the relevant requirements of the <i>Biosecurity Act 2015</i> .
O4	Soils and contamination	
O4.1	Soil erosion and sedimentation	Erosion and sediment controls will be implemented during maintenance activities where soils are exposed, in accordance with ARTC's standard environmental management measures included within its Environmental Management System.

Ref	Issue	Mitigation measures
O4.2	Contamination	ARTC's existing spill response procedures will be complied with to minimise the potential for impacts on the local community and the environment as a result of any leaks and spills. Additionally, leaks and spills will be managed in accordance with ARTC's EPL #3142.
O5	Waste	
O5.1	Waste management	Waste management measures will be implemented in accordance ARTC's standard environmental management measures included within its Environmental Management System and the mitigation measures listed in Table 19.6.
O6	Health, safety and hazards	
O6.1	Unauthorised access to the rail corridor	Security of the rail corridor will be undertaken in accordance with ARTC's standard operating procedures and risk management framework which will include continued maintenance of security features such as fencing.
O6.2	Public health and safety from emissions/leaks of dangerous goods and hazardous materials	Operation of the project will be undertaken in accordance with ARTC's standard operating procedures and ARTC's EPL #3142.

22.4 Compilation of performance outcomes

The SEARs identify a number of desired performance outcomes for the project. These desired performance outcomes outline the broader objectives to be achieved during design, construction, and operation. Based on the outcomes of the environmental impact assessment, and implementation of the mitigation measures (chapters 8 to 21), environmental performance outcomes have been established (refer to Table 22.5).

Future design development and any design changes would be considered against these environmental performance outcomes.

Table 22.5 **Compilation of environmental performance outcomes**

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Project specific environmental performance outcomes
1. Transport and traffic	Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors.	The project assists in meeting the forecast demand for container freight transport on the SSFL. The project assists in encouraging a shift in freight transport from road to rail, supporting a reduced rate of growth in truck movements and associated traffic congestion. The performance of the local and regional network is not significantly impacted during construction. Motorist, pedestrian and cyclist safety is maintained or improved.

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Project specific environmental performance outcomes
		Safe access to properties is maintained.
2. Noise and vibration - amenity	Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity. Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and well-being of the community.	The project minimises impacts to the local community by: - controlling noise and vibration at the source - controlling noise and vibration on the source to receiver transmission path - controlling noise and vibration at the receiver - implementing practicable and reasonable measures to minimise the noise and vibration impacts of construction activities on local sensitive receivers.
3. Noise and vibration - structural	Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on the structural integrity of buildings and items including Aboriginal places and environmental heritage. Increases in noise emissions and vibration affecting environmental heritage as defined in the <i>Heritage Act 1977</i> during operation of the project are effectively managed.	The project minimises impacts to structures by: - controlling vibration at the source - controlling vibration on the source to receiver transmission path - implementing practicable and reasonable measures to minimise vibration impacts during construction and operation.
4. Air quality	The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent practicable.	The project is constructed and operated in accordance with the requirements of the POEO Act and ARTC's existing EPL #3142. Dust generated during construction will not exceed the relevant criteria in the <i>National Environment Protection (Ambient Air Quality) Measure and the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales</i> (DEC, 2005).
5. Biodiversity	The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity. Offsets and/or supplementary measures are assured which are equivalent to any remaining impacts of project construction and operation	The project is designed to minimise impacts on biodiversity. Where practicable, the design minimises the need to clear vegetation. The project would minimise further impacts on biodiversity through the implementation of relevant mitigation measures. Potential impacts on biodiversity are managed in accordance with relevant legislation. No offsets are required for the project.

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Project specific environmental performance outcomes
6. Soils, protected and sensitive lands	The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination.	Site-specific soil characteristics are taken into consideration during detailed design and construction. Any contamination is managed in accordance with relevant regulatory requirements. Any soil waste is assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (EPA, 2014) and <i>The Australian Rail Track Corporation excavated material order 2019</i>.
7. Water - hydrology	Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources.	Construction compounds and work areas are laid out such that flows are not significantly impeded. The project avoids long term impacts to surface water. Opportunities to reuse water resources are considered during the design process. The use of water during construction is minimised.
8. Water - quality	The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable).	Impacts to water quality are minimised during construction and operation. Erosion and sediment controls during construction are implemented in accordance with <i>Managing Urban Stormwater: Soils and Construction Volume 1</i> (Landcom, 2004) and <i>Managing Urban Stormwater: Soils and Construction Volume 2</i> (DECC, 2008a). The project will protect or contribute to achieving the Water Quality Objectives, during construction and operation. Construction water quality discharge will comply with the requirements of ARTC's existing EPL #3142.

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Project specific environmental performance outcomes
9. Flooding	The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure.	Construction is undertaken in a manner that minimises the potential for adverse flooding impacts, through staging of works and the implementation of mitigation measures. Construction compounds and work areas are laid out such that flows are not significantly impeded. Flooding design criteria will be achieved. The performance of the downstream drainage network is maintained during construction and operation.
10. Heritage	The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of items of environmental heritage and Aboriginal objects and places. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.	The project is designed to minimise the surface footprint. The design is sympathetic to the heritage significance of surrounding listed heritage items, and where practicable, avoids and minimises impacts to heritage. Impacts on heritage are managed in accordance with relevant legislation, including the EP&A Act, the <i>Heritage Act 1977</i>, and relevant guidelines.
11. Climate change risk	The project is designed, constructed and operated to be resilient to the future impacts of climate change.	Climate change risks are considered throughout the design and development process. The project is designed to maximise climate change resilience while minimising costs, community, and environmental impacts. The climate change risk assessment is maintained in line with updated global climate models and regional projection data. The project is designed, constructed, and operated in accordance with relevant climate change legislation and guidelines.

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Project specific environmental performance outcomes
12. Health and safety	The project avoids or minimises any adverse health impacts arising from the project. The project avoids, to the greatest extent possible, risk to public safety.	Construction targets zero safety incidents. All dangerous goods are stored, handled and transported in accordance with relevant regulatory requirements and Australian Standards. Dust, odour and other emissions will be effectively managed to avoid human health impacts. Noise will be managed to comply with relevant criteria and minimise the potential for health impacts.
13. Urban design & visual amenity	The project design complements the visual amenity, character and quality of the surrounding environment. The project contributes to the accessibility and connectivity of communities. The project minimises adverse impacts on the visual amenity of the built and natural environment (including public open space) and capitalises on opportunities to improve visual amenity.	The project is designed to have regard to the surrounding landscape and visual environment and to minimise the potential for visual impacts. The project is visually integrated with its surroundings. Vegetation providing screening to the rail corridor is retained where practicable.
14. Waste	All wastes generated during the construction and operation of the project are effectively stored, handled, treated, reused, recycled and/or disposed of lawfully and in a manner that protects environmental values.	Suitable spoil will be recycled or reused. Off-site waste re-use will be managed in accordance with relevant NSW EPA resource recovery exemptions and requirements. Waste will be disposed of at appropriately licensed facilities.

22.5 Proposal uncertainties and approach to design refinements

22.5.1 Proposal uncertainties

The EIS is based on the concept design for the project. Given the current level of design development, there remain some uncertainties relating to technical requirements and how the project would be constructed. These details would be resolved as the design progresses.

A summary of the uncertainties around the design, construction and/or operational methodologies of the project, and how these will be resolved, is provided in Table 22.6.

Table 22.6 Proposal uncertainties

Category	Key uncertainty	How uncertainties will be resolved
Land use and property	Property acquisition – exact areas that need to be acquired	Refining the amount and location of property acquisition will involve a detailed survey of the proposal site and surrounding properties, and confirmation of the final detailed design for the proposal.
Waste management	Spoil quantity	Further development of the design will inform the identification of material reuse opportunities and offsite spoiling requirements and volumes.
Hydrology and flooding	Drainage along Broomfield Street	The existing flooding situation along Broomfield Street is complex. Flood modelling and drainage design will continue to progress as the design develops with the aim of matching existing conditions as closely as possible.
Hydrology and flooding	Drainage within Jacquie Osmond Reserve	Currently a trapped low point exists at the southern end of Jacquie Osmond Reserve. Flood modelling and drainage design will continue to progress as the design develops to resolve this issue.
Landscape and visual	Jacquie Osmond Reserve – retaining wall/embankment	The final configuration of the retaining wall and embankment will be confirmed during detailed design.
Across a number of potential impact areas	Utilities – impacts to utilities to be defined in detail	Utility investigations are ongoing and will be completed during detailed design, to validate current assessments, and confirm relocation/protection requirements.

22.5.2 Approach to design refinements

The design of the project as described in the EIS would be subject to ongoing refinements during the detailed design phase. Refinements may be made to:

- avoid services that present significant construction difficulties in terms of logistics, time and/or cost
- reduce the construction timeframe
- avoid areas of environmental sensitivity identified following approval
- reduce impacts on the community
- improve operation without increasing the potential environmental impacts.

Such refinements may include, for example:

- minor changes to the location of construction compounds and work area access
- minor changes to the location of key infrastructure, refinement or reorientation of site boundaries
- minor changes in technology or the features of key project components.

Refinements would not include significant changes to the project.

For design refinements a consistency review would be undertaken to consider whether the refinement:

- would result in any of the conditions of approval not being met
- be consistent with the objectives and operation of the project as described in the environmental assessment
- result in a significant change to the approved project

- would result in any potential environmental or social impacts of a greater scale or different nature than that considered by the EIS.

A refinement that does not meet these criteria would be considered a design modification. Approval would be sought from the Minister for Planning for any such modifications in accordance with the requirements of Division 5.2 of the EP&A Act.

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

23 Conclusion

This chapter provides the conclusion to the EIS. It summarises the project for which approval is sought; the uncertainties that still exist and how these will be resolved; and provides the justification for the project, having regard to biophysical, economic and social considerations.

23.1 Summary description of the project for which approval is sought

The project is State significant infrastructure in accordance with Division 5.2 of the EP&A Act and is subject to approval by the NSW Minister for Planning and Public Spaces.

This EIS considers the potential impacts of the project to construct and operate the Cabramatta Loop. It has been prepared to support ARTC's application for approval of the project in accordance with the requirements of Division 5.2. The EIS addresses the environmental assessment requirements of the Secretary of the Department of Planning, Industry and Environment, dated 17 May 2018.

Further information on the location of the project is provided in Chapter 2 (Location and setting).

23.1.1 Project overview

The project is partly located within the existing rail corridor between the Hume Highway and Cabramatta Road East road overbridges in the suburbs of Warwick Farm and Cabramatta, and the local government areas of the City of Fairfield and the City of Liverpool. In addition, the project includes works to Broomfield Street and Jacquie Osmond Reserve, adjacent to the rail corridor.

The project would allow freight trains to pass and provide additional rail freight capacity along the SSFL. The project would involve:

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

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

Further information on the project's features is provided in Chapter 6 (Project features and operation).

23.1.2 Construction

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

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

Construction of the project would broadly involve the following main work phases:

- enabling works
- main construction works
- testing and commissioning works.

Further information on how the project would be constructed is provided in Chapter 7 (Construction).

23.1.3 Operation

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

It is estimated that once the project is operational, there would be an increase in freight train movements from 48 to 72 per day by 2033.

Further information on operation is provided in Chapter 6 (Project features and operation).

23.2 Justification of the project

23.2.1 Summary of project justification

Australia's freight task is set to experience significant growth over the coming decades. The existing freight infrastructure cannot support this projected growth, with increasing pressure on already congested roads and rail lines through Sydney, and increasing use of heavy trucks. The Australian and NSW Governments have identified clear objectives to increase the share of freight moved by rail – from 17.5 per cent in 2016 to 28 per cent by 2021 (Transport for NSW 2018d, Infrastructure Australia 2018).

Over the next 20 years, container rail freight volumes on Sydney's rail freight network are predicted to increase substantially. This will put more pressure on existing rail infrastructure, which includes the SSFL. Efficient access to and from Port Botany is critical to the economic growth and prosperity of Sydney.

ARTC's *Sydney Metropolitan Freight Strategy* (ARTC 2015) considers existing rail freight capacity issues and identifies priority actions to respond to rail freight demands on Sydney's rail freight network, including the SSFL. This includes the Cabramatta Loop Project.

The project is one of a number of initiatives proposed to increase the capacity of Sydney's rail freight network. In addition to the project, ARTC is also proposing to undertake the Botany Rail Duplication Project, which would involve duplicating a section of the Botany Line.

The Australian Government has recognised the need for the Cabramatta Loop and Botany Rail Duplication projects and announced a funding commitment of \$400 million in the 2018 budget for both projects.

23.2.2 Summary of project benefits

The project is one of a number of initiatives proposed to improve freight rail transport from Port Botany through the Sydney Metropolitan Freight Network in response to a growing economy and policy objectives to increase the rail modal share for container freight.

The primary objective of the project is to increase the capacity of the freight rail network to meet the forecast demand for container freight transport along the Southern Sydney Freight Line.

Secondary benefits of the project would include:

- provide increased operational efficiency, flexibility and reliability for freight customers
- increase rail market share for containerised freight

- support connection to, and operation of, intermodal terminals to meet their targeted freight capacity.

It is intended that the project would:

- alleviate constraints and increase the capacity of Sydney's freight rail network to meet existing and future demands
- support the operation of intermodal terminals, including Moorebank
- encourage a shift in freight transport from road to rail, and support a reduced rate of growth in truck movements and associated traffic congestion around Sydney.

23.2.3 Consequences of not proceeding

Without the project, there would not be sufficient capacity to provide for the predicted growth in rail freight in Sydney, particularly between the proposed Moorebank Intermodal Terminal and Port Botany.

23.2.4 Environmental considerations

Environmental investigations were undertaken during preparation of the EIS to assess the potential impacts of the project. These included specialist assessments of traffic, transport and access, noise and vibration, air quality, biodiversity, soils and contamination, hydrology and flooding, surface water quality and groundwater, Aboriginal and non-Aboriginal heritage, landscape and visual amenity, socio-economic impacts and climate change. The EIS has documented the potential environmental impacts, considering both potential positive and negative impacts, and identifies mitigation measures (compiled in section 22.3) to protect the environment where required.

The key potential impacts on the biophysical, social and cultural environments are summarised in section 22.1.

As described in section 22.2, the project would incorporate environmental management and design features to ensure that potential impacts are managed and mitigated as far as practicable.

23.2.5 Ecologically sustainable development

The EP&A Act adopts the definition of ecologically sustainable development contained in the *Protection of the Environment Administration Act 1991*. An assessment of the project against the principles of ecologically sustainable development as per clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 is provided below.

23.2.5.1 Precautionary principle

A range of environmental investigations, as described in Part B of the EIS, have been undertaken during the development of the project and the environmental assessment process, to ensure that potential impacts are understood with a high degree of certainty. The assessment of the potential impacts of the project is considered to be consistent with the precautionary principle. The assessments undertaken are consistent with accepted scientific and assessment methodologies, and have taken into account relevant statutory and agency requirements. The assessments have applied a conservative approach with regard to construction and operational arrangements, and the modelling used.

The project has evolved to avoid impacts where possible and to reflect the findings of the studies undertaken.

Examples of the application of the precautionary principle include the biodiversity assessment, and the noise and vibration assessment. For the biodiversity assessment, although the project would result in the removal of only a small area of foraging habitat for the Grey-headed Flying fox, the potential impacts on this species were still assessed.

The noise and vibration assessment involved a 'worst case' construction noise impact assessment, even though the likelihood of the worst-case is considered to be low and therefore potential noise impacts are considered to be lower than assessment. The noise and vibration assessment has been undertaken on the basis that there will be no noise wall in place during the entire construction period, however the demolishing and construction of the noise wall will be undertaken in stages during the construction period. Therefore, the predicted noise impacts due to construction works within the rail corridor are likely to be conservative for sensitive receivers located on Broomfield Street.

The project has evolved to avoid impacts where possible, and to reflect the findings of the assessments undertaken. A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation. No safeguards have been postponed as a result of lack of scientific certainty.

23.2.5.2 Principle of inter-generational equity

Construction along a long linear corridor has the potential for some degree of environmental and social disturbance. These disturbances include the clearing of vegetation, amenity impacts during construction, and changes to traffic movements and access. However, the potential for environmental and social disturbance as a result of construction has to be balanced against the long term benefits of the project in terms of rail freight transport.

Should the project not proceed, the principle of intergenerational equity may be compromised, as future generations would experience the increased environmental and safety impacts associated with the transport of large volumes of freight via road. The strategic planning studies summarised in Chapter 5 (Project background, needs and options) have identified a strong need and justification for freight rail transport. As a result, the project would benefit future generations by providing a safer, more efficient, means of freight transport.

23.2.5.3 Conservation of biological diversity and ecological integrity

Ecological studies have been undertaken to identify potential adverse impacts on biodiversity. Where potential impacts cannot be avoided, mitigation measures would be implemented to reduce the impact as far as possible.

The project would result in the removal of a very small area of fauna habitat. Mitigation measures are proposed to minimise and manage the significance of the impact on native vegetation and flora and fauna.

23.2.5.4 Improved valuation and pricing of environmental resources

The assessment has identified the environmental and other consequences of the project, and identified mitigation measures where appropriate to manage potential impacts. If approved, the construction and operation of the project would be in accordance with relevant legislation, the conditions of approval, and the construction and operation environmental management plans. These requirements would result in an economic cost to the proponent. The implementation of mitigation measures would increase both the capital and operating costs of the project. This signifies that environmental resources have been given appropriate valuation.

The concept design for the project has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the concept design has been developed with an environmental objective in mind.

23.3 Concluding statement

The project involves the provision of rail track and other works to provide a passing loop for freight trains between Warwick Farm and Cabramatta stations. The project is needed to meet the demands for increased freight rail capacity along the SSFL.

Potential impacts resulting from the project are considered manageable through the implementation of the proposed mitigation measures.

The detailed design for the project would be developed with the objective of minimising potential impacts on the local and regional environment, and the local community. The design and construction methodology would continue to be developed with this overriding objective in mind, taking into account the input of stakeholders.

To manage the potential impacts identified by the EIS, and in some cases remove them completely, the assessment chapters outline a range of mitigation measures that would be implemented during construction and operation of the project. Chapter 22 (Approach to environment management and mitigation) summarises the mitigation measures that would be implemented. The environmental performance of the project would be managed by the implementation of the Site EMP(s), CEMP and ARTC's Environmental Management System. This would also ensure compliance with relevant legislation and any conditions of approval.

With the implementation of the proposed mitigation and management measures the potential environmental impacts of the project would be adequately managed.

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK

24 References

- ABMARC, 2016, *Diesel Locomotive Fuel Efficiency and Emissions Testing* prepared for NSW EPA.
- Australian Rail Track Corporation (ARTC), 2005 *North-South Corridor Strategy*. 9 February 2015.
- ANZECC and ARMCANZ, 1994, *National Water Quality Management Strategy*.
- ANZECC and ARMCANZ, 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.
- ARTC, 2012, *Southern Sydney Freight Line Operational Air Quality Management Plan*.
- ARTC, 2015, *2015-2024 Sydney Metropolitan Freight Strategy*, October 2015.
- ARTC, 2015a, *PBRL Stage 3 Capacity Project Scoping Report*.
- ARTC, 2017, *NSW EPA Environmental protection licence for licensee ARTC*. 8 December 2017.
- Australian Standards (AS), 1993, AS2890.5 *Parking Facilities Onstreet Parking*.
- AS, 1997, AS4282 *Control of the obtrusive effects of outdoor lighting*
- AS, 1997, AS1055.1 *Acoustics – Description and measurement of environmental noise*.
- AS, 2009, AS 1742.3 *Traffic Control for Works on Roads*.
- AS, 2010, AS2436:2010 *Guide to noise and vibration control on construction, demolition and maintenance sites*.
- AS, 2013, AS 5334, *Climate change adaptation for settlements and infrastructure – a risk based approach*.
- AS/NZS, 2018, AS/NZS ISO 31000:2018 *Risk management – principles and guidelines*.
- Attenbrow, V 2002, *Sydney's Aboriginal Past: Investigating the archaeological and historical records*, University of New South Wales Press Ltd, Sydney.
- AU ISO 14064-2 2006, *Greenhouse gases Part 2: Specification with guidance at the project level for quantification and report of greenhouse gas emissions reductions and removal of enhancements (MOD)*
- Australia ICOMOS, 2013, *Charter for Places of Cultural Significance, The Burra Charter*.
- Australian Government, 2012, *Atlas of Groundwater Dependent Ecosystems (GDE Atlas), Phase 2 Task 5 Report: Identifying and mapping GDEs*. Final report prepared by CSIRO and SKM.
- Australian Greenhouse Office, 2006, *Climate Change Impacts and Risk Management – A Guide for Business and Government*.
- Austroads, 2015, *Guide to Road Design Austroads 30 June 2018*.
- Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) 2016, *Australian Rainfall and Runoff: A Guide to Flood Estimation*, Commonwealth of Australia.
- Bannerman SM and Hazelton PA, 1990, *Soil landscapes of the Penrith 1: 100 000 Soil Landscape Series – Sheet 9030*, Soil Conservation Service of NSW, Sydney.
- Bewsher Consulting Pty Ltd, 2004, *Georges River Floodplain Risk Management Study and Plan*, Georges River Floodplain Management Committee.
- Bewsher Consulting Pty Ltd, 2004a, *Cabramatta Creek Floodplain Risk Management Study & Plan*, Liverpool City Council and Fairfield City Council.
- British Standard (BS), 1993, BS7385-2:1993 *Evaluation and measurement for vibration in buildings*.
- BS 2009, BS 5228.2 – *Code of Practice for noise and vibration control on construction and open sites: Part 2 Vibration*.

BS, 1992, BS 6742-1:1992. *The Vibration Dose Value*.

BS, 2009, BS 5228.2: 2009, *Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration*.

Commonwealth of Australia 2018,, *Inquiry into National Freight and Supply Chain Priorities*.

Commonwealth Department of Environment and Energy, 2018, *National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008*, 1 July 2018.

Countess Environmental, 2006, *Western Regional Air Partnership Fugitive Dust Handbook (WRAP)*.

Dangerous Goods (Road and Rail Transport) Act 2008, *Dangerous Goods (Road and Rail Transport) Regulation 2009*.

Department of Environment and Conservation (DEC), 2005, *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*

DEC, 2006, *Assessing Vibration: a Technical Guideline*

Department of Environment and Climate Change NSW (DECC), 2008, *Soils and Construction - Managing Urban Stormwater Volume 2*

DECC, 2009, *Interim Construction Noise Guideline*.

Department of Environment, Climate Change and Water (DECCW), 2010 *Aboriginal cultural heritage consultation requirements for proponents*.

DECCW, 2010, *Code of practice for archaeological investigation of Aboriginal objects in NSW (the Code)*

DECCW, 2011, *Road Noise Policy*.

Department of the Environment and Energy (DEE), 2018, *Quarterly Update of Australia's National Greenhouse Gas Inventory: December 2017*.

Department of Land and Water Conservation (DLWC), 2002, *Site Investigations for Urban Salinity*.

Department for Environment, Food and Rural Affairs (DEFRA), 2014, *UK Government GHG Conversion Factors for Company Reporting*.

DEE, 2018, *State and Territory Greenhouse Gas Inventories 2016*.

DEE, 2018a, *Protected Matters Online Search Tool* for MNES listed under the EPBC Act and predicted to occur in the locality.

DEE, 2018b, online *Species profiles and threats database (SPRAT)*.

Department of the Environment, 2013, *Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*.

Department of Environment and Climate Change, 2008 *Managing Urban Stormwater: Soils and Construction Volume 2A*

Department of Planning, 2011, *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 ('Applying SEPP 33')*.

Department of Primary Industries (DPI), 2018, *Freshwater threatened species distribution maps*.

DPI, 2012, *NSW Aquifer Interference Policy*, NSW Government policy for the licensing and assessment of aquifer interference activities, September 2012.

DSEWPac, 2012, *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*.

Enhealth, 2012, *Environmental health risk assessment, guidelines for assessing human health risks from environmental hazards*.

Enhealth, 2017, *Health Impact assessment guidelines 2017*.

- Environmental Protection Authority (EPA), 1995, *Contaminated Sites Sampling Design Guidelines*
- EPA, 2000, *Industrial Noise Policy*.
- EPA, 2013, *Rail Infrastructure Noise Guideline*.
- EPA, 2016, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.
- EPA, 2017, *Noise Policy for Industry*.
- Federal Transit Administration, 2006, *Transit Noise and Vibration Impact Assessment*.
- Fairfield City Council Standard, 2011, *Specification for Roadworks and Drainage associated with subdivision or other development*, 12 September 2011.
- Fairfield City Council, 2013, *Fairfield City Wide Development Control Plan* 31 May 2013.
- Fairfield City Council, 2013, *Local Environmental Plan* Current version for 28 February 2019 to date.
- Fairfield City Council, 2014, *Cabramatta Town Centre Development Control Plan No. 5/2000*, September 2014.
- Fairfield City Council, 2017, *Stormwater Management Policy*.
- Georges River Combined Councils Committee, 2018, 2016-2017 River Health Report Card for the Georges River.
- German Standards, 1999, DIN 4155-3 *Structural Vibration Part 3: Effects of vibration on structures*.
- Greater Sydney Commission, 2018, *Western City District Plan*.
- Greater Sydney Commission, 2018a, *Greater Sydney Region Plan, A Metropolis of Three Cities – connecting people*, March 2018
- Heritage Office, 2001, *Assessing Heritage Significance*.
- Infrastructure Australia and the National Transport Commission (IA/NTC), 2011, *National Ports Strategy - Infrastructure for an economically, socially, and environmentally sustainable future*, endorsed by COAG in July 2011.
- Infrastructure Australia, 2016, *Australian Infrastructure Plan, Priorities and Reforms for our Nation's Future*, February 2016.
- Infrastructure Australia, 2018, *Infrastructure Priority List, Australian Infrastructure Plan, Project and Initiative Summaries*, March 2018.
- Infrastructure NSW, 2018, *Building Momentum State Infrastructure Strategy 2018–2038*, February 2018.
- KMH Environmental, 2016, *PBRL Stage 3 Capacity Project – Cabramatta Loop Preliminary Environmental Assessment*.
- Landcom, 2004, *Managing Urban Stormwater: Soils and Construction Volume 1 (the Blue Book)*
- Landscape Institute and Institute of Environmental Management & Assessment, 2013, *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition.
- Liverpool City Council, 2008, *Development Control Plan 2008*, 17 April 2019.
- Liverpool City Council, 2008, *Local Environmental Plan 2008*, 22 March 2019.
- Nathan, R and Weinmann, E., 2016, *Estimation of Very Rare to Extreme Floods, Book 8 in Australian Rainfall and Runoff - A Guide to Flood Estimation*, Commonwealth of Australia.
- National Transport Commission, 2017, *Australian Code for the Transport of Dangerous Goods by Road & Rail ('the Dangerous Goods Code')*.
- NSW National Parks and Wildlife Service (NPWS), 2002, Available regional-scale vegetation mapping of the site.

- NSW Department of Mineral Resources, 1991, *Penrith 1:100 000 Geological Map 9030*.
- NSW Department of Industry, 2018, Guidelines for controlled activities on waterfront land – Riparian corridors.
- NSW Government, 1991, *Land Acquisition (Just Terms Compensation) Act 1991*.
- NSW Government, 2004, *Planning Guidelines for Walking and Cycling*.
- NSW Government, 2005, *The Floodplain Development Manual- the management of flood liable land (the Floodplain Development Manual)*.
- NSW Government, 2012, *South West Metropolitan Emergency Management District Disaster Plan*.
- NSW Health, 2007, *Health impact assessment: A practical guide*.
- NSW Ports, 2015, Navigating the Future - NSW Ports' 30 Year Master Plan, October 2015.
- Office of Environment and Heritage (OEH), (2011), *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW*.
- OEH, 2015, *Technical Guideline for Urban Green Cover in NSW*.
- OEH, 2017, *Guidance to assist a decision-maker to determine a serious and irreversible impact*.
- OEH, 2018a, *Biodiversity Assessment Method Operational Manual Stage 1*.
- OEH, 2018b, NSW BioNet data, including NSW Wildlife Atlas database records and *Threatened Species Data Collection* profiles of threatened species listed under the BC Act.
- OEH, 2018c, *Threatened biodiversity profile search* online database for threatened ecological communities listed under the BC Act.
- OEH, 2018d, *NSW BioNet Vegetation Classification to identify PCTs in the study area*.
- Parsons Brinckerhoff, 2006, *South Sydney Freight Line Environmental Assessment. Main Volume*.
- Parsons Brinckerhoff, 2009, *Factual geotechnical investigation and limited phase 2 environmental site assessment report* South Sydney Freight Line (SSFL) project – Draft. With ARTC.
- Parsons Brinckerhoff, 2015, *Australian Rail Track Corporation Capacity Project Stage 3B - Concept Design Report*.
- Parsons Brinckerhoff, 2016, *Australian Rail Track Corporation Capacity Project Stage 3B - Feasibility Design Report*, September 2016.
- NSW Department of Mineral Resources, 1991, *Penrith 1: 100 000 Geological Map 9030*.
- RTA, 2002, *Guide to Traffic Generating Developments Version 2.2*.
- Roads and Maritime Services (RMS), 2012, *Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW*.
- Roads and Maritime Services, 2013, *Environmental Impact Assessment Guidance Note - Guidelines for landscape character and visual impact assessment (EIA-N04)*, Version 2.
- Roads and Maritime Services, 2013, *Traffic Modelling Guidelines*.
- Roads and Maritime Services, 2014, *Beyond the Pavement: RTA urban design policy, procedures and design principles*.
- Roads and Maritime Services, 2016 *Construction Noise and Vibration Guideline*
- Roads and Maritime Services, 2017, *Water Sensitive Urban Design Guideline, Applying water sensitive urban design principle to NSW transport projects*.
- RMS, 2018, *Traffic Control at Works Sites Manual*.

Transport for NSW, 2017, *NSW Sustainable Design Guidelines* Version 4.0 May 2017.

Transport for NSW, 2018a, *Construction Noise and Vibration Strategy*, 1 July 2017.

Transport for NSW, 2018b, *Future Transport Strategy 2056*, March 2018.

Transport for NSW, 2018c, *Greater Sydney Services and Infrastructure Plan*, a component of Future Transport 2056, March 2018.

Transport for NSW, 2018d, *NSW Freight and Ports Plan 2018-2023*, September 2018.

Transport for NSW, 2018e, *TAP3 North Strathfield Station Noise and Vibration Impact Assessment*, September 2018.

WorkCover NSW, 2005, *Code of practice for the storage and handling of dangerous goods*.

WSP Parsons Brinkerhoff, 2016, *Australian Rail Track Corporation Capacity Project Stage 3B - Feasibility Design Report*.