MOOREBANK AVENUE REALIGNMENT

Environmental Impact Statement
VOLUME 1

Prepared for Sydney Intermodal Terminal Alliance

March 2021

Moorebank Avenue realignment

Environmental Impact Statement

Report Number

J190486 RP2

Client

Sydney Intermodal Terminal Alliance

Date

1 March 2021

Version

v3 Final

Prepared by		Approved by
Christopher Colusso	**Aaron Bowden**	**David Kelly**
Environmental Planner	Associate Environmental Planner	Associate Director - National Technical Leader – Asset Delivery
1 March 2021	1 March 2021	1 March 2021

Certification

Submission of an environmental impact statement for the Moorebank Avenue Realignment project. Prepared under Division 5.2 of the *Environmental Planning and Assessment Act 1979* for approval of the project.

Environmental impact statement prepared by:

Application number:	SSI-10053
Name:	Aaron Bowden
Qualifications:	Grad. Cert. Public Administration, Bachelor of Planning
Address:	EMM Consulting Pty Ltd Ground Floor, 20 Chandos Street ST LEONARDS NSW 2065
Client representative	Iain Scoular, E3 Advisory Pty Limited
Role:	Project Manager on behalf of SIMTA
Address:	Sydney Intermodal Terminal Alliance (SIMTA) c/o Qube Holdings Limited Level 27, 45 Clarence Street WYNYARD NSW 2000
Description of the infrastructure to which the statement relates:	Moorebank Avenue realignment
Address of the land on which the infrastructure to which the statement relates is to be carried out:	Realignment and upgrade of the existing Moorebank Avenue from south of Anzac Road to the East Hills Railway, running predominantly to the east of the Moorebank Precinct East site.
Environmental impact assessment:	An environmental impact statement is attached addressing all matters in accordance with Division 5.2 of the *Environmental Planning and Assessment Act 1979* and Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

Declaration:

I certify that I have prepared the contents of this environmental impact statement in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulations 2000*, the Secretary of the NSW Department of Planning, Industry and Environment's environmental assessment requirements dated 1 March 2021.

The environmental impact statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates.

To the best of my knowledge, the information contained in the environmental assessment is not false or misleading.

Signature:

Name: Aaron Bowden, Associate Environmental Planner

Date: 1 March 2021

Executive Summary

Sydney Intermodal Terminal Alliance (SIMTA) is seeking approval to realign and upgrade a section of Moorebank Avenue (the Project) under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Before major construction can begin, the Project must be assessed and considered for approval under these Acts.

This Environmental Impact Statement (EIS) has been prepared to describe the Project and presents a detailed description of the construction work needed to build it, and how the realigned road would function once built.

The EIS also provides an assessment of all potential environmental impacts that could occur as a result of construction and operation of the Project. This includes all issues identified in the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Industry and Environment (DPIE) on 1 March 2021.

This EIS is divided into two volumes: the main volume of the EIS and the appendices supporting the main volume.

ES1 What is proposed?

ES1.1 Overview of the Moorebank Avenue realignment

SIMTA is seeking approval for the realignment of Moorebank Avenue, generally to the east of the Moorebank Logistic Park (MLP) (The Project). The Project addresses a development contribution requirement under a voluntary planning agreement between RMS (now Transport for NSW (TfNSW)) and Qube executed 21 March 2019 (the Planning Agreement). The Project also forms part of the satisfactory arrangements made by SIMTA for the provision of relevant State public infrastructure required by clause 7.36 of the Liverpool Local Environment Plan (Liverpool LEP) in respect of the Moorebank Precinct West Stage 2 development (SSD 7709), which are recorded in the Planning Agreement.

The Project would ultimately provide two lanes in each direction adjacent to the Moorebank Precinct East (MPE) site and signalised intersections to provide access into the eastern portion of the MLP. The new road section would merge to one lane in each direction in the vicinity of the south-east corner of the MPE Site. The existing road alignment would be partly retained as a service road to the MLP and have restricted access.

The Project would take up to 16 months to construct and have an estimated capital investment value of approximately 300 million AUD. The completed road asset and corridor would be transferred to TfNSW as a public road.

ES1.2 Overview of the Moorebank Logistics Park

SIMTA is developing the MLP (also known as the Moorebank Intermodal Freight Precinct or Moorebank Intermodal Terminal), a nationally significant freight infrastructure project in the south-western Sydney suburb of Moorebank. In operation, it will include an import-export (IMEX) rail terminal, interstate/intrastate terminal, significant warehousing, auxiliary services including retail and service offerings, and a rail connection to the Southern Sydney Freight Line (SSFL) providing direct access to the facility. When completed, the MLP will provide up to 850,000 square meters (m^2) of high specification warehousing where containers can be unpacked before delivery of their contents to their final destinations.

The MLP is located at and physically separated by the existing Moorebank Avenue which divides the precinct into two sites: MPE and Moorebank Precinct West (MPW).

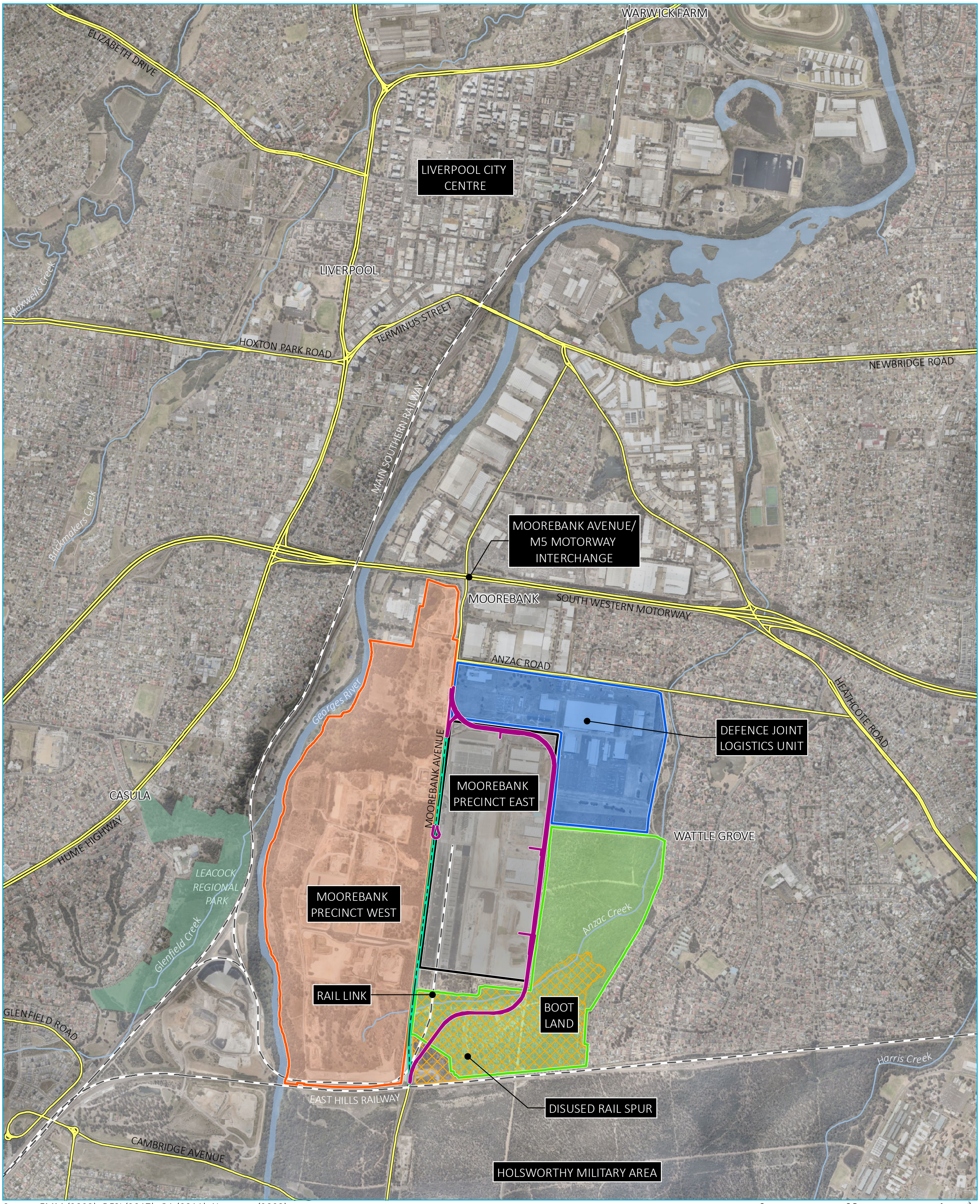
ES1.3 Description of the project

ES1.3.1 Key features

The key features of the project include:

- realigning a section of Moorebank Avenue from a point approximately 130 metres (m) south of the Anzac Road/Moorebank Avenue intersection to the bridge over the East Hills railway;
- constructing approximately 3 kilometres (km) of new road to bypass the MLP to the east, comprising:
  - a four-lane road (two lanes in each direction) in the vicinity of MPE, commencing from a point approximately 130 m south of the Anzac Road/Moorebank Avenue intersection to the south-eastern corner of the MPE site;
  - a two-lane road (one lane in each direction) from the south-eastern corner of the MPE site to a point immediately north of the bridge over the East Hills railway;
- decommissioning of the existing Moorebank Avenue road section, and alterations to enable it to function as a restricted access to the MLP;
- four accesses between the new road and the MLP. The accesses would include signalised intersections with auxiliary left and right turn lanes at entry points and would replicate existing accesses on Moorebank Avenue;
- constructing a central median, typically six metres wide, tapering to zero width where the new road becomes two lanes;
- tie-ins and infrastructure adjustments to the existing Moorebank Avenue, bridge over the East Hills railway, and MLP;
- constructing retaining walls;
- noise mitigation in the vicinity of the Defence Joint Logistics Unit (DJLU) site (chainage 600-800);
- constructing operational drainage infrastructure, onsite stormwater detention basins, and operational water quality controls (including vegetated swales, bioretention systems, and spill containment);
- installing a culvert within Anzac Creek and extending existing culverts within existing watercourses/drainage lines;
- installing road furniture including security fencing, guideposts, traffic signs, and street lighting;
- adjusting public utilities; and
- constructing temporary ancillary facilities, including a work site compound, lay-down areas, and construction water detention basins.

The location of the Project is shown in Figure ES1.



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Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

0 0.5 1 km
GDA 1994 MGA Zone 56
N

KEY

- Project alignment
- Existing road to be realigned
- Moorebank Precinct East
- Moorebank Precinct West
- DJLU boundary
- Boot Land boundary
- 2018 bushfire extent
- Rail line
- Major road
- Watercourse
- NPWS reserve

Local context

Moorebank Avenue realignment
Environmental impact assessment
Figure ES1

creating opportunities

ES1.3.2 Construction footprint

The area required for construction of the road realignment includes access for the construction of road embankments and cuttings, temporary and permanent fencing, temporary and permanent water quality control basins, ancillary facilities, access roads and construction side roads.

The construction footprint area is approximately 18.96 hectares, and is generally bounded by the DJLU, MPE, Boot Land and the Sydney Trains (TAHE) owned land adjacent to the East Hills Railway.

ES1.3.3 Working hours

The construction hours would generally be consistent with the NSW Environment Protection Authority's (EPA) *Interim Construction Noise Guideline* (DECC 2009) recommended standard construction hours:

- Monday to Friday: 7 am to 6 pm;
- Saturday: 8 am to 1 pm; and
- no work on Sundays and public holidays.

Out of hours works may be required for the delivery of oversized items and emergency works. Works at the tie in locations on the existing Moorebank Avenue may also be scheduled for out of hours to reduce impacts on traffic.

ES1.3.4 Work sites

Construction would mostly occur within the area proposed to be the future road reserve. However, some areas outside the project boundary would also be temporarily required. These sites (ancillary facilities) would be used for storing building materials, processing materials, site compounds and/or temporary workshops, as well as other construction activities. These sites would be located within the Moorebank Precinct East (MPE) construction area.

ES1.3.5 Construction materials and earthworks

Construction would require substantial quantities of materials such as earth fill material, aggregates, cement, sand, concrete and steel.

Depending on project staging, earthworks management would require materials and equipment to be stored and/or stockpiled at ancillary sites close to construction activities.

The Project would require the importation of approximately 80,000 tonnes of material for earthworks. Consistent with the access arrangements of the MLP, project-related heavy vehicles would be required to approach the site from the north either via the M5 Motorway (South Western Motorway) or the 'alternative route'. The alternative route involves heavy vehicles travelling south along Moorebank Avenue from the Moorebank Avenue / Newbridge Road intersection, over the M5 Motorway, and then into the site of the Project.

Vehicles transporting fill to the site would generally use the nominated construction truck routes, ie M5 Motorway and Moorebank Avenue to access the site of the Project, as noted above. Heavy vehicles transporting spoil and demolition material off site would exit the Project and head north on Moorebank Avenue towards the M5 Motorway.

ES2 Why is the project needed?

The Project is needed to meet Qube's obligations under the Planning Agreement between RMS (now TfNSW) and Qube executed 21 March 2019 (refer Section 1.4.2). It requires that satisfactory arrangements be made for the provision of relevant State public infrastructure associated with MPW and the MLP generally. Given that the MLP will significantly contribute to traffic on Moorebank Avenue it was resolved that SIMTA be required to undertake the required upgrade works during the development of the precinct. Without development of the Project, the addition of future background traffic will result in Moorebank Avenue operating at an unacceptable Level of Service (LOS) in approximately 2029.

The Project would provide a four-lane road (providing two lanes in each direction) parallel to MPE and one lane each way between MPE and Moorebank Avenue. It would provide enhanced traffic amenity while maintaining appropriate levels of service at local and proposed intersections. Additionally, it would allow for an enhanced connection between Anzac Road and the M5 Motorway in the north and Cambridge Avenue in the south in the vicinity of the MLP.

The Project would deliver operational efficiencies to the terminals within the MLP. Moorebank Avenue currently provides a barrier to east-west movements within the MLP thereby significantly restricting the operational efficiency of the precinct. The relocation of Moorebank Avenue would:

- provide for shorter, more efficient and direct travel route for container-carrying vehicles between the rail link and terminals, contributing to the achievement of precinct throughput targets;
- minimise secondary and non-value creating freight movements by facilitating a direct access between MPE and MPW;
- facilitate future automation of the precinct (ie it would promote the use of the most efficient modes of transport for a given task); and
- result in positive time/cost implications for the MLP.

Additionally, the Project would enhance access and egress arrangements between the MLP and Moorebank Avenue by separating public vehicles and heavy vehicles transferring freight between MPE and MPW and by minimising traffic congestion from the intermingling of background public local traffic and traffic generated by the MLP.

ES3 Alternatives considered

The Planning Agreement provides for two development outcomes, comprising:

- relocate Moorebank Avenue to the east of the MPE site (the Project); or
- upgrade Moorebank Avenue to a four lane road from south of the entrance to MPE freight terminal to a point approximately 120 m south of the MPE site.

It further provides that Qube is obliged to upgrade the existing Moorebank Avenue (South), should all approvals not be achieved for the realignment by December 2021.

Upgrading the existing Moorebank Avenue along its current alignment is not desirable as it:

- would result in container-transporting vehicles interacting with public vehicles (resulting in potential safety and travel time implications for road users);
- create the potential for congestion from the intermingling of background traffic and traffic generated by the MLP;
- would result in Moorebank Avenue continuing to intersect the MLP, creating a barrier to east-west movements and thereby reduce the operational efficiency of terminals;
- provide for longer, less efficient and less direct travel route for MLP traffic between the rail link, terminals and warehouses;
- involves a potential constraint to the future automation of the MLP; and
- would result in negative time/cost implications.

Further, if the Project was not to proceed then the addition of future background traffic (associated with public local traffic and traffic associated with the MLP) will result in Moorebank Avenue operating at an unacceptable Level of Service (LoS) in approximately 2029 and therefore adversely affecting traffic movements between Moorebank and Glenfield

It is also noted that upgrading Moorebank Avenue along its current alignment would still result in impacts (including acquisition of land) to the DJLU site, the MLP, Boot Land and land owned by RailCorp.

ES4 Likely environmental impacts

Many potential environmental and social impacts were avoided through the selection of the preferred route and design refinements during the project development process. Despite this, there will be some temporary and permanent environmental impacts associated with the construction and operation of the Project.

The EIS identifies comprehensive environmental management measures to avoid, manage, mitigate, offset and/or monitor impacts during construction and operation of the Project. These include best practice environmental planning and management techniques, urban design and landscaping treatments and noise mitigation measures. The design, construction and operation of the Project would be carried out in accordance with these identified management measures, as well as any additional measures identified in the Project's conditions of approval.

Key environmental management measures outlined in this EIS include the preparation of a comprehensive construction environmental management plan (CEMP) to manage environmental impacts during preconstruction and construction. The CEMP would include several sub-plans to manage specific issues identified in the EIS.

Further mitigation requirements are likely to be identified during detailed design and construction planning and in consultation with communities and relevant stakeholders. Ongoing consultation would include integration and engagement with surrounding major projects with the view to mitigating and managing potential cumulative impacts during construction and operation.

A summary of the main issues and key management measures identified in the EIS are presented below.

ES4.1 Biodiversity

Impacts to biodiversity values arising from the Project are described in Section 7.2 of this EIS.

The Project is to be located adjacent to lands which have been established as a Biobanking site. Through previous discussions with agencies (including stakeholders which have come to be known as DAWE, EES, DPIE, TfNSW, DoD, Moorebank Intermodal Company (MIC) and SIMTA) when the Biobanking site was established, a corridor of land was left to allow for the future relocation of Moorebank Avenue). The Project would not directly intrude on to the lands established as a Biobanking site but rather in a location that had been already earmarked for that purpose.

The Project would directly result in the clearance of areas of significant native vegetation, high-quality threatened species habitat and threatened ecological communities (TECs) and would also result in the disturbance of waterway beds and banks and riparian vegetation.

Beyond direct clearing activities, the Project also has the potential to reduce the connectivity of some native vegetation between the southern part of the Moorebank Intermodal Precinct East and the relocated Moorebank Avenue. Some fauna species may be able to cross where a culvert is installed to allow water flow through Anzac Creek. Ecological connectivity would, however, be limited. However, it is noted that this land is already fragmented from the broader and extensive area of native vegetation within the Holsworthy Army Range by the East Hills Railway. Some injury or mortality to fauna may also occur should they enter the road corridor.

Other notable impacts include:

- increased noise, vibration and dust with potential to disturb fauna species;
- lighting for night works, security and operational requirements with potential to disturb fauna species;
- increase in weeds and pathogens, resulting in degradation of retained native vegetation and habitat;
- increase in predatory and pest animal species, resulting in increased predation and competition and a consequent reduction in populations; and
- runoff and sedimentation to waterways associated with construction activities.

The Project has the potential to impact upon two serious and irreversible impacts (SAII) entities including the minimal clearing (0.16 ha) of an intact patch of the Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (with a further 0.52 ha experiencing indirect impacts) and the Thick Lip Spider Orchid. The latter, while not recorded in the study area or region, having suitable habitat in all plant community types (PCTs) identified in the area of investigation.

Some impact would require offsetting in accordance with the *Biodiversity Assessment Method* (BAM) (NSW DPIE 2020), including impacts to 4.72 hectares (ha) of NSW PCT 724 (Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion), 1.13 ha of PCT 725 (Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion), 8.65 ha of PCT 883 (Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion description) and 0.3 ha of PCT 1067 (Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion). A total of 189 ecosystem credits and 876 species credits are required to offset the residual impacts of the Project.

The Project would have a potential significant impact on matters of national environmental significance (MNES) entities protected under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), including the Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion EEC, Thick Lip Spider Orchid, Woronora Beard-heath and Koala.

The focus of the design and operation selection has been to minimise and mitigate these impacts. This included the identification of biodiversity values through biodiversity surveys and consultation with key government stakeholders and species experts, to seek input and discuss measures proposed to avoid, minimise and mitigate impacts.

A suite of management and mitigation measures would be implemented to minimise impacts to biodiversity values. These measures range from road design elements such as the inclusion of fauna exclusion fencing and vegetation exclusion areas and construction controls including the retention and relocation of hollow logs and limbs for within the retained vegetation, the translocation of fauna into areas of retained vegetation and weed control.

ES4.2 Bushfire

Bushfire hazards associated with the Project are described in Section 7.3 of this EIS.

The site of the Project is partially mapped as Bushfire Prone Land (Vegetation Category 1 and Buffer) on the Liverpool City Council Bushfire Prone Land Map. Fire is capable of damaging infrastructure associated with the Project and consequently impacting upon the safety of staff and contractors during the construction of the Project and/or the safety of the public during the operation of the Project.

Potential ignition sources during the construction of the Project include diesel generators, storage of flammable liquids, vehicle and machine movements over long grass, sparks generated from hot works and general human error such as non-compliance of hot works procedures or incorrect disposal of cigarette butts. During operation, potential source of ignition include car accidents and littering (such as the incorrect disposal of cigarette butts).

A Bushfire Management Plan would be prepared to detail mitigation measures for managing bushfire risk including those identified by the Bushfire Hazard Assessment (Appendix C).

ES4.3 Transport and traffic

Those transport and traffic impacts and aspects of the Project are described in Section 7.4 of this EIS.

Moorebank Avenue provides local and regional connections between Anzac Road and the M5 Motorway to the north and Cambridge Avenue to the south. The realignment would result in a detour of approximately one additional km for traffic along Moorebank Avenue. However, connectivity would be maintained.

An intersection count survey was undertaken on 4 March 2020 at five key intersections along Moorebank Avenue and the Cambridge Avenue/Glenfield Road/Railway Parade/Canterbury Road four arm roundabout to determine traffic volume and capacity.

For the section of Moorebank Avenue to be realigned (ie between the DJLU site access and the East Hills Railway bridge), the typical existing northbound journey times varied between 2 minutes 07 seconds and 2 minutes 35 seconds. Longer journeys were noted as occurring during AM peak periods reflecting the generally higher northbound route traffic volumes and increased delays at the three traffic signal controlled intersections on this section during the busy periods of the day. Southbound journey times along the realigned road section were generally consistent with the northbound direction, varying between 2 minutes 16 seconds and 2 minutes 30 seconds.

Construction of the Project would not result in changes to LOS for key intersections and are unlikely to be noticeable to road users. The mid-block level of service for Moorebank Avenue and Cambridge Avenue were also assessed and found that Moorebank Avenue operated at a LOS of F and Cambridge Avenue operated at an LOS of E. The Project would not impact on public transport services and Moorebank Avenue would remain publicly accessible for pedestrians and cyclists throughout construction of the Project.

During operation, bypass traffic could experience an increase of travel time by up to 60% (78.9 seconds) owing to the additional travel distance (addition of approximately 1 km) while still maintaining the posted speed limit of 60 km/hr. Additional bus stops would be provided in proximity to the Moorebank Avenue/MPE site access intersection and along the internal road to ensure access to the warehouse developments. A shared pedestrian/cycling path would be provided on the western side of the road providing access to the MPE developments while a pedestrian footpath would be provided along the eastern side adjoining the undeveloped land. A gate providing access to Sydney Trains/Transport Asset Holding Entity of NSW land would be repositioned as part of the Project.

North of the south-eastern corner of the MPE site, the Project would have two lanes each way; while south of that point the Project would be reduced to one lane each way. In terms of the future mid-block capacity, the Project would replicate exiting conditions and would have a predicted level of traffic at LOS E or F during the peak hours.

Construction of the project would be guided by Traffic Control Plans and traffic controllers. Safety barriers are also recommended for inclusion into the design to reduce risk vehicle collision.

ES4.4 Noise and vibration

Noise and vibration impacts arising from the Project are described in Section 7.5 of this EIS.

Land uses in the vicinity of the Project are primarily industrial, infrastructure and urban bushland. Residential land uses (Low Density Residential and Medium Density Residential) and public recreation uses are located further east in the suburb of Wattle Grove.

To establish the existing ambient noise environment of the area, unattended noise surveys and operator-attended aural observations were conducted at monitoring locations as part of a noise and vibration impact assessment carried out during the EIS preparation for the Project.

The results of the modelling for worst case construction activities identify that construction noise levels satisfy the NSW Government Interim Construction Noise Guideline (ICNG) noise management levels (NMLs) at nearby commercial and industrial assessment location, however, could be exceeded at residential assessment locations to the east of the works. There are no buildings, sensitive structures or heritage items identified within the safe working distances for cosmetic damage or human response from construction vibration. Vibration impacts at residential assessment locations are highly unlikely given setback distances.

A road traffic noise assessment was undertaken to predict traffic noise associated with the Project during operation (for 2024 and 2034 'build scenarios)'. It finds that while the Project is predicted to increase road traffic noise levels at residential areas to the east it would be less than the recommended Road Noise Policy (RNP) criteria.

There is little opportunity to provide significant noise mitigation due to the extent of works and fleet of plant and equipment for road construction, proximity of residential assessment locations and local topography. Management and mitigation measures have been recommended and would be implemented to limit, so far as practically possible, impacts to surrounding users.

ES4.5 Contamination

Contamination risks associated with the Project are described in Section 7.6 of this EIS.

The site of the Project and surrounding area has been occupied by the DoD since at least 1915. In the early 1990s, the Project site partially comprised the Defence National Storage Distribution Centre (DNSDC), which included warehousing, refuelling and chemical storage areas. It was subsequently developed into MPE, which includes Commonwealth land and land held by Qube and the SIMTA on a 99-year lease.

Based on a review of site history and information for the Project site and surrounding areas, potential sources of contamination and associated contaminants of potential concern that may impact on the Project have been identified. Sources of contamination include stockpiles of fill material, with potential asbestos containing material, and a former grenade range in the southern portion of the site. These contamination sources do not constrain future use of the area for its intended purpose as a road.

Investigations undertaken at Holsworthy Barracks to the south of the site identified that the former DoD fire station (now Liverpool Fire Station), located approximately 350 m to the north of the site, was a source of per- and poly-fluoroalkyl substances (PFAS) contamination. Additionally, migration of PFAS via surface water from the fire station to Anzac Creek was identified, subsequently discharging to Georges River.

A Contamination Management Plan would be developed for the Project which would provide details for the ongoing management and maintenance of contamination management and mitigation measures during the construction phase of the Project.

ES4.6 Water

Assessment of issues relating to water, particularly stormwater management and flooding arising from the Project are described in Section 7.7 of this EIS.

The Project is within the Liverpool local government area (LGA) region of the Georges River catchment and a majority of the Project is within the Anzac Creek Catchment. The Project intersects Anzac Creek, a minor tributary to Georges River, in the vicinity of the south-eastern corner of the MPE site. Existing stormwater drainage in proximity of the project site consists of pit and pipe network and open channels associated with MPE, MPW and the existing Moorebank Avenue.

Most of the Project site drains to Anzac Creek while the north-western extent of the Project drains towards existing stormwater infrastructure established associated with MPE and MPW prior to discharge to the Georges River. The quality of stormwater discharging from the existing site is influenced by discharges from adjacent developments (MPE and MPW), existing road infrastructure and upstream land uses. Two main aquifer systems are present across the Project site at depths typically between 4 m to 7 m below ground level (mbgl) however, groundwater has been observed at 1.5 mbgl at the south-eastern corner of the MPE site near Anzac Creek.

The Project incorporates water management infrastructure including longitudinal drainage, transverse drainage, flooding, and water quantity and quality controls that will be further refined during detailed design stages of the Project.

During construction, impacts to flow regime, streamflow volume and discharge rates are predicted to occur due to removal of vegetation and establishment of engineered surfaces such as roads and hardstand areas. Potential changes to watercourse geomorphology could occur in the form of altered bed and bank conditions due to changes in streamflow characteristics. Impacts to water quality through increased loads of suspended solids, nutrients, and metals in runoff, accidental leaks and spills and instream works could occur in the absence of appropriate controls. Groundwater interception during the installation of culverts within Anzac Creek is not anticipated.

During operation, water management infrastructure would function to minimise impacts to hydrology and water quality. Design of Project will ensure that there is adequate downstream drainage capacity where stormwater infrastructure is planned to convey flows from both the Project and broader MLP.

A Soil and Water Management Plan (SWMP) and Erosion and Sediment Control Plan (ESCP) or equivalent would be prepared for the construction phase of the Project. The SWMP will incorporate a surface water monitoring program to identify water quality problems occurring as a result of construction activities.

ES4.7 Historic heritage

The historic heritage values present within the site of the Project and the potential for the Project to impact on these values are described in Section 7.8 of this EIS.

Historically, the site of the Project was obtained by the Commonwealth government for the establishment of a military training and encampment area. Following the establishment of the Liverpool township in 1810, a military barracks was subsequently established and land at Moorebank was granted to the military for use as a training ground. By 1907, a permanent military camp and rifle range had been developed on the eastern and northern side of the Georges River.

The military camp was expanded during the onset of World War I. Prior to 1915, the camp comprised the areas now encompassed by the northern end of MPW; this land consisted of cleared and levelled land with wooden structure for barracks and storage depots. The land was extensively cleared to the south and to thew east to accommodate further infrastructure.

During World War II, the camp was further expanded (into the land now comprising MPE) to accommodate more permanent warehouse structures. This large flat area would become the DNSDC. Large warehouses were constructed and would remain in use until the site was decommissioned.

No heritage items listed on the National Heritage List, or the Section 170 Register are located adjacent to or within the boundary of the Project. There are several items identified on the Commonwealth Heritage List occurring (or have occurred) to the west and south of the boundary of the Project. There is one item on the State Heritage Register; namely Glenfield Park, near the Project site. Lastly, there are no Commonwealth listed heritage items currently occur within the boundary of the Project.

The field survey had identified that site of the Project has been significantly altered through the development of the MPE Project and associated infrastructure. Imported fill was observed in the southern portion of the study area, associated with water management and/or the construction of transmission lines. Based on the outcomes of the field survey and documentary research, it is considered that the potential for European archaeological material to be present within the Project site to be nil to low.

ES4.8 Aboriginal heritage

The potential for the Project to impact upon Aboriginal heritage values present within the site of the Project are described in Section 7.9 of this EIS.

Previous archaeological studies, associated with the development of the MLP, have occurred within, or near to, the study area. A search of the Aboriginal Heritage Information Management System register identified 36 Aboriginal sites and one Aboriginal place within a 6 km^2 area centred on the study area. These sites (predominantly surface and/or sub-surface stone artefact sites) were primarily situated on the banks of the Georges River as a result of archaeological investigations associated with the MPW project and the Wattle Grove residential development.

No sites were registered as being located within the boundary of the Project; however, a number of isolated Aboriginal objects were documented in previous studies on the fringe of the MPE site. Previous assessments suggest that these sites were likely destroyed in the course of nearby development associated with MPE and the rail link.

A pedestrian field survey was undertaken with the assistance of a representative of the Cubbitch Barta Native Title Claimants Aboriginal Corporation. It confirmed that the study area has been heavily impacted by a range of activities, including land clearing, power lines, historical realignment of Anzac Creek, and earthworks.

One Aboriginal site was identified as part of the field inspection. It was an isolated silcrete cote – a piece of stone used for recovering flakes used in later tool manufacture – situated on graded surface beneath an established powerline. Given the disturbed and isolated nature of the site, along with the broader archaeological record, it is considered that this artefact forms part of the wider background scatter known to occur in the region. It is therefore considered to be of low archaeological significance.

Two previous isolated Aboriginal objects and a potential archaeological deposit were investigated as part of the assessment. These objects have been subject to previous assessment and development activities and are considered either declassified or destroyed.

The site of Project is best characterised as containing very low densities of stone artefacts. Artefacts present would be in disturbed contexts. Therefore, the Project would likely impact very low densities of cultural material, which would generally be considered of low significance.

An Aboriginal Heritage Management Plan would be developed for the Project and would provide details for the ongoing management and maintenance of Aboriginal heritage, and mitigation measures during the construction phase of the Project, including the implementation of an Unexpected Finds Protocol.

ES4.9 Air quality

Air quality impacts arising from the Project are described in Section 7.10 of this EIS.

Atmospheric dispersion modelling (using AERMOD) was used to determine the likely air quality impacts of the operation of the Project and to provide quantitative inputs for a screening level review of health risks. Emissions data for MLP activities were adopted from previous assessments to enable the cumulative impacts of the Project with MLP to be assessed.

Project construction dust is unlikely to represent a serious ongoing problem to the surrounding environment, given the significant distance between the Project and receptors. Any effects would be temporary and relatively short-lived and would only arise during dry weather with wind blowing towards a receptor at a time when dust is being generated and the mitigation measures are not being fully effective.

During operation of the Project, for NO_2, both the total annual mean concentration and the maximum total 1-hour concentration were well below the impact assessment criteria in both scenarios and at all assessment locations. For PM_{10}, both the total annual mean concentration and the maximum total 24-hour concentration were below the impact assessment criteria in both scenarios and at all assessment locations. For $PM_{2.5}$, the annual mean background concentration already exceeded the criterion, and therefore the total concentration at all assessment locations was also above the standard. Additional exceedances of criteria were only predicted for 24-hour $PM_{2.5}$, and in the absence of the MLP, the Project would only be responsible for additional exceedances at two assessment locations.

An Air Quality Management Plan would be developed for the Project prior to construction to detail the ongoing management and maintenance of air quality management and mitigation measures during the construction phase of the Project.

ES4.10 Social

Social impacts associated with the construction and operation of the Project are described in Section 7.11 of this EIS.

Stakeholder engagement and community consultation were undertaken for the Project. These engagement and consultation activities include a newsletter that informed residents of the Project, information provided on the SIMTA webpage, an interactive web-map which presented the proposed site of the Project and enabled stakeholders to add comments and markers to specific sites within the area of the Project, a community survey that allowed residents to provide feedback on the Project and rate their perceived potential impacts/benefits and a community ideas wall which allowed community members and stakeholders to voice their ideas, views, and concerns related to the Project.

The Project is expected to impact the local area of social influence comprising the suburbs of Moorebank, Wattle Grove, Casula, and Glenfield and the regional area of social influence which includes the LGAs of Liverpool and Campbelltown. These communities have the potential to experience change during the construction and operation of the Project.

The estimated total workforce to be employed over the 16 month construction period would be an average of 83 personnel (comprising 72 construction personnel and 11 contractor site staff). At peak construction, up to 122 personnel (comprising 109 construction workers and 13 contractor site staff) would be engaged. The Project is expected to benefit residents of the local and regional area who possess the relevant qualifications to contribute to the construction of the Project.

The Project is expected to impact upon the amenity of residents in the local and regional area, particularly during construction. In particular, there is potential for dust and noise from construction activities which has the potential to causing impact on the amenity and lifestyle of nearby residents. Management and mitigation measures to control dust and noise generation would be implemented to reduce these amenity impacts.

Reduced traffic congestion and generally improved traffic amenity along Moorebank Avenue and nearby intersections may make travel more attractive thereby enhancing community access and interaction. Additionally, the Project would improve access to and use of infrastructure, services, and facilities promoting opportunities to increase community wellbeing through improved access to services, including health, community services, recreation, and leisure facilities

The Project has the potential to enhance physical and mental health through the allocation of an off-road shared user path that would support connectivity for pedestrians and cyclists thereby encouraging residents to walk and cycle. Public safety has been considered in the design of the Project to minimise risk to residents of the local and regional area from vehicle collision, flooding and dust exuberating health related issues.

A monitoring and management framework would be implemented for the Project to ensure that the assessed positive and negative impacts are monitored over time and that the measures are effective.

ES4.11 Visual and landscape character

Landscape character and visual impacts arising from the Project are described in Section 7.12 of this EIS.

The Project is to be sited within an industrial setting with heavily vegetated bushland and remnant vegetation adjacent to the west and south. The surrounding landform is generally flat with gentle undulating slopes closer to the Georges River and surrounding residential areas. To the north and north-east of the Project, large areas of industrial development are interspersed with fragmented vegetation along streets, reserves and waterways. To the south, the Project is encompassed by natural bushland vegetation that screens views to the Holsworthy Military Area, and Wattle Grove residents in the east. Raised landforms are present to the east and south. These areas have elevated views into the Project site and are partially screened by existing vegetation in some cases.

During construction of the Project, visual receptors would be able to see areas cleared of vegetation, cut and fill earthworks, plant and material storage areas, temporary construction buildings and light spill. Once the Project is built, some elements of the Project would be visible to visual receptors. This would include any noise mitigation measures, retaining walls and relocated overhead transmission lines that are currently visible to the same receptors.

The Project is predicted to impact the character of surrounding landscapes. The greatest impact is expected to be to the fragmented vegetation adjacent to the south, south-east and south-west of the Project through vegetation clearing activities, increases to traffic and light spill.

Light pollution would occur as a result of the Project through increased illumination of the new road alignment. Light pollution would have an impact on surrounding receivers, particularly residents in Casula and Glenfield, given the raised topography of these areas. This impact would be lesser for residents in Wattle Grove, given the existing screening and relatively flat topography. However, it should be noted that the Project site and surrounds have experienced a gradual increase in light pollution as a result of increased urbanisation and industrial expansion and therefore the Project would not represent a significant increase to light pollution during construction and operation.

There is potential for shielding features in the landscape to reduce the visibility of Project infrastructure from a number of the selected viewpoints. This is largely due to scattered remnant vegetation, planted landscaping and built landform. Three of the 11 viewpoints would experience open elevated views of Project infrastructure (predominantly to the west and south).

The most significant construction visual impact would be experienced by motorists travelling north along Moorebank Avenue who currently have an elevated view of dense vegetation, some of which would be removed allowing views to the Project. During operation motorists will have a close proximate bushland view to the south and east. Given that the users of this road are transiting and temporary in nature, this impact is considered to be 'moderate'.

A suite of management and mitigation measures will be implemented for potential visual impacts and impacts to landscape character. These measures would mainly relate to design elements and finishes during the detailed design of the Project and include the planting of shrub species in medians and verges where space is available, the design for lighting to avoid unnecessary spill on adjacent residential receivers and use of screen planting where feasible to provide further shielding to Project elements.

ES5 Consultation

SIMTA has consulted with key stakeholders and the community prior to and during the preparation of this EIS. SIMTA would continue to consult with key stakeholders and the community during detailed design and the delivery of the Project.

DPIE will place this EIS on public exhibition for a minimum of 28 days in accordance with the EP&A Regulation. During this period, it will be available for inspection at the DPIE website www.planningportal.nsw.gov.au/major-projects/projects/on-exhibition and on the SIMTA website https://simta.com.au/.

A project email address (simta@elton.com.au) and phone number (1800 986 465) were established to manage enquiries and provide information on the EIS. To provide feedback on the project, you may make written submissions to the Secretary of the DPIE during the exhibition period. All submissions received will be placed on the DPIE website.

To make a submission, use the online form if possible. This is available at:

www.planningportal.nsw.gov.au/major-projects/projects/on-exhibition

If you cannot lodge online, you can write to the address below:

Attn: Director Transport Assessments
Department of Planning, Industry and Environment
GPO Box 39
Sydney NSW 2001

If you wish for the Department to delete your personal information before publication, please make this clear at the top of your letter.

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Tables

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Appendices

Abbreviations

ABS	Australian Bureau of Statistics
AC	asphaltic concrete
ACM	asbestos containing material
AEP	annual exceedance probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHMP	Aboriginal heritage management plan
AHMS	Archaeological and Heritage Management Solutions Pty Ltd
APZ	asset protection zone
AQIA	air quality impact assessment
ARI	annual recurrence interval
AS	Australian Standard
ASL	above sea level
BAM	Biodiversity Assessment Method
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BFHA	bushfire hazard assessment
BFMC	Bush Fire Management Committee
BFMP	bushfire management plan
BMP	biodiversity management plan
BoM	Bureau of Meteorology
BOS	Biodiversity Offset Scheme
BS	British Standard
BS Act	NSW *Biosecurity Act 2015*
BTEX	benzene, toluene, ethylbenzene and xylene
CAU	Cambridge Avenue Upgrade
CBD	central business district
CCB	Configuration Change Board
CDR	cross discipline review

CEEC	Critically Endangered Ecological Community
CEMP	construction environmental management plan
CHL	Commonwealth Heritage List
CM SEPP	State Environmental Planning Policy (Coastal Management) 2018
CoPC	chemicals of potential concern
CSM	conceptual site model
CWRMP	construction waste and resource management plan
DA	Development Application
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
dBA	decibels (A weighted)
DEC	Department of Environment and Conservation (NSW) (a former division of the Government of NSW)
DECC	Department of Environment and Climate Change (NSW) (a former division of the Government of NSW)
DECCW	Department of Environment, Climate Change and Water (NSW) (a former division of the Government of NSW)
DEL	average delay
DoD	Commonwealth Department of Defence
DoEE	Commonwealth Department of the Environment and Energy
DOS	degree of saturation
DJLU	Defence Joint Logistics Unit
DNG	derived native grassland
DNSDC	Defence National Storage and Distribution Centre
DP	Deposited Plan
DPE	NSW Department of Planning, now Department of Planning, Industry and Environment
DPIE	NSW Department of Planning, Industry and Environment (formerly Department of Planning and Environment)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EO	explosive ordnance
EOW	explosive ordnance waste
EPA	NSW Environmental Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*

EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPIs	environmental planning instruments
EPL	environmental protection licence
ESD	ecologically sustainable development
FFDI	Forest Fire Danger Index
FM Act	NSW *Fisheries Management Act 1994*
FRNSW	Fire and Rescue NSW
GDE	groundwater dependent ecosystem
GFA	gross floor area
GHG	greenhouse gas
ha	hectares
Heritage Act	NSW *Heritage Act 1977*
HIS	Heritage Interpretation Strategy
HHMP	historic heritage management plan
HV	heavy vehicles
IAQM	Institute of Air Quality Management
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	*Interim Construction Noise Guideline*
IMEX	import-export terminal
IMT	intermodal terminal
Infrastructure SEPP	State Environmental Planning Policy (Infrastructure) 2007
IPC	Independent Planning Commission (formerly the Planning Assessment Commission)
km	kilometre
KTP	key threatening process
LALC	Local Aboriginal Land Council
IBRA	Interim Biogeographic Regionalisation for Australia
LCC	Liverpool City Council
LCVIA	land character and visual impact assessment
LCZ	landscape character zone
LGA	local government area
Liverpool LEP	Liverpool Local Environmental Plan 2008

LOS	level of service
LV	light vehicles
m	metres
MAR	Moorebank Avenue Realignment
mbgl	metres below ground level
MIC	Moorebank Intermodal Company
MITRA	Moorebank Intermodal Terminal Road Access
MNES	matters of national environmental significance
MLP	Moorebank Logistics Park– comprising the MPE Project and MPW Project
MPE	Moorebank Precinct East
MPW	Moorebank Precinct West
NCG	*Noise Criteria Guideline*
NEPC	National Environment Protection Council
NHL	National Heritage List
NMG	*Noise Mitigation Guideline*
NML	noise management level
NMVG	Noise Model Validation Guideline
NPfI	*Noise Policy for Industry*
NVIA	noise and vibration impact assessment
NVMP	noise and vibration management plan
OEH	Office of Environment and Heritage (NSW)
PAD	potential archaeological deposit
PAC	Planning Assessment Commission (now the Independent Planning Commission)
PAH	polycyclic aromatic hydrocarbon
PAHA	preliminary Aboriginal heritage assessment
PBP	*Planning for Bushfire Protection 2019*
PCB	polychlorinated biphenyl
PCT	plant community type
PFAS	poly-fluoroalkyl substances
PMST	Protected Matters Search Tool
POEO Act	*Protection of the Environment Operations Act* 1997
PSI	preliminary site investigation

PSNLs	project specific noise levels
Q95	95% queue lengths
Qube	Qube Holdings Limited
RAP	registered Aboriginal party
RailCorp	Rail Corporation of New South Wales
RBL	rating background level
RCIP	Regional Contamination Investigation Program
RF Act	NSW *Rural Fires Act 1997*
RFS	NSW Rural Fire Service
RMS	NSW Roads and Maritime Services, now Transport for NSW (TfNSW)
RNP	*Road Noise Policy*
RRF	resource recovery facility
RTA	Roads & Traffic Authority
RTS	response to submissions
RVAs	rapid vegetation assessments
SAII	serious and irreversible impacts
SEARs	Secretary's environmental assessment requirements
SEPP	State Environmental Planning Policy
SEPP 33	State Environmental Planning Policy No 33 - Hazardous and Offensive Development
SEPP 55	State Environmental Planning Policy No 55 - Remediation of Land
SHR	State Heritage Register
SIA	social impact assessment
SIMTA	Sydney Intermodal Terminal Alliance
SME	School of Military Engineering
SMP	spoil management plan
SMZ	selected material zone
SoHI	statement of historic impact
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSD	State significant development
SSI	State significant infrastructure
SSFL	Southern Sydney Freight Line
TAHE	Transport Asset Holding Entity of New South Wales

TCP	traffic control plan
TEC	Threatened Ecological Community
TEU	Twenty-foot equivalent unit or a standard shipping container
TfNSW	Transport for New South Wales
TIA	traffic impact assessment
TPH	total petroleum hydrocarbons
TSC Act	NSW *Threatened Species Conservation Act 1995*
TTMP	transport and traffic management plan
UST	underground storage tank
UXO	unexploded ordnance
VEC	Vulnerable Ecological Community
VENM	virgin excavated natural material
WA	water assessment
WAD	Works Authorisation Deed
WM Act	NSW *Water Management Act 2000*
WWI	World War I
WWII	World War II

Glossary

Term	Definition
aggregate	A material composed of discrete mineral particles of species size produced from sand, gravel, rock or metallurgical slag by selective extraction, screening, blasting or crushing.
alignment	The general route (eg of a roadway) in plan and elevation.
Boot Land	Residual Commonwealth-owned land to the east of the MPE Site between the site boundary and the Wattle Grove residential area and to the south of the MPE Site between the boundary and the East Hills Railway. It comprises Part Lot 4 DP1197707.
carriageway	The portion of a roadway devoted to vehicular traffic generally delineated by kerbs, a verge or a median (inclusive of shoulders and ancillary lanes).
catchment	The area from which a surface watercourse or a groundwater system derives its water.
culvert	One or more adjacent enclosed channels for conveying a stream below formation level.
cut	The material excavated from a cutting.
cutting	Formation resulting from the construction of the road below existing ground level – the material is cut out or excavated.
design speed	A nominal speed fixed to determine the geometric features of a road.
earthworks	All works involving the loosening, excavating, placing, shaping and compacting of soil or rock.
ecological receptor	In the context of the air quality impact assessment, any sensitive habitat/species affected by dust deposition.
embankment	That portion of a road located on an earthen structure where the subgrade level is above the natural surface.
ENM	Excavated natural material - naturally occurring rock and soil (including materials such as sandstone, shale, clay and soil) that has been excavated from the ground, contains at least (by weight) 98% natural material and does not mee the definition of Virgin excavated natural material.
fill	The material placed in an embankment.
grade	The rate of longitudinal rise (or fall) of a carriageway with respect to the horizontal expressed as a percentage. To secure or smooth an earth, gravel or other surface by means of a grader or similar implement.
Greenhills Road	An unformed gazetted Crown Road Reserve. It runs adjacent to and parallel to the eastern boundary of MPE.
human receptor	Any location where a person or property may experience the adverse effects.
intersection	An intersection where carriageways cross at a common level (at-grade).
kerb	A hard stone or concrete shaped to inhibit passage by vehicles. Used for bordering a road and limiting the shared user paths/footways.
lane	A portion of the carriageway allotted for the use of a single line of vehicles.
M5 Motorway	South Western Motorway forming part of the Metroad 5, the main arterial route linking Sydney's city centre to south-western suburbs and beyond.
median	The central reservation which separates carriageways from traffic travelling in the opposite direction.
Moorebank Logistics Park	A nationally-significant freight infrastructure project located in southwest Sydney. In operation it will be Australia's largest intermodal terminal facility linking Port Botany directly to rail terminals and warehousing on a 243 ha precinct owned by the Commonwealth of Australia (Moorebank Precinct West) and Sydney Intermodal Terminal Alliance (Moorebank Precinct East). It is currently under construction.

Term	Definition
Moorebank Precinct East	The development of an import/export port shuttle freight terminal, warehouses, and distribution facilities together with ancillary offices, a freight village, and ancillary infrastructure. The MPE Project includes a rail link providing connection to the South Sydney Freight Line within the East Hills Rail Corridor. The MPE Project is currently being developed in stages pursuant to the Concept Approval No. MP10_0913 as modified.
Moorebank Precinct West	The development of an intermodal facility, including a rail link to the South Sydney Freight Line, warehouse and distribution facilities and associated works. The MPW Project is currently being developed in stages pursuant to Concept Approval No. SSD 5066 as modified.
pavement	The portion of a carriageway placed above the subgrade for the support of, and to form a running surface for vehicular traffic.
the Planning Agreement	The Voluntary Planning Agreement executed between RMS (now TfNSW) and Qube entered into on 21 March 2019. SIMTA (the developer of the MPW site) is solely owned by Qube. It requires Qube to make a cash contribution for regional road upgrades and to obtain a separate planning approval to relocate Moorebank Avenue to the east of the MPE site or upgrade Moorebank Avenue along its current alignment to a four lane road.
the Project	The upgrade and realignment of a section of Moorebank Avenue from a point south of Anzac Road/Moorebank Avenue to a point immediately north of the East Hills Railway, running predominantly to the east of the MLP.
QA specification	Quality assurance specification - a contractual document that sets out the quality standards that must be achieved by the contractor when carrying out works.
quarry	An open pit from which stone, sand, gravel or fill is taken.
road furniture	A general term covering all signs, street lights and protective devices for the control, guidance and safety of traffic and convenience of road users.
road reserve	A legally defined area of land within which facilities such as roads, footpaths and associated features may be constructed for public travel.
scour	The erosion of material by the action of flowing water.
selected fill	Fill complying with specified requirements.
selected material zone	The top layer of the sub-grade.
shared path	A pathway used for both cyclists and pedestrians, usually located on the side of the road.
shoulder	The portion of the carriageway beyond the traffic lanes adjacent to and flush with the surface of the pavement.
the site	Land on which the Project is to be developed.
slip lane	A lane providing for left turning vehicles allowing them to avoid stopping at an intersection.
Southern Sydney Freight Line	A dedicated freight rail line that provides a direct link to the interstate freight network and, together with the Metropolitan Freight Network, a direct link to Port Botany.
subgrade	The trimmed or prepared portion of the formation on which the pavement is constructed.
verge	That portion of the formation not covered by the carriageway or footpath.
VENM	Virgin excavated natural material - natural material that has been excavated or quarried from areas that are not contaminated with manufactured chemicals or process residues, as a result of industrial, commercial, mining or agricultural activities, and that does not contain sulphidic ores or soils.

1 Introduction

1.1 Overview

Sydney Intermodal Terminal Alliance (SIMTA) is developing the Moorebank Logistics Park (MLP) (also known as the Moorebank Intermodal Freight Precinct or Moorebank Intermodal Terminal), a nationally-significant freight infrastructure project in the south-western Sydney suburb of Moorebank. In operation, it will include an import-export (IMEX) rail terminal, interstate/intrastate terminal, significant warehousing, auxiliary services including retail and service offerings, and a rail connection to the Southern Sydney Freight Line (SSFL) providing direct access to the intermodal freight terminals. When completed, the MLP will provide up to 600,000 square metres (m^2) of high specification warehousing where containers can be unpacked before delivery of their contents to their final destinations.

The MLP is located at and physically separated by Moorebank Avenue. Moorebank Avenue divides the MLP into two sites: Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW).

This Environmental Impact Statement (EIS) is seeking approval for the realignment of Moorebank Avenue, generally to the east of the MLP (The Project). The Project addresses a requirement under a voluntary planning agreement between RMS (now Transport for NSW (TfNSW)) and Qube executed 21 March 2019 (the Planning Agreement). The Project also forms part of the satisfactory arrangements made by SIMTA for the provision of relevant State public infrastructure required by clause 7.36 of the *Liverpool Local Environment Plan* (Liverpool LEP) in respect of the Moorebank Precinct West Stage 2 development (SSD 7709).

The Project would ultimately provide two lanes in each direction adjacent to the MPE site and signalised intersections to provide access into the MLP. The road would merge to one lane in each direction in the vicinity of the south-east corner of the MPE Site. The existing road alignment would be partly retained as a service road to the MLP.

The Project is expected to take up to 16 months to construct and would have an estimated capital investment value of approximately 300 million AUD. The completed road asset and corridor would be dedicated to TfNSW as a public road.

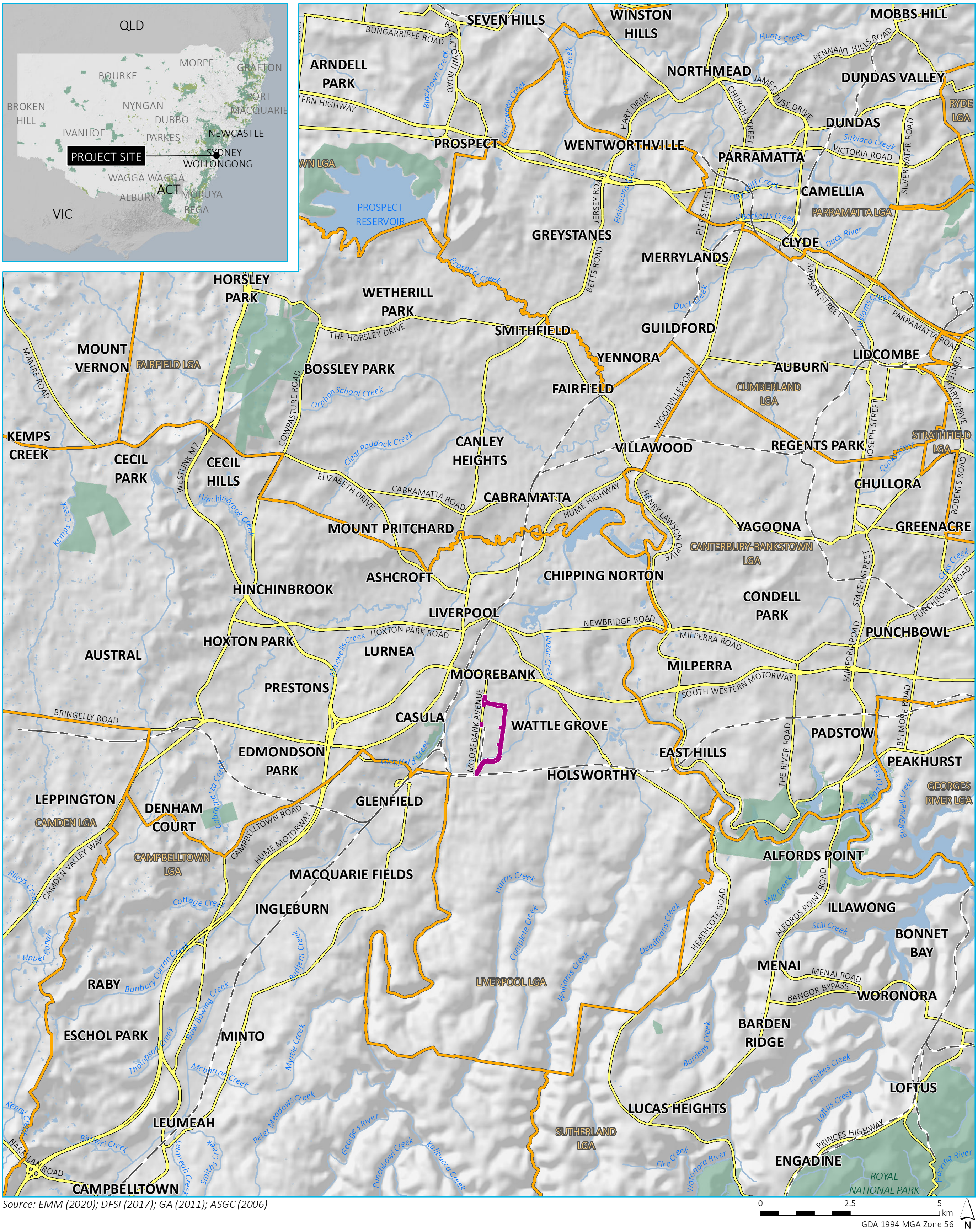
The Project has been declared by the NSW Minister for Planning and Public Spaces to be State significant infrastructure (SSI) on the basis that it would contribute towards relevant State public infrastructure needs and is required to meet strategic State and local objectives for the Moorebank area. Once realigned, Moorebank Avenue would improve traffic conditions in the vicinity of the MLP for both the precinct and the broader community-generated traffic.

The Project is presented in its regional and local context in Figure 1.1.

1.2 Sydney Intermodal Terminal Alliance

SIMTA (the applicant) was formed in 2007 to develop an IMEX terminal and onsite warehousing at Moorebank. Initially formed as a joint venture between Stockland, Qube, and Aurizon (formerly QR National), SIMTA is now a wholly owned subsidiary of Qube. Qube is an integrated provider of import and export logistics services, headquartered in Sydney, Australia. Qube employs over 6,000 employees across its ports, bulk, logistics, infrastructure and property operations. In Australia, Qube operates eight intermodal terminal (IMT) facilities.

SIMTA was the applicant for the MPE Concept Plan Approval (MP 10_0193), MPE Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval (2011/6229), MPE Stage 1 (SSD 6766), and MPE Stage 2 (SSD 7628). SIMTA has entered into an agreement with the Moorebank Intermodal Company (MIC), a wholly owned Australian Government entity to develop and operate the MLP.



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006)

KEY

- Construction footprint
- Local government area
- Rail line
- Major road
- Named watercourse
- NPWS reserve

Regional context

Moorebank Avenue realignment
Environmental inplact assessment
Figure 1.1

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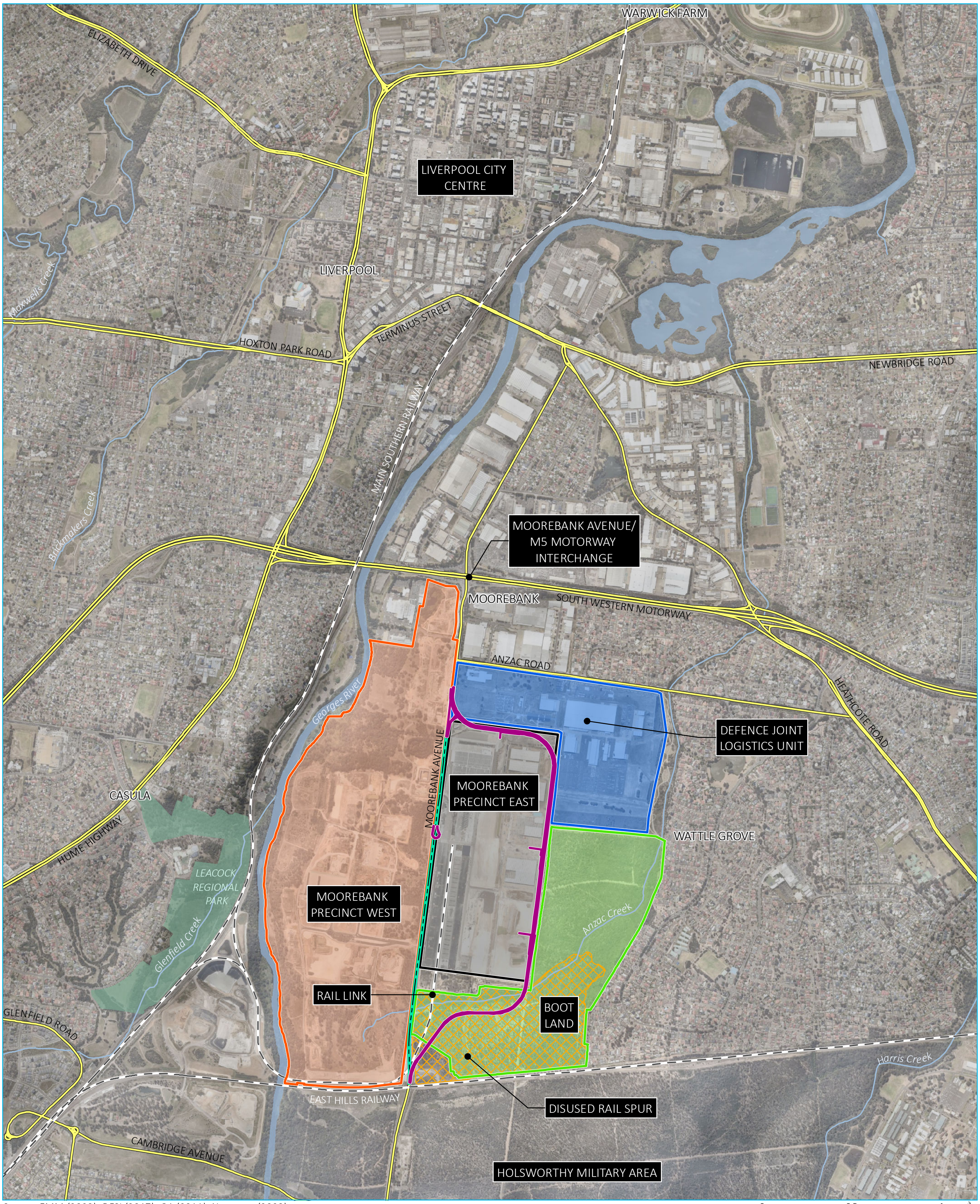

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Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

0 0.5 1 km
GDA 1994 MGA Zone 56
N

KEY

- Project alignment
- Existing road to be realigned
- Moorebank Precinct East
- Moorebank Precinct West
- DJLU boundary
- Boot Land boundary
- 2018 bushfire extent
- Rail line
- Major road
- Watercourse
- NPWS reserve

Local context

Moorebank Avenue realignment
Environmental impact assessment
Figure 1.2

EMM
creating opportunities

1.3 Terminology

A summary description of important terminology in this EIS is provided in Table 1.1.

Table 1.1 Project terminology

Full component name	Abbreviated name	Brief component description
Moorebank Logistics Park	MLP	A nationally significant freight infrastructure project located in southwest Sydney. In operation it will be Australia's largest intermodal freight terminal facility linking Port Botany directly to rail terminals and warehousing on a 243 ha precinct owned by the Commonwealth of Australia (Moorebank Precinct West) and Sydney Intermodal Terminal Alliance (Moorebank Precinct East). The MLP Project is currently under construction.
Moorebank Precinct East	MPE	Refers to the MLP eastern precinct.
Moorebank Precinct East Project (formerly the SIMTA Project)	MPE Project	The development of an import/export port shuttle freight terminal, warehouses, and distribution facilities together with ancillary offices, a freight village, and ancillary infrastructure. The MPE Project includes a rail link providing connection to the South Sydney Freight Line (SSFL) within the East Hills Rail Corridor. The MPE Project is currently being developed in stages pursuant to the Concept Approval No. MP10_0913 as modified.
Moorebank Precinct East site	MPE site	The approximate 83 ha site located on the eastern side of Moorebank Avenue. The MPE site is the subject to Concept Approval No. MP10_0913. The MPE site comprises Lots 12 and 13 in DP 1251885, Lots 21, 22, 23, and 26 in DP 1253673.
Moorebank Precinct West	MPW	Refers to the MLP western precinct.
Moorebank Precinct West Project (formerly the MIC Project)	MPW Project	The development of an intermodal facility, including a rail link to the South Sydney Freight Line, warehouse and distribution facilities and associated works. The MPW Project is currently being developed in stages pursuant to Concept Approval No. SSD 5066 as modified.
Moorebank Precinct West site	MPW site	The approximate 220 ha site located on the western side of Moorebank Avenue. The MPW site is the subject to Concept Approval No. SSD 5066. The MPW site comprising Lot 1 in DP1197707 and Lot 100 in DP1049508.
The planning agreement between Transport for NSW and Qube	the Planning Agreement	The Voluntary Planning Agreement executed between Roads and RMS (now TfNSW) and Qube entered into on 21 March 2019. SIMTA (the developer of the MPW site) is solely owned by Qube. It requires Qube to make a cash contribution for regional road upgrades and to obtain a separate planning approval and carry out the works required to relocate Moorebank Avenue to the east of the MPE site or upgrade Moorebank Avenue along its current alignment to a four lane road.
Moorebank Avenue Realignment	the Project	The upgrade and realignment of a section of Moorebank Avenue from a point south of Anzac Road/Moorebank Avenue to a point immediately north of the East Hills Railway, running predominantly to the east of the MLP.
Moorebank Avenue South Upgrade	-	Defined in the Planning Agreement. The upgrade of Moorebank Avenue to four lanes along its current alignment from the IMEX Terminal Main access point to the southern boundary of MPE.

1.4 Background

1.4.1 Moorebank Logistics Park

MLP is located at Moorebank Avenue which divides the precinct into MPE and MPW.

The land comprising MPW is owned by the Commonwealth of Australia. The Moorebank Intermodal Company (MIC) was established in December 2012 to assume responsibility to facilitate development of MPW. A Development and Operations Deed was agreed between the MIC and SIMTA on 3 June 2015 for the development of the MLP. Under the Development and Operations Deed, SIMTA is responsible to obtain all future planning approvals and to construct, maintain, and operate both the MPE and MPW. Additionally, it provides for specific requirements for works relating to Moorebank Avenue.

i Moorebank Precinct East

MPE is located on the eastern side of Moorebank Avenue and forms the eastern section of the MLP. The MPE site is owned by SIMTA. The MPE Project is undertaken at the MPE site and involves the construction and operation of an IMEX port shuttle freight terminal, a rail link to SSFL, and associated warehousing and estate works.

The MPE Project is being developed pursuant to Concept Approval MP10_0193(MPE Concept Plan) (as modified), and the following staged approval:

- MPE Stage 1 – Construction and operation of an intermodal terminal facility (IMT) with a maximum capacity of 250,000 twenty-foot equivalent units (TEU) per annum, a rail link to SSFL, and associated infrastructure.

- MPE Stage 2 – Construction and operation of warehousing, distribution facilities, and upgrades to part of Moorebank Avenue. MPE Stage 2 is subject to three modifications.

Existing approvals issued to date relating to the MPE Project are summarised in Table 1.2.

Table 1.2 MPE Project approvals

Approval	Date approved/status	Particulars
MPE Concept Plan		
MP 10_0193 (the MPE Concept Plan Approval)	29 September 2014	Concept Approval under (the now repealed) Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to use the site as an IMT, including a rail link to the SSFL within the rail corridor, warehouse distribution facilities, freight village (ancillary site and operational services), stormwater, landscaping, and associated works.
MP 10_0193 MOD 1	12 December 2016	Modification to the Concept Plan Approval under (the now repealed) Section 75W of the EP&A Act for: • inclusion of additional land parcels for the construction of the approved rail link; and • modification to road infrastructure upgrade requirements and bus routes.

Table 1.2 MPE Project approvals

Approval	Date approved/status	Particulars
MP 10_0193 MOD 2	31 January 2018	Amendments to the approved concept plan, including: • an increase in the MPE Site area and amendments to the MPE Site boundary to include works on Moorebank Avenue and drainage works to the south and east of the site; • upgrade works to Moorebank Avenue, including a widening of the road to four-lanes from the northern to southern extent of the MPE Site; • formation of a diversion road and interim access to the MPE site area along Moorebank Avenue during the upgrade works; • provision of interim site access for warehousing from Moorebank Avenue; • reconfiguration of internal road layout and use of all internal roads by both light and heavy vehicles; • importation of approximately 600,000m^3 of clean fill for bulk earthworks within the site and part of Moorebank Avenue; • revised warehousing and freight village locations and layouts; • revision of the proposed staging of the project; and • subdivision of the site following development.
MP 10_0193 MOD 3	31 January 2020	An amendment to the approved concept plan to adjust the southern boundary of the MPE site to facilitate a revised drainage system layout and design for Onsite Stormwater Detention Basin 2.
MPE EPBC Project Approval		
EPBC 2011/6229	6 March 2014	The project was declared a controlled action by the Commonwealth Minister for the Environment due to potential impacts on listed threatened species and communities and Commonwealth land.
MPE Stage 1 (Intermodal Facility)		
SSD 6766 (the MPE Stage 1 Approval)	12 December 2016	Approval for: • an intermodal terminal facility handling a container freight volume of up to 250,000 TEUs (containers) per year, including truck processing and loading areas, rail loading and container storage areas, and an administration facility and associated car parking; • a rail link connecting the southern end of the site to the SSFL; • associated works including rail sidings, vegetation clearing, remediation and levelling works, and drainage and utilities installation; and • operation 24 hours a day, seven days per week.

Table 1.2 MPE Project approvals

Approval	Date approved/status	Particulars
MPE Stage 2 (Warehousing Approval)		
SSD 7628 (the MPE Stage 2 Approval)	31 January 2018	Approval for: • earthworks, including the importation of 600,000 m^3 of fill and vegetation clearing; • approximately 300,000 m^2 of gross floor area (GFA) of warehousing and ancillary facilities; • warehouse fit-out; • freight village, with 8,000 m^2 GFA of ancillary retail, commercial, and light industrial land uses; • internal road network and hardstand across site; • ancillary supporting infrastructure; • upgrades to part of Moorebank Avenue; and • operation 24 hours a day, seven days per week.
SSD 7628 MOD 1	Under assessment	Modification seeking to change timing for road upgrade design approval and completion of works.
SSD 7628 MOD 2	31 January 2020	Modification to the approval, including: • adjustment to the southern boundary of the site to facilitate a revised drainage system layout and design; and • removal of the requirement of maximum batter slopes of 1V:4H for an onsite detention basin. Note: This modification was approved concurrently with MP 10_0193 MOD 3.
SSD 7628 MOD 3	Under assessment	Modification for the subdivision two additional lots as part of the subdivision of the MPE Site, change construction compliance reporting required by condition C21 (c)(ii) to six-monthly, revise controls for building signage and administrative updates to conditions.
SSD 7628 MOD 4	Under assessment	Modification seeking exclusion of Target warehouse car park "Area 1" from requirement to provide landscaped bays in car parks to include canopy trees for shade, and provision of alternate landscaping in that area.

ii Moorebank Precinct West

MPW is located on the western side of Moorebank Avenue and forms the western section of the MLP. The MPW site is owned by the Commonwealth of Australia. The MPW Project is being carried out at the MPW site and involves the construction and operation of an intermodal facility, including a rail link to the South Sydney Freight Line, warehouse and distribution facilities and associated works.

The MPW Project is being developed pursuant to Concept Approval SSD 5066 (MPW Concept Plan) (as modified), and the following staged approvals:

- MPW Stage 1 Early Works (approved as Stage 1 of the MPW Concept Plan) – For site preparatory works and establishment of construction facilities and access.

- MPW Stage 2 – For earthworks, warehouses, freight village, intermodal terminals, and access and intersection upgrades to Anzac Road.

- MPW Stage 3 – For the establishment of works compound, and supporting ancillary facilities such as access roads, services and utilities and subdivision of the site.

Existing approvals issued to date relating to the MPW Project are summarised in Table 1.3.

Table 1.3 MPW Project approvals

Approval	Date approved/status	Particulars
MPW Concept Plan & Stage 1 Early Works		
SSD 5066 (the MPW Concept Plan and Stage 1 Approval)	3 June 2016	Concept plan approval for an import export (IMEX) terminal to handle up to 1.05 million TEUs, an interstate terminal that will handle up to 500,000 TEUs, and warehousing of up to 300,000 m^2. Early Works (Stage 1) involves the demolition of buildings; rehabilitation of the excavation/earthmoving training area; remediation of contaminated land; removal of underground storage tanks; heritage impact remediation works; and the establishment of construction facilities and access, including site security.
SSD 5066 MOD 1	30 October 2019	Modification to the approval, including: • importation of approximately 1,600,000 m^3 of clean fill for bulk earthworks within the site; • expansion of the construction footprint to allow for Moorebank Avenue/Anzac Road intersection works; • rearrangement of warehousing, freight village, internal roads, and truck parking locations and layouts; • additional onsite detention basin near the northern boundary of the site and relocation to the western boundary of the site and relocation to the western boundary and enlargement of the southern onsite detention basin; • deletion of the port shuttle rail freight intermodal terminal and an increase in the warehousing area; • use of the interstate terminal for interstate, intrastate and port shuttle rail freight including one additional rail track; • increase in building heights as a result of raising the site by up to 3.6 m; • reducing constructions stages from four (excluding State 1 Early Works) with potentially only two future development applications; • transfer of containers by heavy vehicles between the MPW warehouses and MPE rail terminal and between the MPE rail terminal and MPW warehouses; and • ability to subdivide the site as part of a future development application.
MPW EPBC Project Approval		
EPBC 2011/6086	27 September 2016	The project was declared a controlled action by the Commonwealth Minister for the Environment due to potential impacts on listed threatened species and communities and Commonwealth land.

Table 1.3 MPW Project approvals

Approval	Date approved/status	Particulars
MPW Stage 2		
SSD 7709 (the MPW Stage 2 Approval)	11 November 2019	Approval for: • an IMT facility to support a container freight throughput volume of 500,000 TEUs including and associated rail infrastructure (eg rail sidings); • approximately 215,000 m² of GFA of warehousing, ancillary facilities, and freight village; • intersection upgrades to Moorebank Avenue; • construction and operation of on-site detention basins; • construction works and temporary ancillary facilities including vegetation clearing, and importation of up to 1,600,00 m³ of fill; and • operation 24 hours a day, seven days per week.

1.4.2 Planning Agreement

Under the Liverpool LEP, the MPW site is mapped as being located within a number of key sites in particular the IMT Area. Clause 7.36(4) of the LEP says that development consent must not be granted to development for the purposes of an IMT on land in the IMT Area unless the Secretary has certified in writing to the consent authority (in the case of the MPW Project, the Independent Planning Commission) that satisfactory arrangements have been made to contribute to the provision of relevant State public infrastructure in relation to that land.

This requirement applied to the determination of the MPE Stage 2 development application (SSD 7709).

On 25 March 2019, Qube RE Services (No 2) Pty Limited (Qube) entered into a planning agreement with Roads and Maritime Services (RMS) (now TfNSW). The Planning Agreement required SIMTA to make development contributions, requiring it to:

- make a cash contribution of $48 million to be paid to TfNSW for regional road upgrades; and
- complete an environmental impact assessment and obtain a separate planning approval to relocate Moorebank Avenue to the east of the MPE site (the Moorebank Avenue Realignment), or upgrade Moorebank Avenue to a four lane road from south of the entrance to MPE freight terminal to a point approximately 120 m south of the MPE site (the Moorebank Avenue South Upgrade).

Under the Planning Agreement, the following arrangements are made concerning the delivery of the Moorebank Avenue Realignment and Moorebank Avenue South Upgrade:

- where all approvals required for the Moorebank Avenue Realignment are obtained by 31 December 2021, Qube is required to complete the realignment by 31 December 2023;
- where Qube does not obtain all approvals required for the Moorebank Avenue Realignment by 31 December 2021, Qube is required to instead carry out the Moorebank Avenue South Upgrade; and
- where the Moorebank Avenue South Upgrade is instead required to be delivered, Qube must obtain all approvals required for that upgrade by 31 December 2022 and complete that upgrade by 31 December 2024 (or such other date agreed by TfNSW).

Qube is also required to take all practical steps to procure the dedication of the Moorebank Avenue Realignment land (or Moorebank Avenue South Upgrade land) as a public road by the above completion dates. It is noted that under the agreement, TfNSW has the absolute discretion for alternative dates.

The recitals to the Planning Agreement say that Qube offered to enter into the planning agreement to provide development contributions to satisfy the relevant state public infrastructure needs that will arise from the MPW Stage 2 development to enable a satisfactory arrangements certificate to be issued for the MPW Stage 2 development application.

The Acting Deputy Secretary, under delegation from the Secretary of the DPIE, certified to the Independent Planning Commission (IPC) that satisfactory arrangements had been agreed for the provision of relevant State public infrastructure on 23 April 2019.

1.4.3 The Project

This EIS addresses the requirement for the Moorebank Avenue Realignment as required by the Planning Agreement and consent condition A58 of the MPW Stage 2 Approval (SSD 7709).

A full project description is provided in Section 5.

Key features of the Project include:

- realigning a section of Moorebank Avenue from a point approximately 130 metres (m) south of the Anzac Road/Moorebank Avenue intersection to the bridge over the East Hills railway;
- constructing approximately 3 kilometres (km) of new road to bypass the MLP to the east, comprising:
  - a four-lane road (two lanes in each direction) in the vicinity of MPE, commencing from a point approximately 130 m south of the Anzac Road/ Moorebank Avenue intersection to the south-eastern corner of the MPE site;
  - a two-lane road (one lane in each direction) from the south-eastern corner of the MPE site to a point immediately north of the bridge over the East Hills railway;
- decommissioning of the existing Moorebank Avenue road section, and alterations to enable it to function as a restricted access to the MLP;
- four accesses between the new road and the MLP. The accesses would include signalised intersections with auxiliary left and right turn lanes at entry points and would replicate existing accesses on Moorebank Avenue;
- constructing a central median, typically six metres wide, tapering to zero width where the new road becomes two lanes;
- tie-ins and infrastructure adjustments to the existing Moorebank Avenue, bridge over the East Hills railway, and MLP;
- constructing retaining walls;
- noise mitigation in the vicinity of the Defence Joint Logistics Unit (DJLU) site (chainage 600-800);
- constructing operational drainage infrastructure, onsite stormwater detention basins, and operational water quality controls (including vegetated swales, bioretention systems, and spill containment);

- installing a culvert within Anzac Creek and extending existing culverts within existing watercourses/drainage lines;
- installing road furniture including security fencing, guideposts, traffic signs, and street lighting;
- adjusting public utilities; and
- constructing temporary ancillary facilities, including a work site compound, lay-down areas, and construction water detention basins.

The Project is expected to take approximately 16 months to construct using a workforce of up to 122 personnel. In line with arrangements made under the Planning Agreement, the new road section would be operational in 2024.

Upon completion, the new road section (not including those sections extending into the MLP) would be transferred to TfNSW to operate as a local road. The existing road section would continue to be owned by the Commonwealth and would be operated as an internal service road to the MLP, with limited public access.

1.4.4 Objectives

The objectives of the Project are to:

- obtain development approval by 31 December 2021;
- construct the Project by 31 December 2023;
- demonstrate that satisfactory arrangements in respect to the traffic impacts arising from developing MPW;
- deliver operational efficiencies to terminals at Moorebank; and
- effectively manage impacts on surrounding residents and the local environment during the construction and operations and achieving, at a minimum compliance with the relevant statutory requirements.

1.5 Approvals approach

To facilitate the Project, SIMTA is seeking approval under Part 5, Division 5.2 of the E&A Act.

1.5.1 New South Wales

The Project is declared to be SSI under section 5.12 of the EP&A Act, by virtue of clause 15, and clause of Schedule 4 of the State Environmental Planning Policy (State and Regional Development) 2011 (State and Regional Development SEPP).

An application for SSI must be accompanied by an EIS and be determined by the NSW Minister for Planning and Public Spaces.

On 29 June 2020, EMM Consulting Pty Ltd (EMM), on behalf of SIMTA, submitted a scoping report for the Project to DPIE. It updated a previous version prepared and submitted by Aspect Environmental Pty Ltd, on behalf of SIMTA to DPIE in 2019. The purpose of the scoping report was to request and inform the content of the Secretary's (of DPIE) Environment Assessment Requirements (SEARs) which specify minimum requirements for the EIS required to accompany the application for the Project.

On 1 March 2021, DPIE issued the SEARs for the Project. These SEARs are provided in Appendix A and summarised in Table 2.1. This EIS has been prepared in accordance with these SEARs.

Further details on the NSW approval process are provided in Chapter 2.

1.5.2 Commonwealth

The EPBC Act is the primary Commonwealth legislation that governs the protection of the environment. Under the EPBC Act, proposed 'actions' that have the potential to have a significant impact on matters of national environmental significance (MNES) or the environment inside or outside the Australian jurisdiction may not be undertaken without prior approval from the Minister for the Environment. MNES include World and National heritage properties and places, and Commonwealth listed threatened ecological communities and species.

On 11 November 2020, SIMTA referred the Project (Referral Number 2020/8839) to the Commonwealth Minister for the Environment, and on a precautionary basis, nominated that it had potential to have a significant impact on listed threatened species and threatened ecological communities. The referral was publicly notified between 6 January 2021 and 16 January 2021. On 8 February, the Project was determined to be a controlled action and will be assessed under the bilateral agreement with NSW (Appendix A). On 16 February 2021, DAWE provided project assessment notes to DPIE.

1.6 Purpose of the EIS

The Project is classified as SSI pursuant to Schedule 4 of the State and Regional Development SEPP. Accordingly, the Project requires approval under Part 5, Division 5.1 of the EP&A Act.

This EIS has been prepared by EMM Consulting Pty Limited (EMM) on behalf of SIMTA to assess the potential environmental and social impacts of the Project and to support an SSI application. It has been prepared to the form and content requirements set out in Clauses 6 and 7 of Schedule 2 of the Environmental Regulation 2000 (EP&A Regulation).

This EIS sets out the Project in the context of the existing environment, planning considerations, key environmental issues, potential impacts, mitigation measures and residual impacts. It is informed by the technical assessments contained in the appendices and provides an overview of these specialist assessments. It addresses the specific minimum requirements in the SEARs issued by DPIE and additional agency requirements.

1.7 EIS structure

The structure of the EIS is as follows:

- **Chapter 1 Introduction** –provides an overview of the Project and the MLP (including historical planning approvals and the Planning Agreement). It also outlines the purpose and structure of the EIS.

- **Chapter 2 Statutory context** – identifies the approvals framework for the Project under NSW and Commonwealth legislation. Specifically, Section 2.1 lists the SEARs and identifies where each matter is addressed within the EIS (refer to Table 2.1).

- **Chapter 3 Strategic justification** – discusses how the Project responds to the objectives of Australian and NSW Government strategic policies, and the objectives of the MLP. It describes the strategic need of the Project and identifies the consequences of not carrying out the Project.

- **Chapter 4 Project development and alternatives** – describes the various alternatives to the Project that were considered as part of the design development process. It also identifies how the principles of ecologically sustainable development (ESD) were considered.

- **Chapter 5 The Project** – describes the Project, including details of the Project site and surroundings, design and construction. It also identifies works to the existing Moorebank Avenue and sustainability initiatives during construction.

- **Chapter 6 Consultation** – demonstrates the consultation carried out to date, how to have your say during the public exhibition, and SIMTA's commitment to consultation following the exhibition of the EIS.

- **Chapter 7 Impact assessment** – assesses the potential environmental and social impacts of the Project and the proposed management and mitigation measures to address these impacts.

- **Chapter 8 Mitigation and management measures** – provides a summary of the management, mitigation and monitoring measures.

- **Chapter 9 Evaluation and conclusion** – provides a detailed evaluation of the Project and conclusion for the EIS.

The EIS is supported with input from technical specialists who have undertaken assessments of the Project in their fields of expertise. The following Appendices are included in the EIS:

- Appendix A SEARs and EPBC Act Referral Decision
- Appendix B Biodiversity Development Assessment Report
- Appendix C Bushfire Hazard Assessment
- Appendix D Traffic Impact Assessment
- Appendix E Noise and Vibration Impact Assessment
- Appendix F Preliminary Site Investigation
- Appendix G Water Assessment
- Appendix H Statement of Heritage Impact
- Appendix I Preliminary Aboriginal Heritage Assessment
- Appendix J Air Quality Impact Assessment
- Appendix K Social Impact Assessment
- Appendix L Landscape Character and Visual Impact Assessment

2 Statutory context

2.1 Introduction

This chapter describes the relevant Commonwealth and NSW regulatory and policy framework under which the Project will be assessed and determined.

2.1.1 New South Wales

SIMTA is seeking project approval for the proposed Moorebank Avenue Realignment under Division 5.2 of the EP&A Act.

i Environmental Planning and Assessment Act 1979

The EP&A Act (together with the EP&A Regulation) forms the statutory framework for environmental assessment and planning approval in NSW. It provides for environmental planning instruments (EPIs) (including State Environmental Planning Policies (SEPPs)) which establish planning controls for NSW. Division 5.2 of the EP&A Act establishes for the assessment and approval regime for SSI.

A SEPP may declare development to be SSI (section 5.12(2)) provided the development is permitted by a SEPP to be carried out without development consent under Part 4 and is either infrastructure or other development for which the proponent is also the determining authority and would require an EIS under Division 5.1 (section 5.12(3)). Despite this, specified development on specified land may be specifically declared to be SSI by a SEPP or by an order of the NSW Planning and Public Spaces that amends a SEPP for that purpose (section 5.12(4)).

On Tuesday 17 November 2020, the NSW Minister for Planning declared the Project to be SSI. This declaration came into effect on 20 November 2020 and is included in Clause 7 to Schedule 4 of the State and Regional Development SEPP, reproduced below.

7 Moorebank Avenue Realignment

(1) Development for the purposes of the Moorebank Avenue Realignment as identified on the State Significant Infrastructure Sites Map, being

(a) a new multi-lane road from the existing Moorebank Avenue near Anzac Avenue at Moorebank extending for approximately 3 kilometres to the existing Moorebank Avenue near the East Hills Railway at Moorebank, and

(b) ancillary development including (but not limited to) access roads, construction compounds, pedestrian and cycling facilities, road modification works, signage, and utilities infrastructure (including adjustments to, or relocation of, existing utilities infrastructure).

(2) The development is to be carried out in the suburb of Moorebank.

Accordingly, the Project is subject to Part 5, Division 5.2 of the EP&A Act and the NSW Minister for Planning and Public Spaces is the determining authority for the Project.

ii Secretary's Environment Assessment Requirements

On 29 May 2020, SIMTA submitted an application under Section 5.15 of the EP&A Act to the Secretary of DPIE to carry out the Project. On 18 July 2020, the Secretary issued the Department's environmental assessment requirements for the Project. SEARs were revised on 1 March 2021 following the EPBC Act referral decision (refer to Appendix A). The SEARs and where they have been addressed in this EIS are provided in Table 2.1.

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
1. General SEARs	
1. Environmental Impact Assessment Process	
1. The EIS must be prepared in accordance with Part 3 of Schedule 2 of the EP&A Regulation.	Entire EIS
2. The project will impact matters of national environmental significance (MNES) protected under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and will be assessed in accordance with the NSW Bilateral Agreement (2015) as amended. The Proponent must assess impacts to MNES protected under the EPBC Act. The assessment must be in accordance with the requirements listed in Attachment A	Section 2.2
3. The onus is on the Proponent to ensure legislative requirements relevant to the project are met.	Noted
2. Environmental Impact Statement	
1. The EIS must include, but not necessarily be limited to, the following:	
(a) executive summary;	Executive Summary
(b) a description of the project, including key components and activities (including ancillary components and activities) required to construct and operate it including:	
– the proposed infrastructure;	Section 5.3
– site location (including use of plans)	Section 5.2.1
– "place making" design initiatives;	Section 5.3.15
– all road work and car parking;	Section 5.3
– scope of works to construct the project, including key activities and timing, working hours and indicative plant and equipment to be used;	Section 5.4
– operational activities; and	Section 1.4.3 Section 5.3.2
– acquisition of privately owned, council and crown land;	Section 5.2.3
(c) a statement of the objective(s) of the project;	Section 4.2
(d) a summary of the strategic need for the project with regard to its State significance and relevant State Government policy;	Section 3.4
(e) an analysis of feasible alternatives to the project;	Section 4.3
(f) a description of feasible options within the project;	Section 4.3
(g) a description of how alternatives to and options within the project were analysed to inform the selection of the preferred alternative / option. The description must contain sufficient detail to enable an understanding of why the preferred alternative and options(s) within the project were selected;	Section 4.3

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
(h) a concise description of different construction methods that were analysed and preferred methods;	Section 4.3
(i) a concise description of the general biophysical, social and economic environment that is likely to be impacted by the project (including offsite impacts). Elements of the environment that are not likely to be affected by the project do not need to be described;	Section 5.2
(j) a demonstration of how the project design has been developed to avoid or minimise likely adverse impacts;	Section 4.4
(k) the identification and assessment of key issues as provided in the 'Assessment of Key Issues' performance outcome;	Section 7.1
(l) a statement of the outcomes the Proponent will achieve for each key issue;	Section 8.2
(m) measures to avoid, minimise or offset impacts must be linked to the impact(s) they treat, so it is clear which measures will be applied to each impact;	Chapter 8
(n) consideration of the interactions between measures proposed to avoid or minimise impact(s), between impacts themselves and between measures and impacts;	Chapter 7
(o) an assessment of the relevant cumulative impacts of the project taking into account other projects that have been approved but where construction has not commenced, projects that have commenced construction, and projects that have been completed (including but not limited to the Moorebank Precinct East (MPE) and Moorebank Precinct West projects;	Section 7.16
(p) a clear description of how the project relates to the approved stages within the Moorebank Intermodal Terminal Precinct in relation to construction programming and the final design. The EIS must consider the need for any consequential modifications to MPE 2 and MPE Concept Approvals;	Section 5.2.4
(q) statutory context of the project as a whole, including:	
– how the project meets the provisions of the EP&A Act and EP&A Regulation;	Section 2.1.1
– a list of any approvals that must be obtained under any other Act or law before the project may lawfully be carried out;	Section 2.1.2
(r) a chapter that synthesises the environmental impact assessment and provides:	
– a succinct but full description of the project for which approval is sought;	Chapter 9
– a description of any uncertainties that still exist around design, construction methodologies and/or operational methodologies and how these will be resolved;	Section 9.4
– a compilation of the impacts of the project that have not been avoided;	Section 9.4
– a compilation of the proposed measures associated with each impact to avoid or minimise (through design refinements or ongoing management during construction and operation) or offset these impacts;	Section 9.3
– a compilation of the outcome(s) the Proponent commits to achieve; and	Section 9.1.1
– the reasons justifying carrying out the project as proposed, having regard to the biophysical, economic and social considerations, including ecologically sustainable development and cumulative impacts; and	Section 9.2
(s) relevant project plans, drawings, diagrams in an electronic format that enables integration with mapping and other technical software.	Refer to separate electronic files

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
2. The EIS must only include data and analysis that is reasonably needed to make a decision on the project. Relevant information must be succinctly summarised in the EIS and included in full in appendices. Irrelevant, conflicting or duplicated information must be avoided.	Entire EIS
3. Assessment of Key Issues	
1. The level of assessment of likely impacts must be proportionate to the significance of, or degree of impact on, the issue, within the context of the project location and the surrounding environment. The level of assessment must be commensurate to the degree of impact and sufficient to ensure that the Department and other government agencies are able to understand and assess impacts.	Chapter 7 Section 7.1
2. For each key issue the Proponent must:	
(a) describe the biophysical, social and economic environment, as far as it is relevant to that issue, including baseline data that is reflective of current guidelines where relevant;	Chapter 7
(b) describe the legislative and policy context, as far as it is relevant to the issue;	Chapter 7
(c) identify, describe and quantify (if possible) the impacts associated with the issue, including the likelihood and consequence (including worst case scenario) of the impact (comprehensive risk assessment), the impacts of concurrent activities within the project and cumulative impacts;	Chapter 7
(d) demonstrate how potential impacts have been avoided (through design, or construction or operation methodologies);	Chapter 7
(e) detail how likely impacts that have not been avoided through design will be minimised, and the predicted effectiveness of these measures (against performance criteria where relevant); and	Chapter 7
(f) detail how any residual impacts will be managed or offset, and the approach and effectiveness of these measures.	Chapter 7
3. Where multiple reasonable and feasible options to avoid or minimise impacts are available, they must be identified and considered, and the proposed measure justified taking into account the public interest.	Chapter 7
4. Consultation	
1. The project must be informed by consultation, including with relevant local, State and Commonwealth government agencies, infrastructure and service providers, special interest groups, Aboriginal groups, affected landowners, businesses and the community.	Chapter 6
2. The Proponent must document the consultation process and demonstrate how the project has responded to the inputs received.	Section 6.2
3. The Proponent must describe the timing and type of community consultation proposed during the design and delivery of the project, the mechanisms for community feedback, the mechanisms for keeping the community informed, and procedures for complaints handling and resolution.	Section 6.6
4. The Proponent must liaise with Sydney Trains regarding the bridge and any affectation/utilisation of the land owned by TAHE (formerly RailCorp) that adjoin the rail corridor (also known as the Moorebank Station site).	Section 6.4
5. The Proponent must liaise with the Department of Defence concerning Commonwealth land, construction impacts, and the final design for the realignment, such that Defence access requirements are considered.	Section 6.4

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
2. Key Issue SEARs	
1. Biodiversity	
1. Biodiversity impacts in accordance with section 7.9 of the Biodiversity Conservation Act 2016 (BC Act), the Biodiversity Assessment Method (BAM), and be documented in a Biodiversity Development Assessment Report (BDAR).	Section 7.2.3 Appendix B ch.7
2. The BDAR must include information in the form detailed in section 6.12 of the BC Act, clause 6.8 of the Biodiversity Conservation Regulation 2017 and the BAM.	Section 7.2 Appendix B
3. The BDAR must be submitted with all digital spatial data associated with the survey and assessment as per Appendix 10 of the BAM.	Section 7.2 Appendix B
4. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under section 6.10 of the BC Act.	Section 7.2 Appendix B
5. The BDAR must include details of the measures proposed to address offset obligations.	Section 7.2 Appendix B s7.4
6. Impacts on biodiversity values not covered by the BAM. This includes a threatened aquatic species assessment (Part 7A *Fisheries Management Act 1994* (FM Act) to address whether there are likely to be any significant impact on listed threatened species, populations or ecological communities listed under the FM Act.	Section 7.2 Appendix B (s.3.2.4)
7. Identify whether the project, or any component of the project, would be classified as a Key Threatening Process (KTP) in accordance with the listings in the BC Act, FM Act and the EPBC Act.	Section 7.2.1 Appendix B (s.7.1.3)
2. Transport and Traffic	
1. Construction transport and traffic (vehicle, pedestrian, cyclists, bus services and train operations) impacts, including, but not necessarily limited to:	
(a) a considered approach to route identification and scheduling of transport movements, particularly outside construction hours;	Section 7.4.3 Appendix D (s.5.4)
(b) the indicative number, frequency and size of construction related vehicles (light and heavy vehicles) including those related to the establishment of ancillary facilities;	Section 7.4.3 Appendix D (s.5.11)
(c) construction worker parking;	Section 7.4.4 Appendix D (s.5.11)
(d) the nature of existing parking, and traffic on construction access routes;	Section 7.4.2 Appendix D (s4.4, s.7.4.1)
(e) access constraints and impacts on public transport, pedestrians and cyclists;	Section 7.4.4 Appendix D (ss5.8, 5.16, 5.17)
(f) the need to close, divert or otherwise reconfigure elements of roads, car parking and pedestrian and cycle network associated with the construction of the project and the duration of these changes;	Section 7.4.4 Appendix D (ss5.9, 5.10)
(g) safe access and egress to/from the classified road network; and	Safe access to and from the realigned Moorebank Avenue would be via the tie ins to the existing Moorebank Avenue.
(h) cumulative impacts with other construction activities occurring in the vicinity of the project.	Section 7.4.4 Section 7.15

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
2. Assess and model the operational transport impacts of the project including, but not necessarily limited to:	
(a) estimation of daily and peak traffic movements at key intersections along the proposed alignment;	Section 7.4.4 Appendix D (s6.2)
(b) intersection performance analysis of key intersections using SIDRA (or an equivalent traffic modelling software) considering scenarios of 2020, 2026, 2036 and the year of completion of the Moorebank Avenue Realignment. A sensitivity test should be undertaken for the feasible redistribution of the Moorebank Intermodal Terminal traffic as a result of the Cambridge Avenue Upgrade project;	Section 7.4.4 Appendix D (s6.6)
(c) forecast travel demand and traffic volumes generated by the operation of the project and other surrounding developments (light and heavy vehicles);	Section 7.4.4 Appendix D (s6.2)
(d) travel time impacts;	Section 7.4.4 Appendix D (s6.3)
(e) traffic signal warrant assessment and justifications for all proposed signalised intersections in accordance with the requirements set out in the TfNSW Traffic Signal Design Guidelines;	Section 7.4.4 Appendix D (s6.3)
(f) performance of key interchanges and intersections undertaking a level of service analysis at key locations;	Section 7.4.4 Appendix D (s6.3)
(g) impacts on cyclists and pedestrian access and safety;	Section 7.4.4 Appendix D (s6.8)
(h) property and business access and on street parking (where relevant); and	Section 7.4.4 Appendix D (s6.9)
(i) an explanation for the scope of the modelled area, including justification of the nominated boundaries.	Section 7.4.4
3. Noise and Vibration	
1. Assess construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines, including activities with the proposed alignment and activities at ancillary facilities, and vehicle movements associated with the proposal, including haulage vehicles. The assessment must identify sensitive receivers and assess construction noise/vibration generated by representative construction scenarios focusing on high noise generating works. Where work hours outside of standard construction hours are proposed, clear justification and detailed assessment of these work hours must be provided, including alternatives considered and mitigation measures proposed.	Section 7.5.2 Section 7.5.3 Appendix E (chs4,5&6)
2. Demonstrate that blast impacts are capable of complying with the current guidelines, if blasting is required.	Section 7.5.3iii
3. Impacts to the structural integrity and heritage significance of items (including Aboriginal places and items of environmental heritage).	Section 7.5.3 Appendix E (s.6.2)
4. An assessment of cumulative impacts associated with any existing development and any developments having been granted development consent, but which have not commenced.	Section 7.5.3.v
4. Soils and Contamination	
1. Verify the risk of acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Risk Map) within, and in the area likely to be impacted by, the project.	Section 7.6.2
2. Assess the impact of the project on acid sulfate soils (including impacts of acidic runoff offsite) in accordance with the current guidelines.	Section 7.6.3

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
3. Assess whether the land is likely to be contaminated and identify if remediation of the land is required, having regard to the ecological and human health risks posed by the contamination in the context of past, existing and future land uses. Where assessment and/or remediation is required, document how the assessment and/or remediation would be undertaken in accordance with current guidelines.	Section 7.6.2
4. Assess the impacts on soil and land resources (including erosion risk or hazard). Particular attention must be given to soil erosion and sediment transport consistent with the practices and principles in the current guidelines.	Section 7.6.2 Section 7.7 (air) Section 7.10 (water)
5. Water - Quality	
1. Identify the ambient NSW Water Quality Objectives (NSW WQO) and environmental values for the receiving waters relevant to the project, including the indicators and associated trigger values or criteria for the identified environmental values;	Section 7.7.3
2. Demonstrate how construction and operation of the project will, to the extent that the project can influence:	
(a) where the NSW WQOs for receiving waters are currently being met they will continue to be protected; and	Section 7.7.4
(b) where the NSW WQOs are not currently being met, activities will work toward their achievement over time.	Section 7.7.4
3. Justify, if required, why the WQOs cannot be maintained or achieved over time.	Section 7.7.4
4. Identify and estimate the quality and quantity of pollutants that may be discharged and an analysis of the likely nature and degree of impact that any discharge(s) may have on the receiving environment.	Section 7.7.4
5. Identify the rainfall event that water quality protection measures will be designed to cope with.	Section 7.7.4.ii.b
6. Demonstrate that all practical measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented.	Section 7.7.4
7. Identify sensitive receiving environments (which may include estuarine and marine waters downstream) and develop a strategy to avoid or minimise impacts on these environments.	Section 7.7.2 Section 7.7.3
8. Identify proposed monitoring and indicators of surface and groundwater quality.	Section 7.7.3 Section 7.7.5
6. Water – Hydrology	
1. Describe any surface and groundwater resource (including reliance by users and for ecological purposes) likely to be impacted by the project, including stream orders, as per the BAM.	Section 7.7.2
2. Identify an adequate and secure water supply for the life of the project.	Section 7.7.4.ii.a
3. Prepare a water balance for ground and surface water for construction.	Section 7.7.4.i.a
4. Assess (and model if appropriate) the impact of the construction and operation of the project (both built elements and discharges) on surface and groundwater hydrology in accordance with the current guidelines.	Section 7.7.4
5. Identify any requirements for baseline monitoring of hydrological attributes.	Section 7.7.5
7. Flooding	
1. Assess the impacts of the proposed development on flood behaviour, including:	
(a) any detrimental increases in the potential flood affectation of other properties, assets and infrastructure;	Section 7.7.4

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
(b) consistency (or inconsistency) with applicable Council floodplain risk management plans;	Section 7.7.2.iv
(c) compatibility with the flood hazard of the land;	Section 7.7.4 ii.c
(d) compatibility with the hydraulic functions of flow conveyance in flood ways and storage areas of the land;	Section 7.7.4 ii.c
(e) downstream velocity and scour potential;	Section 7.7.4 ii.c
(f) impacts the development may have upon existing community emergency management arrangements for flooding. These matters must be discussed with the State Emergency Services and Council;	Section 7.7.1 (consultation) Section 7.7.4
(g) any adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the proposal;	Section 7.7.4
(h) any direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourse;	Section 7.7.4
(i) whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with SES and the local Council;	Section 7.7.4
(j) emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event; and	Section 7.7.4
(k) any impacts the development may have on social and economic costs to the community as a consequence of flooding.	Section 7.7.4
2. Describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of 5% Annual Exceedance Probability (AEP) flood level, 1% AEP flood level and the probable maximum flood, or an equivalent extreme event.	Section 7.7.4.ii.c Appendix G
3. Model the effect of the proposed development (including fill) on the flood behaviour under current flood behaviour for a range of design events as identified above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.	Section 7.7.4.ii.c Appendix G
4. Modelling in the EIS must consider and document:	
(a) existing local council flood studies in the area and examine consistency to the flood behaviour document in these studies;	Section 7.7.4 and Appendix G
(b) the impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood;	Section 7.7.4
(c) impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories; and	Section 7.7.4
(d) relevant provision of the NSW Floodplain Development Manual 2005.	Section 7.7.4
8. Heritage	
1. Direct and/or indirect impacts (including cumulative impacts) to the significance of:	
(a) Aboriginal places, objects and cultural heritage values, as defined under the National Parks and Wildlife Act 1974 and in accordance with the principles and methods of assessment identified in the current guidelines;	Section 7.9.4
(b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan;	Section 7.9.4

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
(c) environmental heritage, as defined under the NSW Heritage Act 1977 (Heritage Act);	Section 7.8.2
(d) items listed on the State, National and World Heritage lists;	Section 7.8.2
(e) heritage items and conservation areas identified in environmental planning instruments applicable to the project area.	Section 7.8.2
2. Where impacts to State or locally significant heritage items are identified, the assessment must:	
(a) include a significance assessment, a state of heritage impact for all heritage items and historical archaeological assessment;	Section 7.8.3
(b) consider the conservation policies of any relevant conservation management plan;	No CMP applies
(c) consider impacts to the item caused by, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment, drainage infrastructure, contamination remediation and ancillary facilities;	Section 7.8.3
(d) outline measures to avoid and minimise those impacts during construction and operation in accordance with the current guidelines; and	Section 7.8.4
(e) be undertaken by a suitably qualified heritage consultant(s) and/or historical archaeologist (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria)	Section 7.8
3. Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, in accordance with section 1.6 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010).	Section 7.9.4.iii
4. Impacts to Aboriginal objects and/or places must be assessed and documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR). Consultation must be undertaken with Aboriginal people in accordance with the Aboriginal Cultural Heritage Consultation requirements for proponents (DECCW, 2010). The ACHAR must:	Section 7.9.4
(a) document the outcomes of consultation with Aboriginal people and outlines measures proposed to mitigate impacts, and document the significance of cultural heritage values for Aboriginal people who have a cultural association with the land;	Section 7.9.2
(b) identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the project;	Section 7.9.4
(c) document the outcomes of the archaeological surface survey and test excavation;	Section 7.9.4
(d) assess and document impacts on Aboriginal cultural heritage values and demonstrate attempts to avoid impacts upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to the AHIMS Registrar; and	Section 7.9.4
(e) outline procedures to be followed if Aboriginal objects are found at any stage of the life of the project to formulate appropriate measures to manage unforeseen impacts.	Section 7.9.5
9. Design, Place and Movement	
1. A design led process that is informed, collaborative and iterative, which:	
(a) Utilises good design processes (such as Design Excellence and Design Review);	Section 5.3.15
(b) utilises design experts and multidisciplinary teams;	Section 5.3.15
(c) considers designing with Country; and	Section 5.3.15

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
(d) involves the community, user groups and other stakeholders.	Section 5.3.15
2. Identify place design principles that are reflective of the design objectives is Better Placed, including a focus on:	
(a) fit – contextually, local and of its place;	Section 5.3.15
(b) performance – sustainable, adaptable and durable;	Section 5.3.15
(c) community – inclusive, connected, accessible and diverse;	Section 5.3.15
(d) people – safe, comfortable and liveable (such as crime prevention through environmental design);	Section 5.3.15
(e) working- functional, efficient and fit for purpose;	Section 5.3.15
(f) value – creating and adding value; and	Section 5.3.15
(g) look and feel – engaging, inviting and attractive.	Section 5.3.15
3. Include and illustrate place designs, actions and outcomes for the project that protect and facilitate improvements to the built environment, including in relation to:	
(a) public space (including open space);	Section 5.3.15
(b) active and public transport; and	Section 5.3.15
(c) views and vistas.	Section 5.3.15
This should address maintenance of infrastructure, place and residual land; and processes to refine design (as per point 1).	Section 5.3.15
4. The provision of visual representations of the project from key locations to illustrate the project.	Section 5.3
5. Identify green infrastructure design principles that are reflective of the principles in Greener Placed and The Sydney Green Grid.	Section 5.3.15
(a) green infrastructure, including how the designs do not preclude future provision of open space that supports recreation, biodiversity and waterway health;	Section 5.3.15
(b) how the project will achieve a net increase in tree numbers and canopy within proximity of the impacted area (this relates to the number of trees to be cleared by the project (a tree is defined by Australian Standard 4970) that will not be covered by a biodiversity offset strategy;	Section 5.3.15
(c) the use of local provenance species (trees, shrubs and groundcovers) propagated from locally source seeds from the impacted native vegetation communities (or from those that once existed).	Section 5.3.15
10. Air Quality	
1. An air quality impact assessment (AQIA) for construction and operation of the project in accordance with the current guidelines.	Section 7.10.3
2. Ensure the AQIA also includes the following:	
(a) demonstrated ability to comply with the relevant regulatory framework, specifically the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (Clean Air) Regulation (2010); and	Section 7.10
(b) a cumulative local and regional air quality impact assessment.	Section 7.10 Section 7.15

Table 2.1 SEARs and additional agency requirements and where addressed

Requirement	Location in EIS
11. Social	
1. Potential social impacts of the project from the points of view of the affected community/ies and other relevant stakeholders, ie how they expect to experience the project.	Section 7.11.3
2. How potential environmental changes in the locality may affect people's (including, but not limited to):	Section 7.11.3
(a) community;	Section 7.11.3
(b) access to and use of infrastructure, services, and facilities;	Section 7.11.3
(c) culture;	Section 7.11.3
(d) decision-making systems; and	Section 7.11.3
(e) fears and aspirations, as relevant and considering how different groups may be disproportionately affected.	Section 7.11.3
3. Identify actions and outcomes that address both negative and positive social impacts.	Section 7.11.4
12. Environmentally Sensitive Lands and Processes	
1. Environmentally sensitive land and processes (and the impact of processes on the project) including, but not limited to:	
(a) protected areas (including land and water) managed by Environment, Energy and Science Group (EESG) and/or Regions, Industry, Agriculture & Resources, (RIAR) of DPIE under the NSW National Parks and Wildlife Act 1974 (NP&W Act) and the Marine Estate Management Act 2014 (MEM Act);	No protected areas in footprint. Leacock Regional Park impacts in Section 7.12.3)
(b) Key Fish Habitat (KFH) as mapped and defined in accordance with the FM Act;	Section 7.2 (no KFH)
(c) waterfront land as defined in the NSW Water Management Act 2000 (Water Management Act);	Section 7.7 (no waterfront land)
(d) land or waters identified as Critical Habitat under the FM Act or EPBC Act or areas of outstanding biodiversity value under the BC Act; and	Section 7.2 (no critical habitat or areas of outstanding biodiversity value)
(e) biodiversity stewardship sites, private conservation lands and other lands identified as offsets.	Section 7.2.1

iii Environmental impact statement requirements

The EIS was prepared in accordance with the SEARs and the EP&A Regulation. Clauses 6 and 7 of Schedule 2 of the EP&A Regulation sets out specific requirements for the preparation of an EIS, including EISs for SSI. A summary of these requirements and where they are addressed in the EIS is provided in Table 2.2.

Table 2.2 Schedule 2 requirements for an EIS

Requirement	Where contained in the EIS
Clause 6 - Form of environmental impact statement	
(a) the name, address and professional qualifications of the person by whom the statement is prepared,	Certification page at the front of this EIS
(b) the name and address of the responsible person,	Certification page at the front of this EIS
(c) the address of the land— (i) in respect of which the development application is made, or (ii) on which the activity or infrastructure to which the statement so relies is carried out,	Certification page at the front of this EIS
(d) a description of the development, activity or infrastructure to which the statement relates,	Chapter 5
(e) an assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates, dealing with the matters referred to in this Schedule,	Chapter 7 and supporting technical assessments in Appendix B to Appendix L
(f) a declaration by the person by whom the statement is prepared to the effect that— (i) the statement has been prepared in accordance with this Schedule, and (ii) the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and (iii) that the information contained in the statement is neither false nor misleading.	Certification page at the front of this EIS
Clause 7 - Content of environmental impact statement	
1. An environmental impact statement must also include each of the following:	
(a) a summary of the environmental impact statement,	Executive Summary
(b) a statement of the objectives of the development, activity or infrastructure,	Section 1.4.4
(c) an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,	Chapter 4
(d) an analysis of the development, activity or infrastructure, including:	
(a) a full description of the development, activity or infrastructure, and	Section 5.3
(b) a general description of the environment likely to be affected by the development, activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected, and	Section 5.2
(c) the likely impact on the environment of the development, activity or infrastructure, and	Chapter 7
(d) a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment, and	Chapter 8
(v) a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,	Section 2.1.2
(e) a compilation (in a single section of the environmental impact statement) of the measures referred to in item (d)(iv),	Chapter 8
(f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4).	Chapter 4

This EIS must be publicly exhibited for at least 28 days, during which time any person (including a public authority) may make a written submission to the Secretary. Once the exhibition period has ended, the Secretary is to provide copies of submissions received or a report of the issues raised in the submissions to SIMTA and any other public authority the Secretary considers appropriate. The Secretary may then require SIMTA to submit a response to the issues raised in the Submissions Report outlining any proposed changes to the project to further minimise its environmental impact or to deal with any other issues raised during the assessment of the Project.

Further information on the assessment process is available on the DPIE website (www.planning.nsw.gov.au).

2.1.2 Other NSW approvals and licences

As the Project is SSI, sections 5.23 and 5.24 of the EP&A Act apply. Under section 5.23, certain separate approvals under other NSW legislation would not be required. Under section 5.24, certain separate approvals under other NSW legislation would be required to be issued consistent with the planning approval, if granted.

Each of these separate environmental approvals is considered in Table 2.3.

Table 2.3 Other State approvals and licences

Approval	Relevance to the Project	Comment
Approvals not required under section 5.23		
A permit under section 201, 205 or 219 of the NSW *Fisheries Management Act 1994* (FM Act)	Relevant	These permits under the FM Act are normally required for projects that: • dredge or reclaim land (ie any excavation within or filling of water land) (section 201); • harm (cut, remove, damage, destroy, shade etc) marine vegetation (mangroves, seagrass and seaweeds) (section 205); and • obstruct the free passage of fish (section 219). Under section 5.32 of the EP&A Act, a permit is not required for SSI projects.
An approval under Part 4 or an excavation permit under section 139 of the NSW *Heritage Act 1977* (Heritage Act)	Not relevant	This approval is normally required for projects that will or are likely to result in a historic heritage item being discovered, exposed, moved, damaged or destroyed. A Statement of Historic Heritage of the Project been prepared to inform the preparation of the EIS (Appendix H). The assessment considers that it is unlikely to result in a heritage item being discovered, exposed, moved, damaged or destroyed.
An Aboriginal heritage impact permit under section 90 of the NSW *National Parks and Wildlife Act 1974* (NPW Act)	Not relevant	This permit is normally required for projects that will or are likely to impact on items of Aboriginal heritage. A preliminary Indigenous heritage assessment of the Project has been undertaken (Appendix I). The assessment indicates that that the Project is unlikely to impact on any items of Aboriginal heritage.
A bushfire safety authority under section 100B of the NSW *Rural Fires Act 1997* (RF Act)	Not relevant	This authority is normally required when a proponent proposes to: • subdivide bush fire prone land that could be used for residential or rural residential purposes (eg, building a house); and • undertake development that is a Special Fire Purpose development of bush fire prone land (eg development of a school). The site of the Project is partially mapped as bushfire prone, however the Project is not a Special Fire Purpose development.

Table 2.3 Other State approvals and licences

Approval	Relevance to the Project	Comment
A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than a groundwater interference approval) under section 91 of the NSW *Water Management Act 2000* (WM Act)	Relevant	These permits are normally only required for projects that: • use water for a particular purpose (eg irrigation) at a particular location (section 89); • construct and use a water management work (water supply work, drainage work or a flood work) at a specific location (section 90); and • undertake works within 40 m of a water course (section 91). The Project would connect to Liverpool City Council's (LCC) water main for supply during the construction phase. The Project includes a drain to divert the flows of Anzac Creek. While the connection to the water supply does not require an approval under the WM Act, the construction of the diversion drain would normally require approvals under sections 90 and 91 of the WM Act. Under section 5.23 of the EP&A Act, a water management work and an activity approval under sections 90 and 91 of the WM Act, are not required for SSI projects.
Approvals required to be issued consistently under section 5.24		
An aquaculture permit under section 114 of the FM Act	Not relevant	An aquaculture permit is required where aquatic species (eg fish and marine vegetation) are cultivated for sale or commercial purposes. The Project does not involve aquaculture.
Approval under section 15 of the NSW *Mine Subsidence Compensation Act 1961*	Not relevant	Under the NSW *Mine Subsidence Compensation Act 1961* approval is required to alter or erect improvements (eg a building) or subdivide land in an area proclaimed to be a mine subsidence district. The site of the Project is not within a mine subsidence district.
A mining lease under the NSW *Mining Act 1992*	Not relevant	A mining lease is required to allow the holder exclusive right to mine for minerals over a specific area of land. The Project does not involve mining or the extraction of minerals.
A production lease under the NSW *Petroleum (Onshore) Act 1991*	Not relevant	A production lease is required to allow the holder exclusive right to extract petroleum over a specific area of land. The Project does not involve petroleum extraction.
An environment protection licence (EPL) under Chapter 3 of the NSW *Protection of the Environment Operations Act 1997* (POEO Act)	Relevant	The NSW Environment Protection Authority (EPA) issues EPLs to the owners or operators of various industrial premises under the POEO Act. Licence conditions generally relate to pollution prevention and monitoring. An EPL will be required from the EPA for the Project as it is defined as a scheduled activity (road construction) that would result in the extraction or process of more than 50,000 tonnes of material in a regulated area. Under section 5.24 of the EP&A Act, an EPL cannot be refused if it is necessary for carrying out approved SSI and is to be substantially consistent with the EP&A Act approval.
A consent under section 138 of the NSW *Roads Act 1993* (Roads Act)	Not relevant	Consents under section 138 of the NSW Roads Act 1993 are required for the carrying out for work or erection of a structure on a public road. Moorebank Avenue is owned by the Commonwealth of Australia. Therefore, the Roads Act does not apply.
A licence under the NSW *Pipelines Act 1967*	Not relevant	Under the NSW *Pipelines Act 1967* licences are required to survey, construct and operate a pipeline to convey a gaseous, liquid or solid state substance. The Project does not involve surveying, constructing or operating of a pipeline to convey a gaseous, liquid or solid state substance.

2.1.3 Environmental planning instruments

SIMTA has considered the consistency of the Project against relevant EPIs. It is noted that EPIs, including SEPPs, do not apply to SSI by virtue of section 5.22(2) of the EP&A Act. Notwithstanding this, the SEPPs that would have otherwise applied to the Project in the absence of section 5.22(2) of the EP&A Act are detailed in Table 2.4.

Table 2.4 Applicable environmental planning instruments

Instrument	Relevant project elements	Consistency of the Project
State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)	Permissibility/ determining authority	The Infrastructure SEPP generally applies to infrastructure development in NSW. Under this SEPP public authorities are afforded the ability to carry out certain road activities without the need for development consent. However, given SIMTA is not a public authority, these provisions do not apply to the Project.
State Environmental Planning Policy (Koala Habitat Protection) 2020 (Koala SEPP)	Potential Koala habitat	The Koala SEPP only applies to local development where Council is the consent authority. Where relevant, appropriate mitigation measures identified in the local Koala Management Plan have been applied (refer to Section 7.2).
Liverpool Local Environmental Plan 2008 (Liverpool LEP)	Permissibility/consent authority	The zoning of the land to which the Project applies is generally General Industrial (IN1) and Infrastructure (SP2). Road works are permissible with consent in these zones.

2.2 Commonwealth legislation

2.2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the primary Commonwealth legislation that governs the protection of the environment. The EPBC Act is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) and provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined under the EPBC Act as MNES. Additionally, the EPBC Act also confers jurisdiction over actions that have a significant impact on the environment where the actions affect, or are undertaken on, Commonwealth land.

Under Part 9 of the EPBC Act, an action that "has, will have or is likely to have a significant impact on a matter of National Environmental Significance" may not be undertaken without prior approval from the Minister for the Environment. Approval is also required where actions are proposed on, or will affect, Commonwealth land and its environment.

In accordance with sections 67 and 67A of the EPBC Act, works (eg construction, alterations, demolition, and vegetation clearing) that have the potential to result in an impact on any matters of MNES or on Commonwealth land are considered 'controlled actions' and require a referral to the Minister for the Environment for approval.

The Project has potential for impacts to:

- listed threatened species and communities (sections 18 and 18A of the EP&A Act); and
- Commonwealth land (sections 16 and 27A of the EPBC Act).

Impacts on MNES are assessed in detail in Section 7.2 and Appendix B.

Land ownership is identified Section 5.2.3, with almost all of the alignment within the ownership of Commonwealth agencies. Impacts on Commonwealth owned land are discussed in Chapter 7 of the EIS.

i Referral

On 11 November 2020, SIMTA referred the Project (Referral Number 2020/8839) to the Commonwealth Minister for the Environment, and on a precautionary basis, nominated that it had potential to have a significant impact on listed threatened species and threatened ecological communities. The referral was public ally notified between 6 January 2021 and 16 January 2021. On 8 February, the Project was determined to be a controlled action and will be assessed under the bilateral agreement with NSW (Appendix A). On 16 February 2021, DAWE provided project assessment notes to DPIE.

3 Strategic justification

3.1 Introduction

This chapter outlines the relationship of the Project to the strategic planning framework. It also identifies the need for the Project and its objectives. It concludes with a statement of strategic need.

3.2 Moorebank Logistics Park

The MLP is a vital piece of infrastructure for NSW that will transform the way containerised freight moves through Port Botany and deliver a faster, simpler, and more cost-effective service. When completed, the Moorebank facility will move 1.5 million shipping containers annually by rail instead of road, taking 2,700 heavy truck movements off Sydney's roads each day and reducing greenhouse gas emissions by 110,000 tonnes every year (SIMTA 2020).

The MLP will also feature Australia's largest purpose-built warehouse and distribution precinct serviced by the latest automated technology which will see driverless shuttle carriers collect and transport containers around the precinct to be processed, unpacked and stored on site or distributed in smaller consignments.

Figure 3.1 MLP logistics system

Source: SIMTA, 2020

This facility is an integral component of the freight, ports and transport strategies of both the NSW and Commonwealth governments to help manage the challenges of an expected tripling of freight volumes at Port Botany by 2031. MLP will streamline the freight logistics supply chain from port to store, deliver savings to businesses and consumers, and help service the rapidly growing demand for imported goods in south-west Sydney.

Without the realignment of Moorebank Avenue, the driverless shuttle carrier system would not be able to operate efficiently across the MPE and MPW sites. The Project would also allow north-south regional traffic connections between Liverpool and Campbelltown to be retained when the existing Moorebank Avenue is decommissioned as part of the MLP development.

3.3 NSW and Australian strategic planning and policy framework

This section describes the strategic justification for the Project, considering the consistency of the Project with key strategic planning and policy documents.

3.3.1 Premier's Priorities

The Premier's Priorities (2020) represent the NSW Government's commitment to making a significant difference to enhance the quality of life of the people of NSW. The key policy priorities are:

- a strong economy;
- highest quality education;
- well-connected communities with quality local environments;
- putting customers at the centre of everything we do; and
- breaking cycles of disadvantage.

The Project would support the NSW Government’s priorities for a strong economy and well-connected communities by providing safe and efficient access between the MLP, the M5 Motorway and Cambridge Avenue.

3.3.2 State Infrastructure Strategy

The State Infrastructure Strategy, developed by Infrastructure NSW (2018), is a 20-year strategy to build on the NSW Government’s major long-term infrastructure plans and set out the government’s infrastructure priorities.

The State Infrastructure Strategy identifies a number of key actions to connect people and places, including to ‘partner with the Australian Government to plan for Sydney’s Western Parkland City’ (Infrastructure NSW, 2018). The Project would support this key action by realigning the existing Moorebank Avenue link between Liverpool and Glenfield, an important regional traffic route for South Western Sydney.

3.3.3 Greater Sydney Region Plan

The Greater Sydney Commission (GSC) aims to make the Greater Sydney area more productive, sustainable and liveable. In June 2018, the GSC identified the leading strategic planning priorities for Greater Sydney, including implementation of the Greater Sydney Region Plan, A Metropolis of Three Cities (Greater Sydney Region Plan) (GSC, 2018a).

The Greater Sydney Region Plan identifies three connected cities (see Figure 3.2) within the Greater Sydney area as follows:

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

The Project would be located within the Western Parkland City. The Project would directly address and support Objective 20 of the Greater Sydney Region Plan, which identifies the Western Sydney Airport and the surrounding business zone as an economic catalyst for the Western Parkland City. The M12 Motorway would be a key section of road infrastructure that would help connect the Western Parkland City to the MLP and beyond to the Greater Sydney motorway network via the M5 Motorway and Cambridge Avenue.

3.3.4 Western City District Plan

The Western City District Plan (GSC, 2018b) sets out planning priorities and actions for improving the quality of life for residents in western Sydney. The Western City stretches from Richmond-Windsor and Rouse Hill in the north to Campbelltown-Macarthur in the south.

The key focus of the Western City District Plan is for residents to have quicker and easier access to a wider range of jobs, housing types and activities. This would be facilitated through a range of infrastructure commitments including the Western Sydney Airport, Sydney Metro extensions and major road and motorway network expansions. These infrastructure projects would result in a significant change and transformation from currently outer suburban land that is primarily agricultural into mixed urban uses associated with the Western Parkland City.

The Project would directly address and support Planning Priority W1 and W7 within the Western City District Plan, by providing infrastructure which aligns with forecast growth and providing transport links that would service employment areas in western Sydney. The objectives for the relevant Planning Priorities are listed out in Table 3.1.

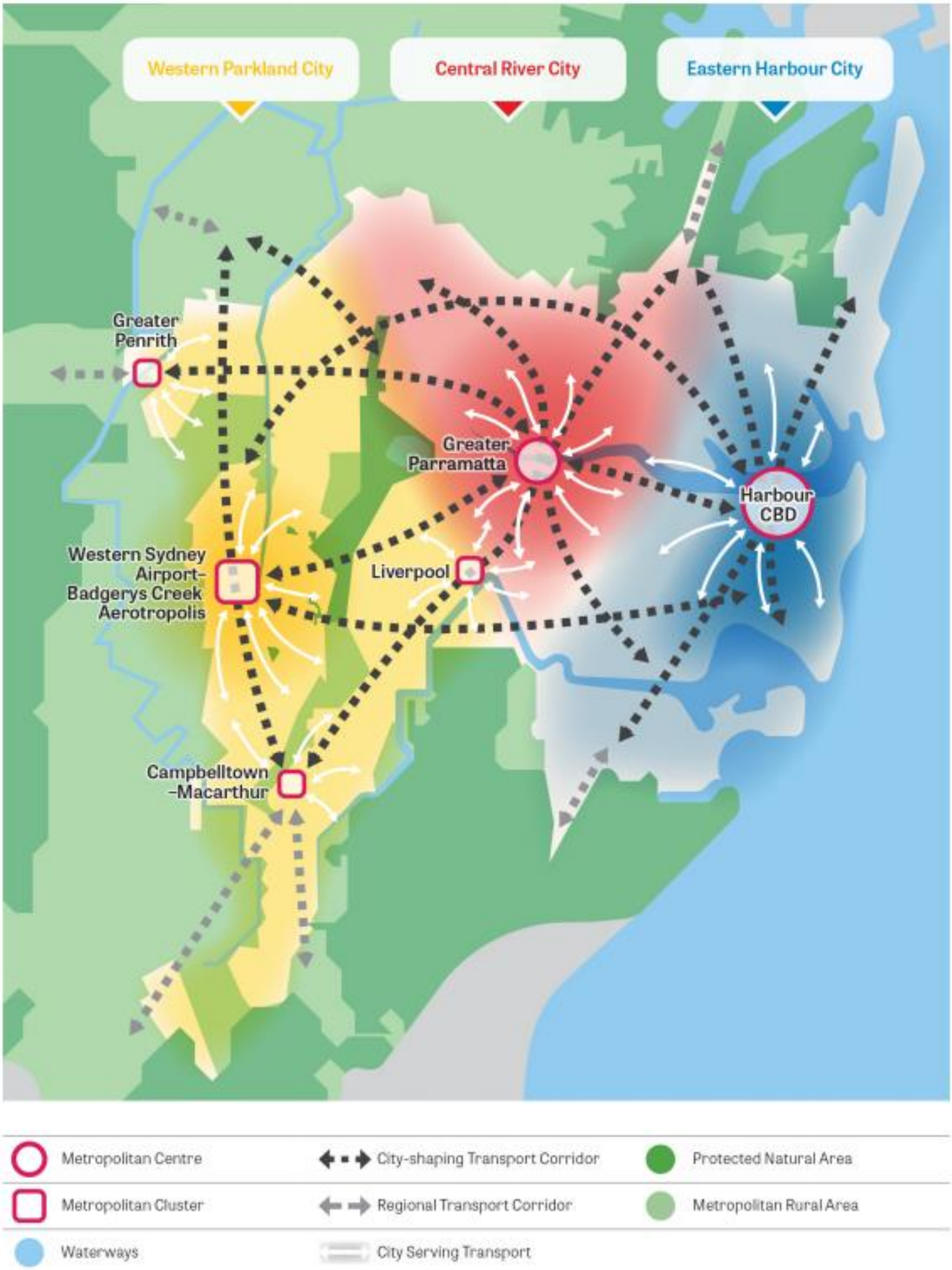


Figure 3.2 Greater Sydney Region Plan

Source: GSC, 2018a

Table 3.1 Planning objectives of the Western City District Plan

Objectives	How the Project meets the objectives
W1 – Planning for a city supported by infrastructure	
Objective 1 – Infrastructure supports the three cities	The Project would provide the necessary infrastructure to support the Western Parkland City, and would provide connections between the MLP, Campbelltown and Liverpool.
Objective 2 – Infrastructure aligns with forecast growth – growth infrastructure compact	The design of the Project incorporates the forecast growth of the Western Parkland City and surrounds.
Objective 3 – Infrastructure adapts to meet future needs	The design of the Project allows for incorporation of future infrastructure and allows for the construction of extra traffic lanes to meet future needs (including the Cambridge Avenue Upgrade).
Objective 4 – Infrastructure use is optimised	The Project retains the connection between the M5 Motorway and Cambridge Avenue that would otherwise be lost without the delivery of the Project.
W7 – Establishing the land use and transport structure to deliver a liveable, productive and sustainable Western Parkland City	
Objective 14 – A Metropolis of Three Cities – integrated land use and transport creates walkable and 30-minute cities	The Project would reinforce the metropolis of three cities by providing an efficient north-south link to allow residents in the surrounding suburbs of Glenfield, Moorebank, Wattle Grove and Liverpool to live within 30 minutes of their jobs, education, health facilities and services.
Objective 15 – The Eastern Greater Parramatta and the Olympic Peninsula (GPOP) and Western Economic Corridors are better connected and more competitive	The Project supports the function of the MLP which connects Port Botany in the Eastern GPOP by rail for the distribution of containerised freight in the Western Economic Corridor and beyond.
Objective 16 – Freight and logistics network is competitive and efficient	The Project is fundamental to the effective, safe and efficient road connection of the MLP the surrounding local and regional road network.
Objective 17 – Regional connectivity is enhanced	The Project retains the connection between the M5 Motorway and Cambridge Avenue that would otherwise be lost without the delivery of the Project.

3.3.5 Future Transport Strategy 2056

The Future Transport Strategy 2056 (TfNSW 2018a) is an update of NSW's Long-Term Transport Master Plan. The Strategy outlines a vision, strategic directions and customer outcomes, with infrastructure and services plans underpinning the delivery of these directions across NSW.

The Future Transport Strategy sets the 40-year vision, directions and outcomes framework for customer mobility in NSW, which will guide transport investment over the longer term. Strategic transport corridors identified in the strategy are shown in Figure 3.3.

The Project would facilitate north-south vehicle connections between Liverpool and Campbelltown-Macarthur, a city-shaping corridor identified in the Future Transport Strategy 2056.

The Strategy also outlines how the NSW Government will work in partnership with local councils, communities and businesses to grow bike riding to 2056. As discussed in Section 5.3.6, the Project would provide a shared user path between Anzac Road and the East Hills Railway.

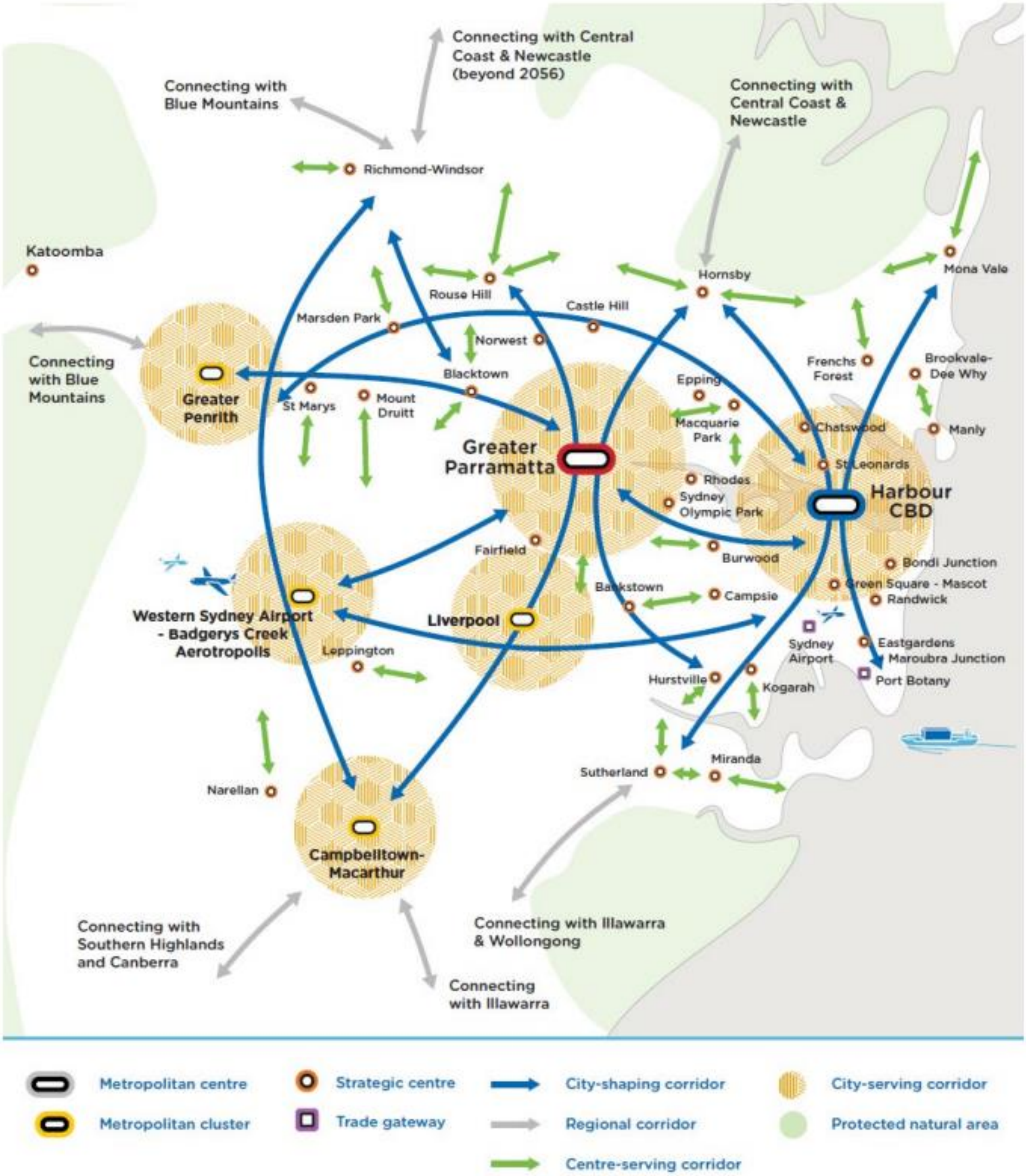


Figure 3.3 Greater Sydney Strategic Transport Corridors

Source: Future Transport 2056 (TfNSW 2018)

3.3.6 NSW Key Freight Routes Road Expenditure and Investment Plan

The NSW Key Freight Routes Road Expenditure and Investment Plan (Transport and Infrastructure Council, 2016) provides an integrated strategy to guide transport investments over the longer term, assisting with the movement of goods in an efficient, safe and environmentally sustainable manner.

The Project would facilitate connections between the MLP and the M5 Motorway, a key freight route identified in the NSW Key Freight Routes Road Expenditure and Investment Plan.

3.3.7 Moorebank Intermodal Terminal Road Access Strategy

TfNSW (2019) has developed the Moorebank Intermodal Terminal Road Access (MITRA) Strategy to address increasing traffic and freight movements in the Liverpool - Moorebank area over the next 10-20 years. The strategy has identified road infrastructure improvements to meet the forecast growth of Liverpool CBD and regional traffic, together with construction of the MLP. The facility will generate over 6,600 heavy vehicle trips and 10,000 light vehicle trips per day.

The proposal to realign Moorebank Avenue is one of the fundamental road infrastructure improvements identified in the MITRA strategy (refer to Figure 3.4).

3.4 Statement of strategic need

The Project is needed to meet Qube's obligations under the voluntary planning agreement between Qube and TfNSW executed 21 March 2019 (refer Section 1.4.2). It requires that satisfactory arrangements be made for the provision of relevant State public infrastructure associated with MPW and the MLP generally. Given that the MLP will significantly contribute to traffic on Moorebank Avenue it was resolved that SIMTA be required to undertake the required upgrade works during the development of the precinct. Without development of the Project, the addition of future background traffic will result in Moorebank Avenue operating at an unacceptable Level of Service (LoS) in approximately 2029.

The Project would provide a four-lane road (providing two lanes in each direction) parallel to MPE and one lane each way between MPE and Moorebank Avenue. It would provide enhanced traffic amenity while maintaining appropriate levels of service at local and proposed intersections. Additionally, it would allow for an enhanced connection between Anzac Road and the M5 Motorway to the north and Cambridge Avenue to the south in the vicinity of the MLP.

The Project would deliver operational efficiencies to the terminals within the MLP. Moorebank Avenue currently provides a barrier to east-west movements within the MLP thereby significantly restricting the operational efficiency of the precinct. The relocation of Moorebank Avenue would:

- provide for shorter, more efficient and direct travel route for container-carrying vehicles between the rail link and terminals, contributing to the achievement of precinct throughput targets;
- minimise secondary and non-value creating freight movements by facilitating a direct access between MPE and MPW;
- facilitate future automation of the precinct (ie it would promote the use of the most efficient modes of transport for a given task); and
- result in positive time/cost implications for the MLP.

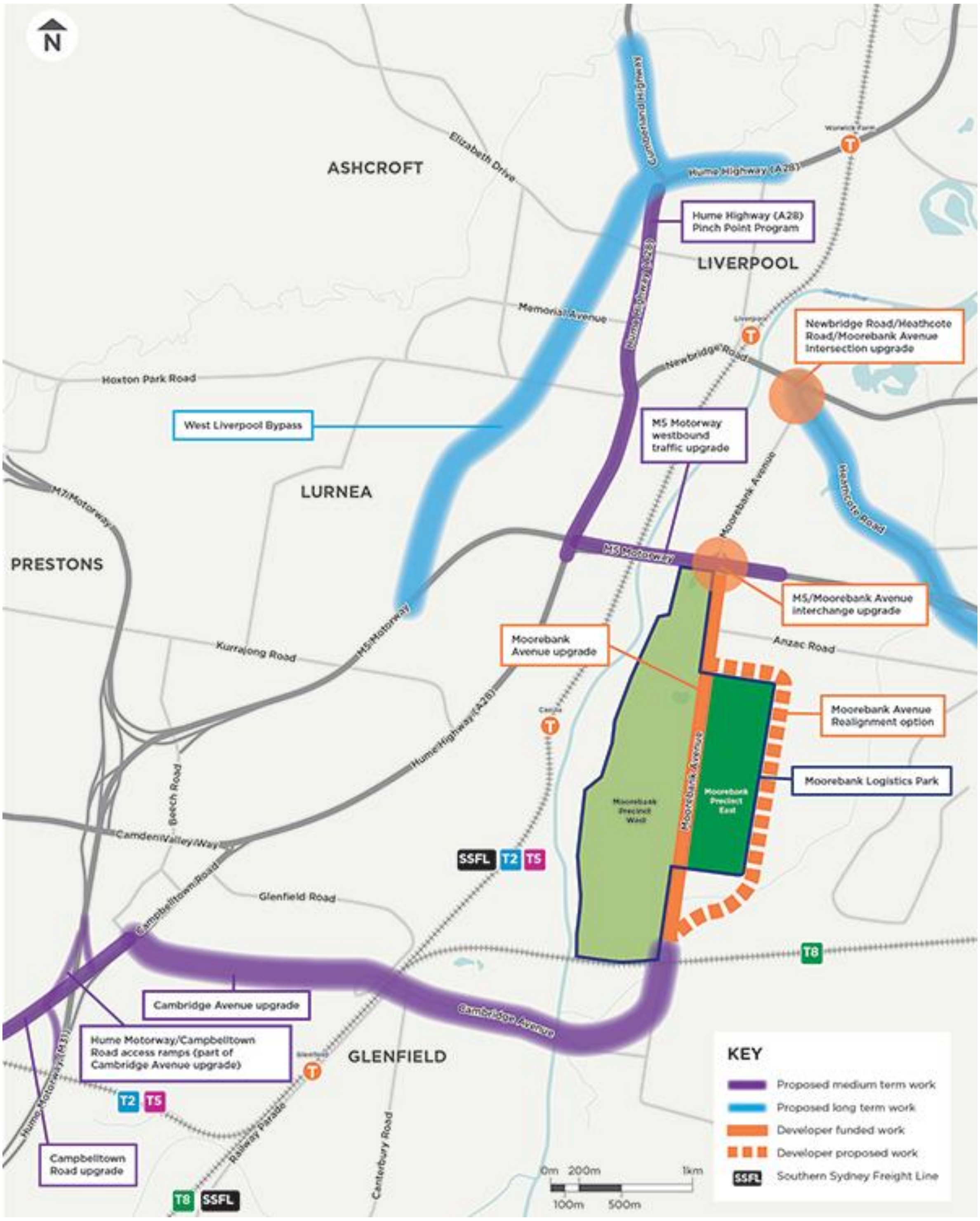


Figure 3.4 Moorebank Intermodal Terminal Road Access map

Source: TfNSW, 2019

The Project would also enhance access and egress arrangements between the MLP and Moorebank Avenue by separating public vehicles and heavy vehicles transferring freight between MPE and MPW and by minimising traffic congestion from the intermingling of background public local traffic and traffic generated by the MLP.

Should the Project not proceed or should all approvals not be achieved for the Project by December 2021, SIMTA would be obligated under the Planning Agreement to upgrade the existing Moorebank Avenue.

3.5 Consequences of not carrying out this Project

If the Project were not to proceed, MLP operations would continue to be compromised and those other benefits arising from the Project would not be realised.

Under the Planning Agreement, where approval for the Project is not obtained by 31 December 2021 or where the Project is not constructed by December 2023, the project is instead required to carry out the Moorebank Avenue South Upgrade.

4 Project development and alternatives

4.1 Introduction

This chapter describes how and why the Project alignment was selected and how it was refined to avoid or minimise adverse impacts. This chapter further presents an overview of the Project alternatives with regard to the obligations under the Planning Agreement.

4.2 Project objectives

During development of the Planning Agreement, an options assessment was commissioned to identify a preferred route for the upgrade/realignment of Moorebank Avenue. This options assessment was carried out in 2017 and utilised a staged approach to short list and ultimately identify a preferred option.

Input into the assessment was sought from a wide range of disciplines including road designers, archaeologists, ecologists, acoustics specialist, drainage engineers, and environmental consultants. The assessment also involved consultation with relevant stakeholders including Transport for NSW (TfNSW), Sydney Trains, MIC and Defence.

A multi-criteria analysis (MCA) of four options was undertaken and identified that the preferred alignment for the Moorebank Avenue Realignment would generally be around the eastern perimeter of MPE. This alignment was selected as it would:

- provide significant additional capacity to the road network and improve road network operational performance;
- maintain, as closely as possible, the current location, configuration, and access arrangement to the DJLU site;
- provide continued public thoroughfare between the M5 and Cambridge Avenue;
- minimise congestion for all road users by reducing intermingling of background traffic and the traffic generated by the MLP;
- remove the existing Moorebank Avenue alignment, currently a barrier to east-west movements between MPE and MPW. The realignment around MLP would provide a shorter, more efficient travel route for precinct vehicles, thereby contributing to the achievement of precinct throughput targets;
- minimise secondary and non-value creating freight movements by facilitating a direct access between MPE and MPW;
- facilitate future automation of the precinct (ie allow for the application of technology where otherwise it would not be possible given the barrier of Moorebank Avenue); and
- reduce time/cost implications for the precinct.

Throughout the project refinement process, the preferred alignment was further refined to avoid impacts to DJLU and potential environmental impacts. Particular attention was given to the alignment immediately south of the MPE site given the high value ecological features in this area. A number of sub-options for the alignment in this location were considered including:

- aligning the road within the MPE southern boundary – while minimising the clearing of vegetation, this option would result in particularly tight geometry and significant additional infrastructure requirements;

- partial alignment within the MPE southern boundary – would potentially result in significant impacts on Nodding Geebung (*Persoonia nutans*), an endangered flora species; and

- alignment south of the MPE southern boundary, from the south-eastern corner of MPE running diagonally south-west to the East Hills Rail Line.

The last alternative was ultimately incorporated into the design as it minimised impacts to the Nodding Geebung species and provided a more feasible and reasonable solution in terms of geometry and required infrastructure.

4.3 Alternatives

The Planning Agreement provides for two development outcomes, comprising:

- relocate Moorebank Avenue to the east of the MPE site (the Project); or

- upgrade Moorebank Avenue to a four lane road from south of the entrance to MPE freight terminal to a point approximately 120 m south of the MPE site.

It further provides that Qube is obliged to upgrade the existing Moorebank Avenue (South), should all approvals not be achieved for the realignment by December 2021.

Upgrading the existing Moorebank Avenue along its current alignment is not desirable as it:

- would result in container-transporting vehicles interacting with public vehicles (resulting in potential safety and travel time implications for road users);

- create the potential for congestion from the intermingling of background traffic and traffic generated by the MLP;

- would result in Moorebank Avenue continuing to intersect the MLP, creating a barrier to east-west movements and thereby reduce the operational efficiency of terminals;

- provide for longer, less efficient and less direct travel route for MLP traffic between the rail link, terminals and warehouses;

- involves a potential constraint to the future automation of the MLP; and

- would result in negative time/cost implications.

Further, if the Project was not to proceed then the addition of future background traffic (associated with public local traffic and traffic associated with the MLP) will result in Moorebank Avenue operating at an unacceptable Level of Service (LoS) in approximately 2029 and therefore adversely affecting traffic movements between Moorebank and Glenfield.

It is also noted that upgrading Moorebank Avenue along its current alignment would still result in impacts (including acquisition of land) to the DJLU site, the MLP, Boot Land and land owned by RailCorp.

4.4 Ecologically sustainable development

The principles of ESD were considered in the design development of the Project. Key ESD considerations included:

- applying a precautionary approach to the identification of constraints, recognising that at this early stage of the design development there was uncertainty in relation to the accuracy and completeness of data;
- development and refinement of route options to minimise impacts to known and potential biodiversity, heritage and social issues;
- conserving biological diversity and ecological integrity through the use of constraints mapping to identify known and potential ecological resources; and adopting the principle of avoiding impacts where possible and, where unavoidable, taking all reasonable steps to minimise impacts;
- considering the impacts on local communities and balancing these impacts against the project requirements and cost, ensuring that the actions of this generation do not compromise the quality of life of future generations; and
- applying the principle of integration in assessing the route options, with a consideration of environmental, social and economic issues in the decision-making process.

4.4.1 Concept design

The Concept Design for the Project was prepared by Arcadis in May 2020. The objectives of the Concept Design were to:

- maximise the efficiency of the MLP operations;
- maximise the efficiency of the heavy vehicle access to the precinct;
- maintain acceptable travel times and conditions for general traffic and freight through movements;
- maintain acceptable operation of intersections with sufficient separation or storage of turning traffic from through traffic;
- improve connectivity and safety for general and active transport users; and
- minimise environmental impacts and maximise the quality of urban and landscape design outcomes.

The development of the concept design supports the objectives listed above by:

- designing the Project to meet the environmental requirements and limit adverse impacts to the natural environment while maximising the environmental benefits;
- satisfying the technical and procedural requirements of SIMTA and other stakeholders with respect to the design of the Project;
- optimising the concept design to ensure that the Project can be practically and efficiently constructed and maintained while meeting all other objectives;
- applying appropriate urban design, landscape and visual principles in the concept design of the Project; and

- designing all connections, modifications and improvements necessary to link the Project to the existing road system.

4.4.2 Detailed design

Prior to the commencement of construction and following planning approval, the design will be further developed by SIMTA and its selected construction contractor(s). The detailed design will be developed in consultation with key stakeholders and the community.

5 The Project

5.1 Overview

Moorebank Avenue currently connects to Newbridge Road and M5 Motorway to the north. Moving south, it then connects to Anzac Road, and terminates at Cambridge Avenue, near the Holsworthy Military Reserve. Currently, Moorebank Avenue is a four-lane undivided road between Newbridge Road and the M5 Motorway. Between the M5 Motorway and Cambridge Avenue it is a two-lane undivided road. A section of Moorebank Avenue currently divides the MLP, comprising MPE and MPW.

North of the M5 Motorway, Moorebank Avenue is a State road. Between the M5 Motorway and Anzac Road it is owned and maintained by Liverpool City Council. Between Anzac Road and Cambridge Avenue it is a private road on Commonwealth land.

The Project involves the realignment of an existing 2 km section of Moorebank Avenue, from a point approximately 130 m south of the Anzac Road/Moorebank Avenue intersection to a point immediately north of the East Hills Railway.

Most of the realigned section of Moorebank Avenue would be a four lane road, providing two lanes in each direction. From its northernmost point, the realignment would depart to the east, following the northern boundary of the MPE Site, before continuing south, following the eastern boundary of the MPE Site. This section of the realignment would provide two lanes in each direction. At the south-western corner of the MPE Site, the new road section would merge to become a dual lane road before continuing in a south-west direction, crossing Anzac Creek, and re-joining the existing Moorebank Avenue alignment near the East Hills Railway. The new road section would be approximately 3 km in length and would tie-in with the existing Moorebank Avenue at the northern and southern extremities.

At completion and commissioning of the realigned road section, the public through traffic using Moorebank Avenue would be redirected onto the new alignment. The existing road alignment would be decommissioned and modified to function as a restricted access to the MLP.

Key features of the Project include:

- realigning a section of Moorebank Avenue from a point approximately 130 metres (m) south of the Anzac Road/Moorebank Avenue intersection to the bridge over the East Hills railway;
- constructing approximately 3 kilometres (km) of new road to bypass the MLP to the east, comprising:
  - a four-lane road (two lanes in each direction) in the vicinity of MPE, commencing from a point approximately 130 m south of the Anzac Road/ Moorebank Avenue intersection to the south-eastern corner of the MPE site;
  - a two-lane road (one lane in each direction) from the south-eastern corner of the MPE site to a point immediately north of the bridge over the East Hills railway;
- decommissioning of the existing Moorebank Avenue road section, and alterations to enable it to function as a restricted access to the MLP;
- four accesses between the new road and the MLP. The accesses would include signalised intersections with auxiliary left and right turn lanes at entry points and would replicate existing accesses on Moorebank Avenue;

- constructing a central median, typically six metres wide, tapering to zero width where the new road becomes two lanes;
- tie-ins and infrastructure adjustments to the existing Moorebank Avenue, bridge over the East Hills railway, and MLP;
- constructing retaining walls;
- noise mitigation in the vicinity of the Defence Joint Logistics Unit (DJLU) site (chainage 600-800);
- constructing operational drainage infrastructure, onsite stormwater detention basins, and operational water quality controls (including vegetated swales, bioretention systems, and spill containment);
- installing a culvert within Anzac Creek and extending existing culverts within existing watercourses/drainage lines;
- installing road furniture including security fencing, guideposts, traffic signs, and street lighting;
- adjusting public utilities; and
- constructing temporary ancillary facilities, including a work site compound, lay-down areas, and construction water detention basins.

Key features of the Project are shown in Figure 5.1.

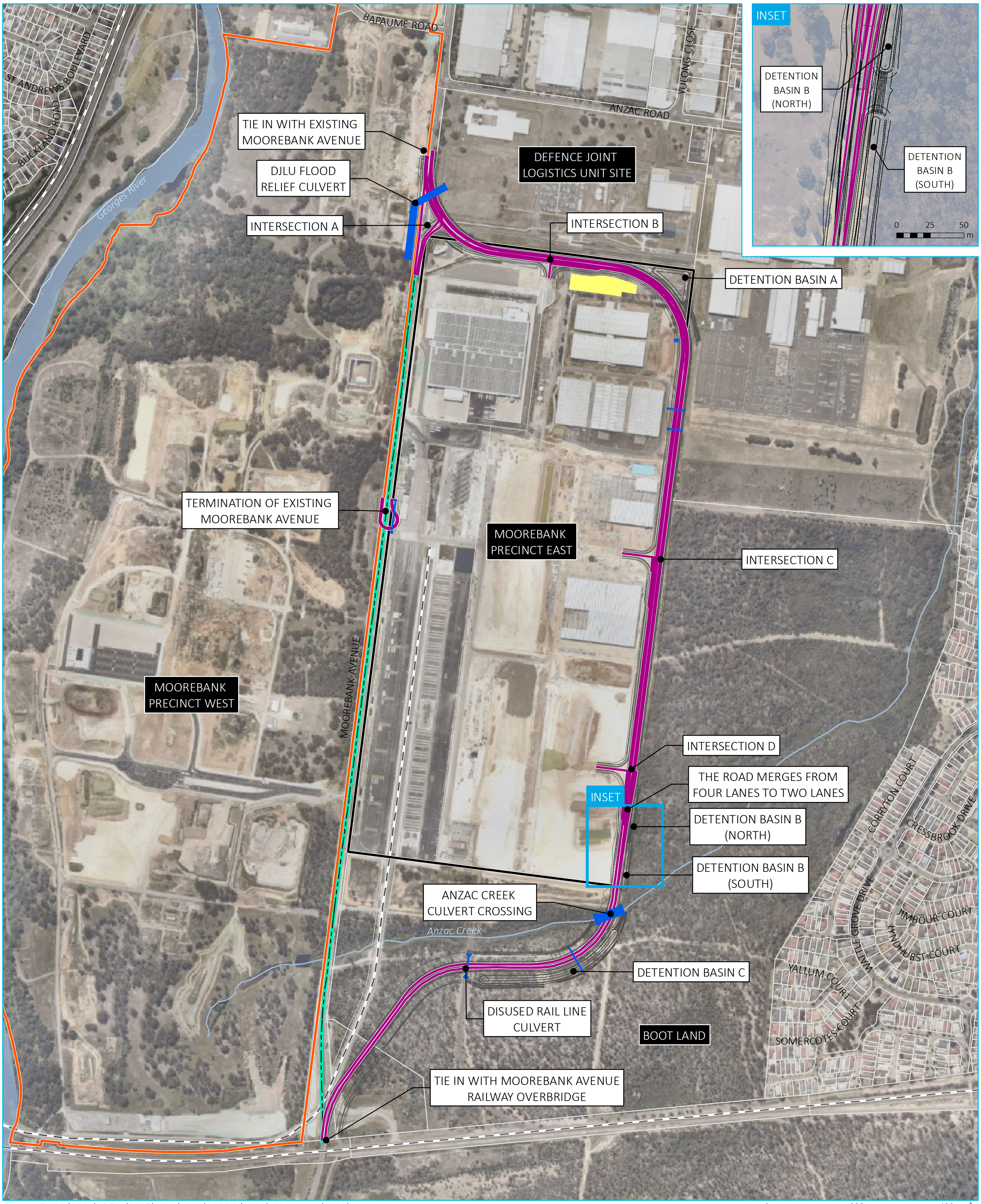
The Project is expected to take approximately 16 months to construct using a workforce of up to 122 personnel. In line with arrangements made under the Planning Agreement, the new road section would be operational in 2024.

Upon completion, the new road section (not including those sections extending into the MLP) would be transferred to TfNSW to operate as a local road. The existing road section would continue to be owned by the Commonwealth and would be operated as an internal service road to the MLP, with limited public access.

The objectives of the Project are to:

- obtain development approval by 31 December 2021;
- construct the Project by 31 December 2023;
- demonstrate satisfactory arrangements in respect to the traffic impacts arising from developing MPW;
- deliver operational efficiencies to terminals at Moorebank; and
- effectively manage impacts on surrounding residents and the local environment during the construction and operations and achieving, at a minimum compliance with the relevant statutory requirements.

A detailed description of the Project, including details of the Project site and surroundings, design and construction are provided in this Chapter. This Chapter also identifies works to the existing Moorebank Avenue and sustainability initiatives during construction.



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Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

0 200 400 m
GDA 1994 MGA Zone 56
N

KEY

- Project alignment
- Existing road to be realigned
- Proposed culvert
- Construction compound
- Moorebank Precinct East
- Moorebank Precinct West
- Cadastral boundary
- Road design
- Rail line
- Watercourse

Key project features

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.1

EMM
creating opportunities

5.2 Project site and surroundings

5.2.1 Projection location and character

i Location

The Project site is located in Moorebank, within the Liverpool LGA and approximately 27 km south-west of the Sydney Central Business District (CBD) and approximately 2.5 km south of the Liverpool City Centre.

The regional context of the Project site is shown on Figure 1.1.

ii Surrounding land use

Land surrounding the site of the Project comprises:

- the MPW site on the western side of Moorebank Avenue;
- the MPE site on the eastern side of Moorebank Avenue;
- the DJLU site on the eastern side of Moorebank Avenue, north of MPE;
- the Holsworthy Military Reserve, to the south of the MPE site on the southern side of the East Hills Rail Corridor;
- residual Commonwealth land (known as the Boot Land) comprising heavily vegetated remnant bushland between Moorebank Avenue, the MPE site and the Wattle Grove residential suburb;
- rail infrastructure including the East Hills Rail Corridor, the IMEX rail link and a disused rail spur corridor;
- residential suburbs including Wattle Grove (320 m north and 350 m east), Moorebank (1,200 m north), Casula (770 m west), and Glenfield (1,250 m south-west); and
- the industrial areas of Moorebank and Warwick Farm to the north, Chipping Norton to the north-east, Prestons to the west and Glenfield and Ingleburn to the south-west.

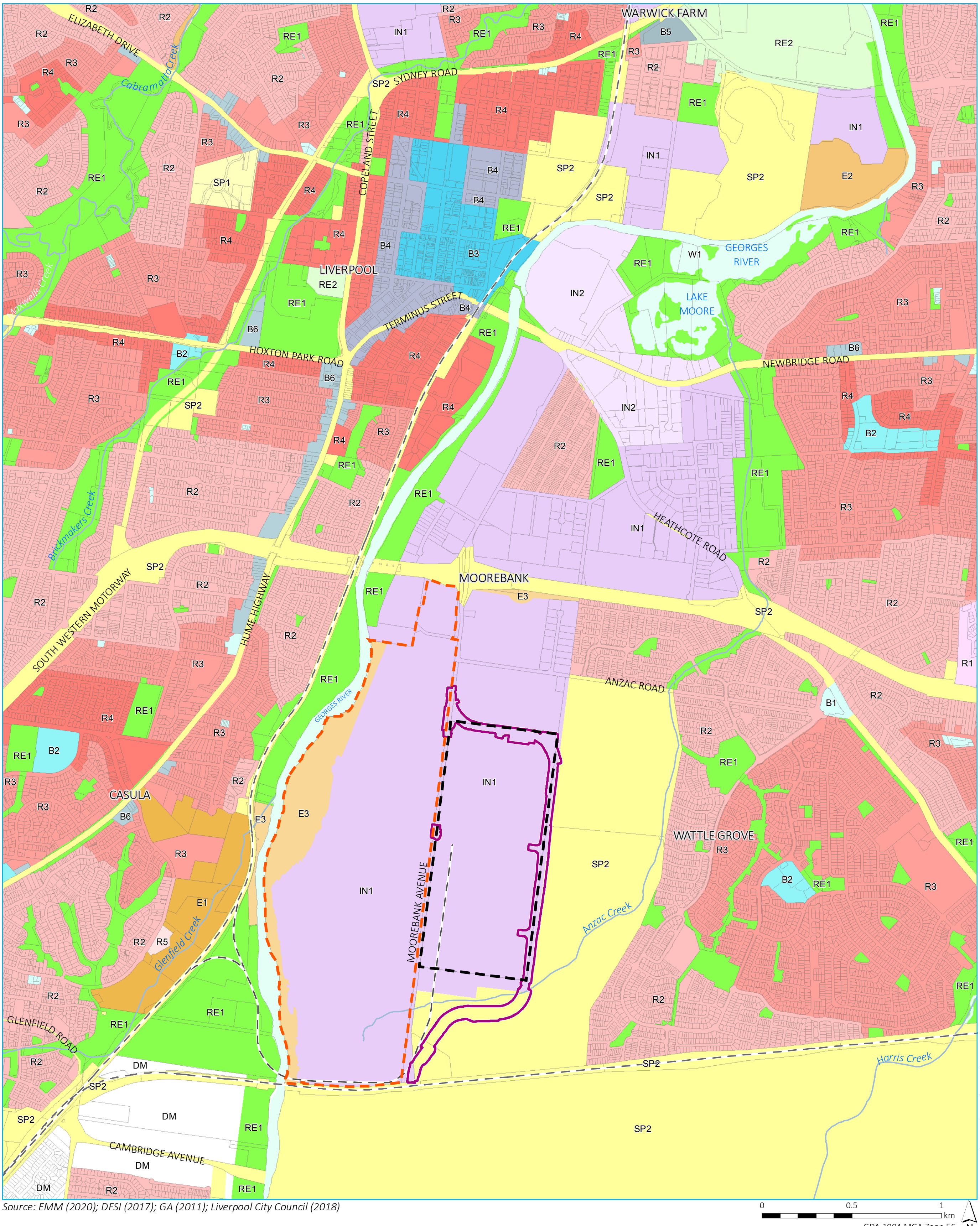
The local context of the Project site is shown on Figure 1.2.

The Project site and surrounding land uses are zoned as either General Industrial (IN1) or Infrastructure (SP2) under the Liverpool LEP. A zoning plan is provided in Figure 5.2.

iii Road network

Moorebank Avenue runs north-south between Heathcote Road (north) and Cambridge Avenue (south) providing local and regional connection and access to the MLP. In the vicinity of the MLP, it is a private road on Commonwealth land.

The Moorebank Avenue/M5 Motorway intersection is located approximately 800 m north of the Project site. The M5 Motorway provides the main road link between the MLP, Port Botany, Sydney's West and South-Western subregions, the Sydney orbital network and the National Road Network. The M5 Motorway connects with the M7 Motorway to the west, providing access to the Greater Metropolitan Region and NSW road network. The M5 Motorway is also the principal connection to Sydney's north and north-east via the Hume Highway.



Source: EMM (2020); DFSI (2017); GA (2011); Liverpool City Council (2018)

KEY

Construction footprint
Moorebank Precinct East
Moorebank Precinct West
Cadastral boundary
Rail line
Watercourse
Land use zone
B1 Neighbourhood Centre
B2 Local Centre
B3 Commercial Core
B4 Mixed Use
B5 Business Development
B6 Enterprise Corridor
E1 National Parks and Nature Reserves
E2 Environmental Conservation
E3 Environmental Management
IN1 General Industrial
IN2 Light Industrial
R1 General Residential
R2 Low Density Residential
R3 Medium Density Residential
R4 High Density Residential
R5 Large Lot Residential
RE1 Public Recreation
RE2 Private Recreation
SP1 Special Activities
SP2 Infrastructure
W1 Natural Waterways
DM Deferred Matter

Surrounding Landuse

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.2

creating opportunities

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5.2.2 Biophysical factors

i Topography and soils

The Project site is predominantly flat with isolated areas of steeper slopes. Land immediately adjacent to the Project's disturbance footprint vary in gradient from 0 degrees (flat land) in most areas to isolated areas that are over 20 degrees in gradient. These steeper gradients are short in distance and are associated with permanent and ephemeral water courses and drainage lines, as well as with areas that have had previous disturbance from clearing of vegetation and subsequent earthworks (cut and fill), largely for the creation of transmission line easements and access tracks.

ii Soils and geology

The Project site is underlain by clayey sand and clay of tertiary age, which are likely to be floodplain deposits associated with the Georges River. These sand and clay deposits are likely to be underlain by Hawkesbury Sandstone and Ashfield Shale or Bringelly Shale of the Triassic age Winamatta Group. Acidic, residual soils of variable thickness with sandstone shale fragments are also likely to be encountered at the site. Based on the Atlas of Australian Acid Sulfate Soils there is a low to extremely low chance of acid sulfate soils being present at the site.

iii Surface water

The Project site is near Georges River and transects Anzac Creek.

The Georges River is located 500 m west of the Project site on the western side of MPW. It flows in a south to north direction and is well defined with vegetated banks on both sides of the river. A terraced floodplain area with relatively low elevations exists on the eastern bank of the river at the northern end of the Project. The terrain rises steadily from the terraced area to the higher elevations of the Project site to the east.

Anzac Creek rises west of the Project site and flows in an easterly direction traversing the existing Moorebank Avenue and rail link. It crosses the proposed road realignment adjacent to the south-eastern corner of MPE before turning north-east through vegetated bushland. Downstream of the Project site, the creek flows adjacent to the DJLU site and Wattle Grove before traversing the M5 Motorway and discharging to the Georges River approximately 3 km north-east of the Project site.

Anzac Creek is observed as being a first order watercourse and having an ephemeral flow regime in the vicinity of the Project site. It has been reported that the concentration of per and poly-fluoroalkyl substances (PFAS) in water samples collected from Anzac Creek were greater than the human health drinking water guidelines but below recreational water use guidelines (CH2M HILL 2018). Anzac Creek was also identified as a potential pathway for the migration of PFAS contamination.

iv Groundwater

Two main aquifer systems are present across the Project site, a perched system within the alluvium soils and a deeper aquifer within the bedrock. Groundwater within the shallow alluvial aquifer is expected to flow towards the Georges River.

Depth to groundwater varies across the Project site, typically 4 m to 7 m below ground level (bgl). Depth to groundwater has been observed at 1.5 m bgl at the south-eastern corner of the MPE site, near Anzac Creek.

Much of the Project site has been identified as groundwater dependent ecosystems (GDEs). The ecosystem types identified in the GDE Atlas include Castlereagh Swamp Woodland, Castlereagh Scribbly Gum Woodland, or Castlereagh Ironbark Forest.

v Biodiversity

A large portion of the Project site is either within or adjacent to the Boot Land, a large area of intact remnant vegetation approximately 93 ha in size. Investigations associated with the BDAR identified the presence of four plant community types (PCTs) and exotic dominated vegetation within the footprint of the Project.

These PCTs include 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion, 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion, 883 - Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion description and 1067 - Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion.

Vegetation observed within the DJLU site and MPE subject to ongoing maintenance such as mowing and fallen timber removal are considered to be a mix of both exotic and native species. A small area of regenerated vegetation was observed immediately north of the fence line of the Boot Land and has experienced past landscape disturbances. At the very north of the Project footprint three mature canopy species have been planted as streetscaping from past road upgrades.

5.2.3 Land ownership

The Project would require portions of the MPE site, the MPW site, DJLU site, the existing Moorebank Avenue road corridor, the Boot Land, and the former Moorebank Railway Station site. An application to modify the MPE Stage 2 Subdivision Partial Development Consent is currently under assessment by DPIE (SSD 7628 Mod 3) and seeks to subdivide the Boot Land (Lot 4 DP1197707) and former Moorebank Railway Station land (Lot 1 DP825352). It is proposed that each lot is subdivided into two, to create a rail access corridor that forms part of the MPE development, and residual land. The Moorebank Avenue realignment will impact on these residual lots (nominated as Part Lot 41 DP1197707 and Part Lot 43 DP825352 in the Modification application).

Table 5.1 Land subject to the Project

Lot or section/DP (pre-subdivision)	Lot or section/DP (post-subdivision)	Ownership	Existing land use
Lot 2 DP 1197707	Lot 2 DP 1197707	Commonwealth of Australia	Moorebank Avenue (south of Anzac Road)
Lot 1 DP 1197707	Lot 1 DP 1197707	Commonwealth of Australia	MPW
Lot 13 DP 1251885	Lot 13 DP 1251885	The Trust Company Limited (SIMTA)	MPE
Lot 26 DP 1253673	Lot 26 DP 1253673	SIMTA	MPE
Lot 27 DP 1253673	Lot 21 DP 1253673	SIMTA	MPE
	Lot 22 DP 1253673	SIMTA	MPE
	Lot 23 DP 1253673	SIMTA	MPE
Lot 3 DP 1197707	Lot 3 DP 1197707	Commonwealth of Australia	DJLU
Lot 3002 DP 1125930	Lot 3002 DP 1125930	Commonwealth of Australia	DJLU
Lot 4 DP1197707	Part Lot 41 DP 1197707	Commonwealth of Australia	Boot Land
Lot 4 DP1197707 and Lot 1 DP 825352	Part Lot 42 DP 1197707	Commonwealth of Australia	Rail link
Lot 1 DP 825352	Part Lot 43 DP825352	Rail Corporation of New South Wales (RailCorp)	Former Moorebank Railway Station site

Table 5.1 shows those parcels of land subject to the Project prior to and after subdivision. Figure 5.3 presents the cadastral boundaries assuming the modification is approved.

5.2.4 Interactions with surrounding properties

The Project would require adjustment to surrounding utilities and properties so as to be accommodated within or adjacent to the footprint of the alignment. The adjustment requirements are identified in this section.

i Utility services

The following existing utilities are located along or near the proposed operational and construction footprint:

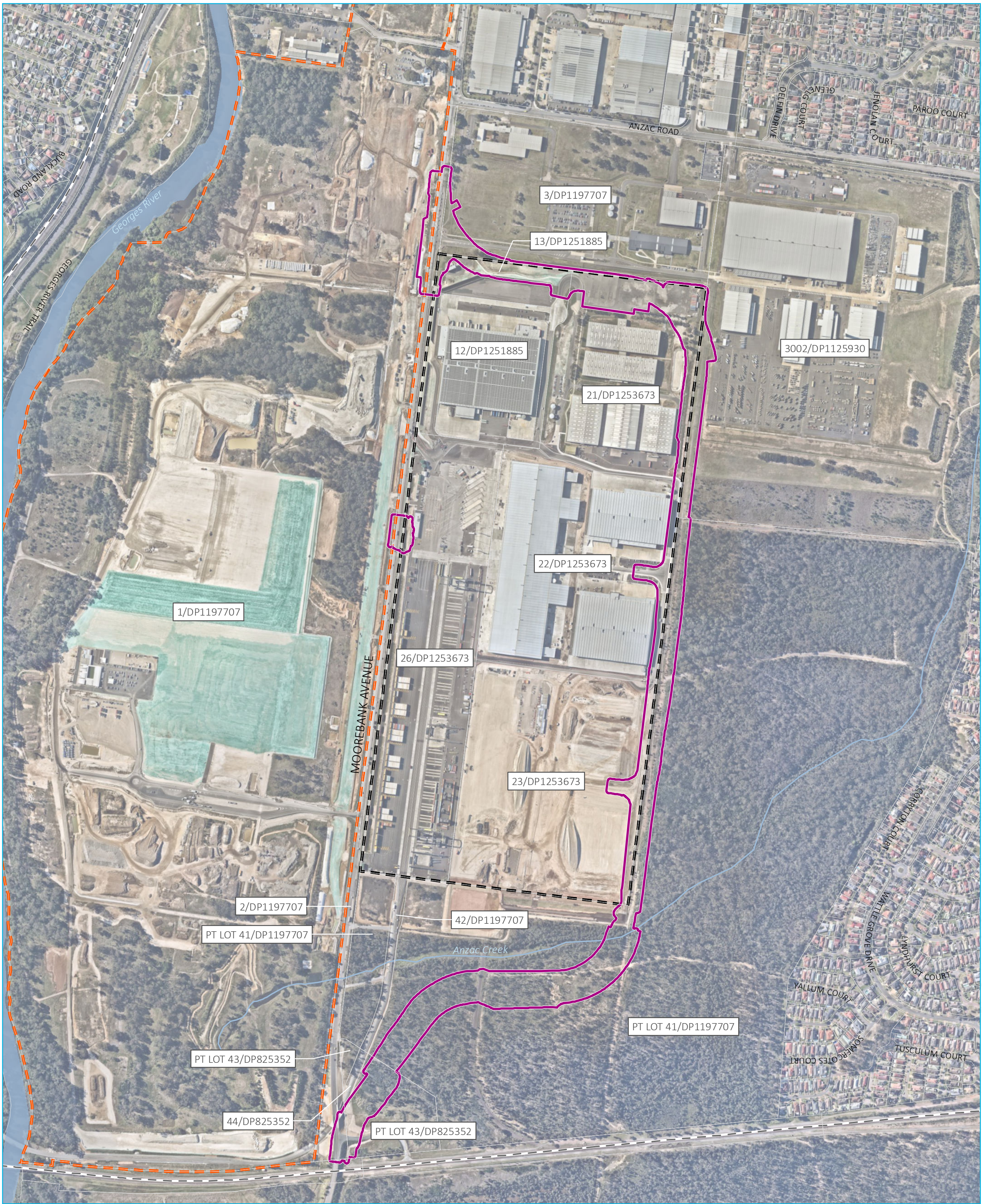
- Electricity – including transmission and distribution lines:
  - a decommissioned 11 kV Defence-owned overhead transmission line running parallel and adjacent to the eastern boundary of the MPE site;
  - 33 kV Defence-owned overhead transmission line running parallel and adjacent to the eastern boundary of the MPE site; and
  - Endeavor Energy overhead and underground cables for signalised intersections in the vicinity of the existing Moorebank Avenue/DJLU intersection and overhead and underground cables in the vicinity of the northern boundary of the MPE site.
- Water – including:
  - two Defence-owned mains along the eastern section of the proposed alignment.
  - two Sydney Water mains currently located parallel to the existing Moorebank Avenue/DJLU access intersection; and
- Gas – a Jemena high pressure gas main currently located adjacent to the existing Moorebank Avenue/DJLU access intersection;
- Sewerage – a Sydney Water rising main located adjacent to the existing Moorebank Avenue/DJLU access intersection; and
- Telecommunications – including optic fibre and coaxial cables adjacent to the existing Moorebank Avenue/DJLU intersection and within Greenhills Road.

Several utilities and services would be impacted by the Project and some may need to be adjusted, relocated, or decommissioned. The relocation strategy for those utilities impacted by the Project is outlined in Section 5.3.13.

ii Interactions with DJLU Site

The Project would result in a change to the DJLU site access from its current arrangement (providing access between Moorebank Avenue and the DJLU site) to a three-way intersection (providing access between the existing Moorebank Avenue, the realigned section of Moorebank Avenue, and the MLP) (refer Figure 5.4). The existing site access to the DJLU site would be maintained for a period during the construction of the Project.

As part of a separate project, the DJLU site access would ultimately be relocated to Anzac Road, positioned between Secombe Place and Yulong Close.



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Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

0 200 400 m
GDA 1994 MGA Zone 56
N

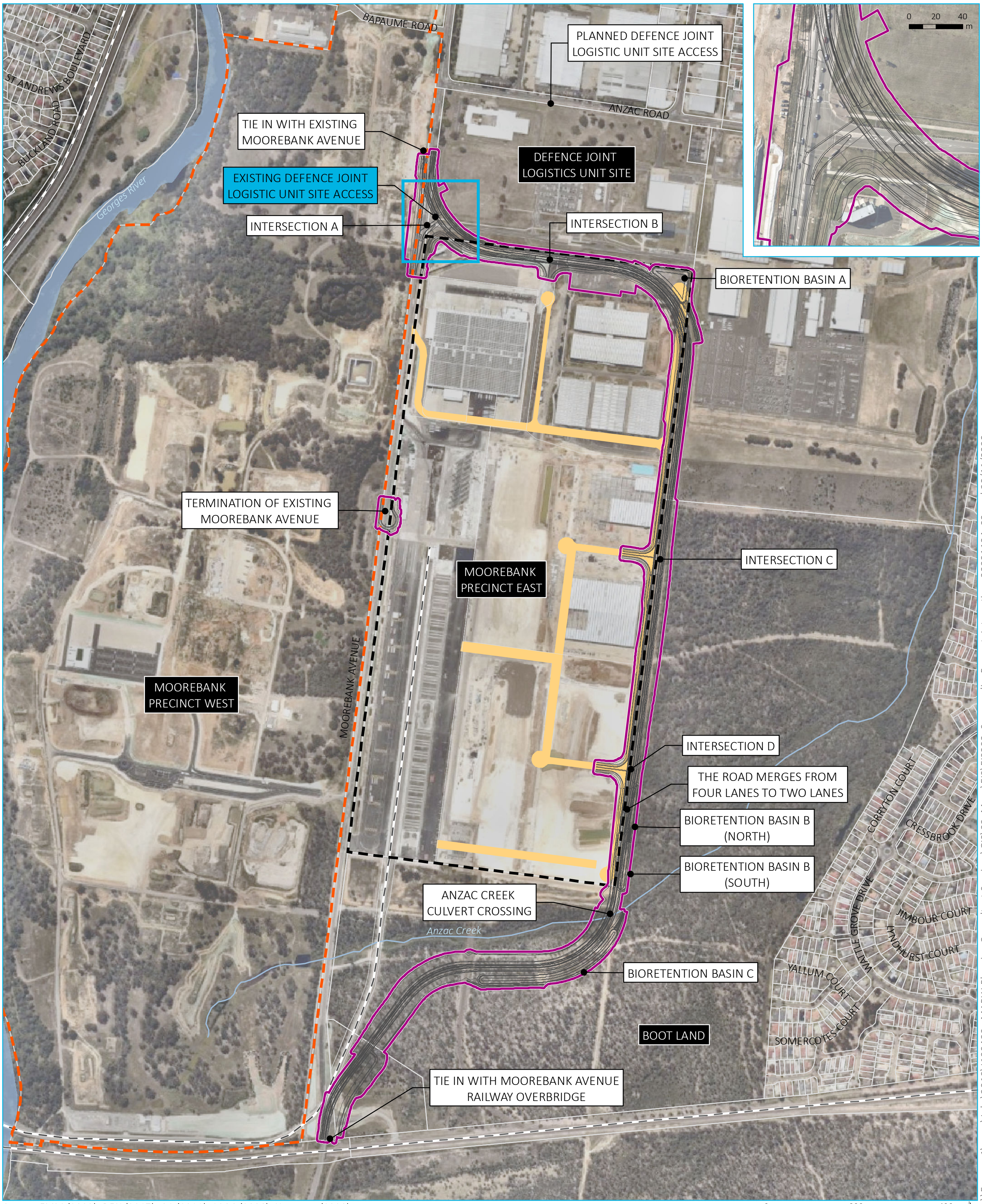
KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- Cadastral boundary
- Rail line
- Watercourse

Cadastral details

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.3

EMM
creating opportunities



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

0 200 400 m
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KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- MPE internal road network
- Cadastral boundary
- Road design
- Rail line
- Watercourse

Interactions with surrounding properties

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.4

EMM
creating opportunities

iii Interactions with MLP

The approved design for the MPE site currently includes two internal roads, which provides for east-west and north-south traffic movements. Internal Road 1 is oriented east-west and connects to Internal Road 2 at its easternmost portion. Internal Road 2 provides for traffic movements along the eastern perimeter of the MPE Site. It also includes a cul-de-sac at both the northern and southern ends to allow vehicles to turn around. Both internal roads connect to a series of service and transfer roads providing vehicular access to warehousing, loading docks, and car parking.

The Project would require a portion of land within the MLP to accommodate the physical footprint of the new road, being required for use as either the northbound road lanes, or for associated road setbacks (refer Figure 5.4).

The Project includes three intersections providing access to the MPE site (Intersections B, C, and D) to replicate existing conditions along Moorebank Avenue. A small length of road alignment would extend into MPE and would connect to MPE internal roads. These sections of road alignment extending into the MPE would function as restricted access roads and would not form a part of the dedication to TfNSW.

Further details of the proposed signalised intersections are outlined in Section 5.3.5.

5.3 Design

This section presents a description of the concept design for the Project. The Project has been developed in consultation with TfNSW and would be consistent with the Works Authorisation Deed (WAD), the Planning Agreement and the following requirements:

- the Austroads *Guide to Road Design*, Parts 3, 4, 4A, 6 and 6A;
- the TfNSW's *Roads and Maritime Supplement to Austroads Guide to Road Design*;
- TfNSW QA specifications, including:
  - Environmental Protection (Management System) QA Specification G36; and
  - Soil and Water Management (Management System) QA Specification G38.
- the TfNSW Standard (Road) Drawings; and
- the TfNSW traffic control signal guidelines.

The EIS has been prepared based on a concept design. If approved, a further detailed design process would follow which may include variations to the concept design.

The design criteria that have guided the Project's design are summarised in Table 5.2.

Table 5.2 Design criteria

Design parameter	Design criteria
Design speed	70 km per hour for cars, 65 km per hour for trucks
Posted speed limit	60 km per hour
Minimum general traffic lane width	3.5 m
Minimum auxiliary lane width	3.5 m
Minimum kerbside lanes	4.2 m with adjustment for curve widening
Median width	Variable, generally 6 m (incorporating 3.5 m turning lanes at intersections) tapering to 0 m at southern extremity
Grade	Absolute minimum longitudinal grade of 0.5 %
Design vehicle	36.2m A-double with 30m Super B Double checking
Verge	3.5 m
Shared user path	2.5 wide
Fill batter slope	4 (horizontal) to 1 (vertical)
Pavement design life	40 years

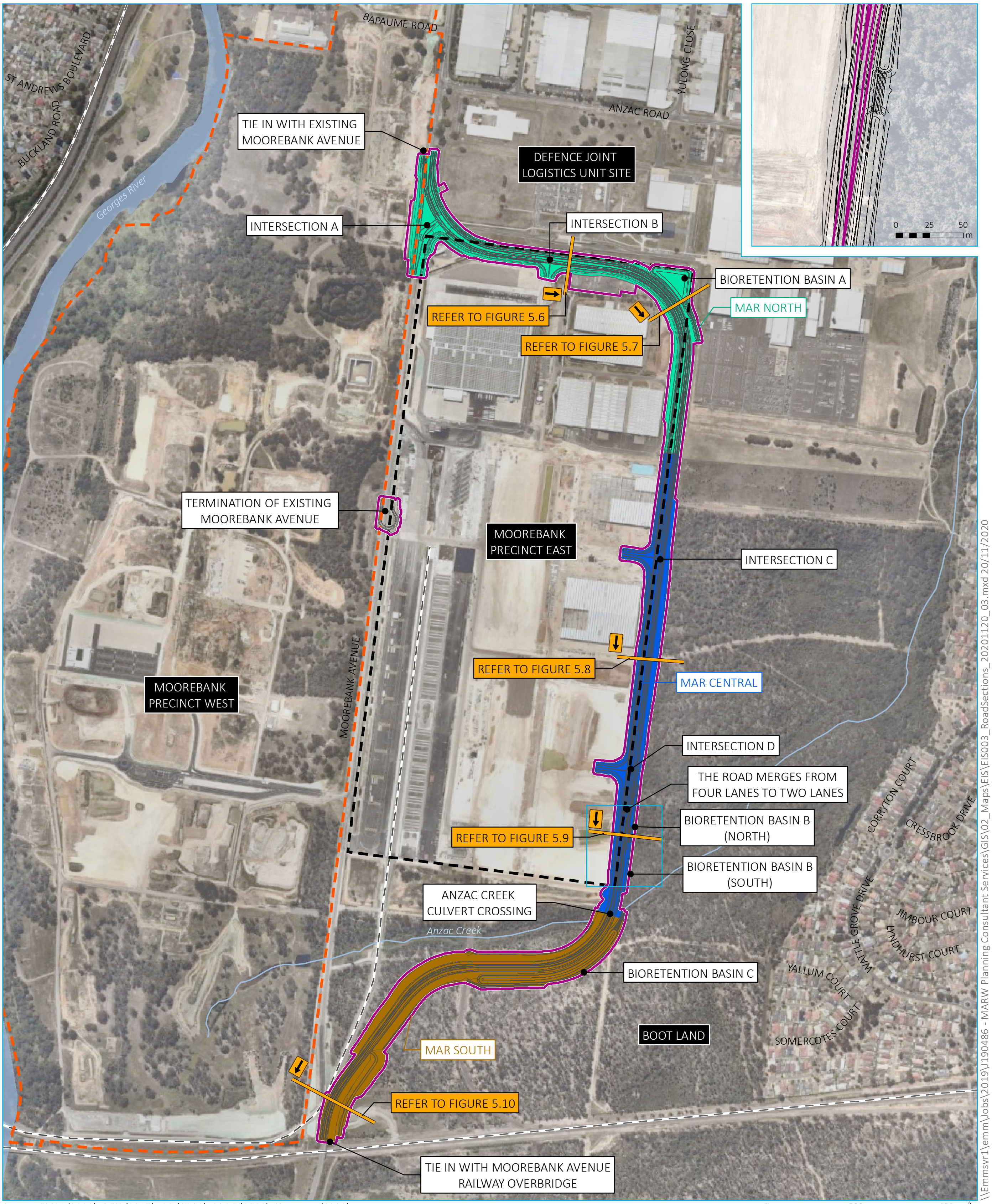
5.3.1 Alignment

For descriptive purposes, the Project has been divided into three sections. These sections are identified in Table 5.3, shown in Figure 5.5.

It should be noted that the lot references used in this section assumes the modification to MPE Stage 2 for the subdivision of two additional lots as part of the subdivision of the MPE site (SSD-7628-Mod-3) is approved and carried out. As of the writing of this EIS this modification is currently under assessment.

Table 5.3 Road sections

Section	Location	Length (m)
MAR North	Moorebank Avenue/DJLU intersection to north-western boundary of Boot Land	1160
MAR Central	North-western boundary of Boot Land to south-eastern boundary of MPE	940
MAR South	South-eastern boundary of MPE to East Hills Rail Corridor	900



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

0 200 400 m

GDA 1994 MGA Zone 56 N

KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- Road design
- Rail line
- Watercourse

Road section

- MAR Central
- MAR North
- MAR South

- Cross-section location
- Cross-section orientation

Road sections

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.5

creating opportunities

i MAR North – Moorebank Avenue/DJLU intersection to north-western boundary of Boot Land

The MAR North road section comprises that section of the alignment between the Moorebank Avenue/DJLU site access intersection and the north-western boundary of the Boot Land. A three-leg intersection (Intersection A) would integrate with the existing signalised intersection and provide access to the new road section and the existing Moorebank Avenue road alignment.

The new road section would be four lanes and extend from the intersection to a point at the north-eastern boundary of the MPE Site, before continuing south to the north-western boundary of the Boot Land. The road section would traverse Lot 2 in DP1197707 (Moorebank Avenue), a portion of Lot 1 in DP1197707 (MPW site) the south and south-western boundaries of Lot 3 in DP1197707 (DJLU site), the northern portion of Lot 12 in DP1251885 (MPE site), the north and north-east boundaries of Lot 21 in DP1253673 (MPE site) and a portion of the western boundary of Lot 3002 in DP1125930 (DJLU site). A three-leg signalised intersection (Intersection B), with turning lanes for heavy trucks, would be provided to the northern boundary of the MPE Site providing access between Warehouse 1 and Warehouse 2.

ii MAR Central – North-western boundary of Boot Land to south-eastern boundary of MPE

The MAR Central road section comprises that part of the alignment between the north-western edge of the Boot Land and the south-eastern boundary of MPE. This road section would be a four-lane road divided by a central median, however, at the southern extremity would become two lanes and undivided.

This road section would traverse the eastern boundary of Lot 22 in DP 1253673 (MPE site), Lot 23 in DP 1253673 (MPE site), the south-western boundary of Lot 3002 in DP1125930 (DJLU Site) and the western boundary of Part Lot 41 in DP1197707 (Boot Land). Two three-leg signalised intersections (Intersection C and Intersection D) would provide access to the MPE Site via auxiliary left and right turn-in lanes.

iii MAR South – South-eastern boundary of MPE to East Hills Rail Corridor

The MAR South road section would comprise that part of the alignment between the south-east boundary of MPE and the East Hills Railway. The road section would commence from the south-eastern boundary of the MPE Site and continue generally in a south-western direction, crossing Anzac Creek, until it intersects with the existing Moorebank Avenue alignment. This road section would comprise two undivided lanes.

This road section would traverse Part Lot 41 in DP1197707 (Boot Land) and Part Lot 43 in DP825352 (the former Moorebank Railway Station site) before re-joining Moorebank Avenue north of the East Hills Railway corridor.

5.3.2 Operational footprint

The operational footprint generally includes the new road alignment and additional areas required for the operation and maintenance of the Project, including:

- intersections and tie-ins;
- earthworks, including fill embankments and cuttings;
- culverts and drainage structures;
- water quality control measures, including basins and swales;
- landscape works, including roadside furniture;
- fencing;

- shared user path; and
- retaining walls and noise mitigation where required.

The total operational footprint is approximately 15.2 ha and is shown in Figure 5.1.

No additional car parking is included as part of the Project.

5.3.3 Road grade and lane widths

i Road grade

The gradient of the alignment would generally be between 0.5% to 1%. However, at the southern extent of the road before re-joining Moorebank Avenue near to the East Hill Railway bridge, the gradient would step up to approximately 3.15% at the bridge approach.

ii Lane widths

Generally, the Project comprises two distinct configurations, North of Intersection D, the Project would be two lanes in each direction divided by a central median to separate opposing traffic flows. South of Intersection D, the Project would be an undivided dual lane road (providing one lane in each direction).

Lane and turn auxiliary lane widths will at different points along the alignment.

North of Intersection D, the Project will typically provide:

- travel lanes will be about 3.5 m wide;
- kerbside (nearside) lanes, typically 4.2. m wide; and
- a median 6 m wide incorporating 3.5 m turning lanes at intersections.

South of Intersection D, the Project will typically provide:

- travel lanes 4.2 m wide.

Typical cross-sections of the Project are shown in Figure 5.6 to Figure 5.10.

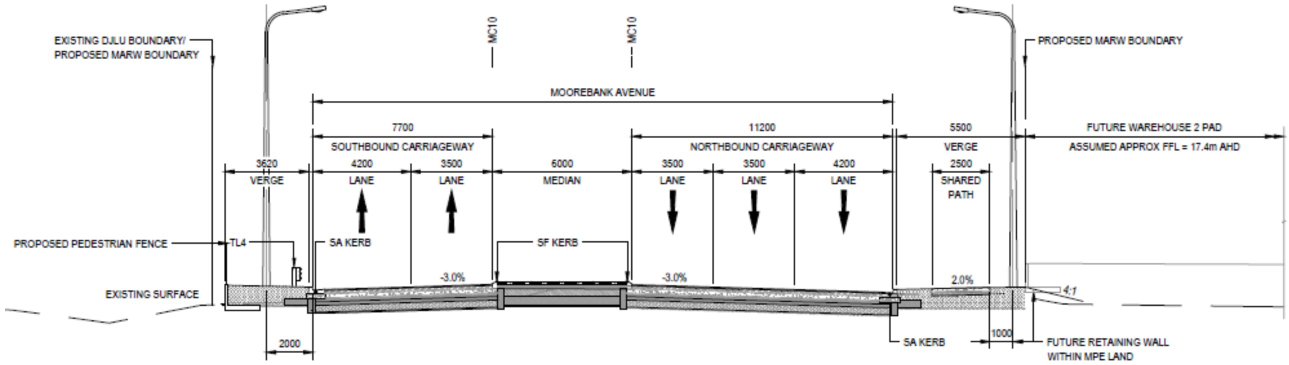


Figure 5.6 Indicative typical cross-section of alignment near Intersection B

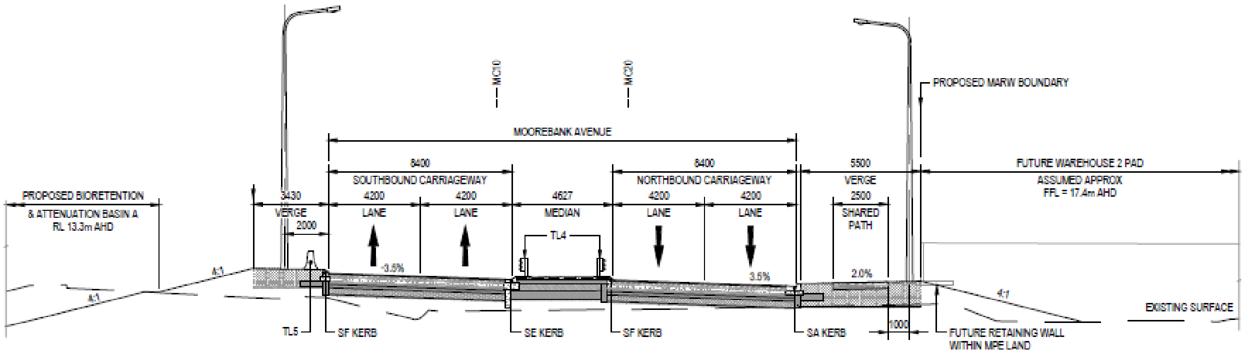


Figure 5.7 Indicative typical cross-section of alignment near north-east corner of MPE site

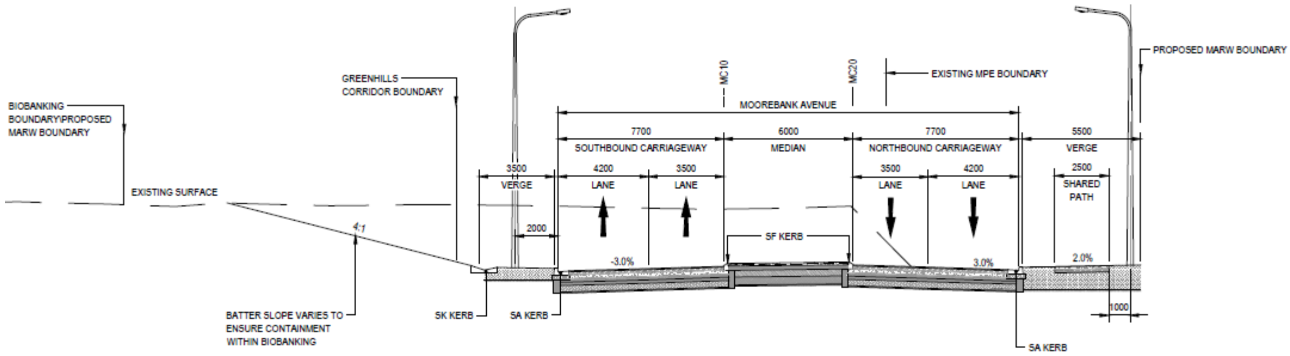


Figure 5.8 Indicative typical cross-section of alignment between Intersection C and Intersection D

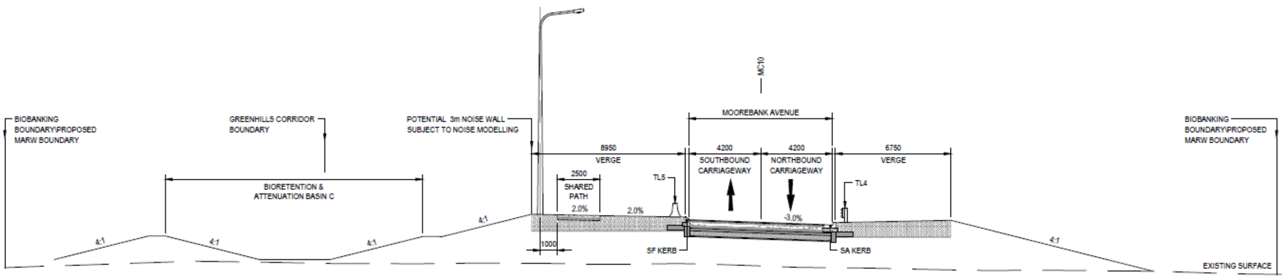


Figure 5.9 Indicative typical cross-section of alignment near Boot Land

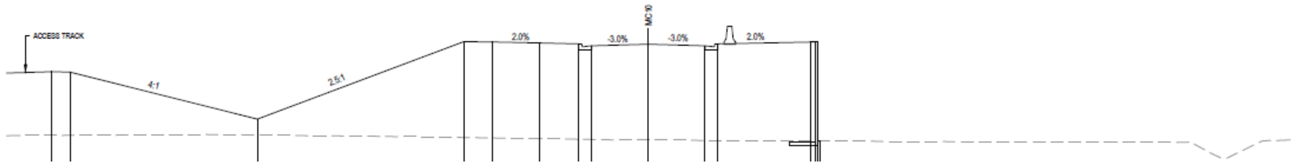


Figure 5.10 Indicative typical cross-section of alignment near East Hills Railway bridge

5.3.4 Pavement

Pavement would comprise (from bottom to top):

- Prepared subgrade – being the existing ground that has been stripped of topsoil, grubbed, levelled, and rolled. It may also include an embankment of compacted fill and/or an upper zone formation of placed fill to design levels;
- Sub-base – layers of compacted granular, select material, placed in layers of increasing strength as the pavement level gets higher;
- Lean mix concrete sub-base;
- Base course – comprising asphaltic concrete (AC); and
- Wearing course – a 45 mm AC layer.

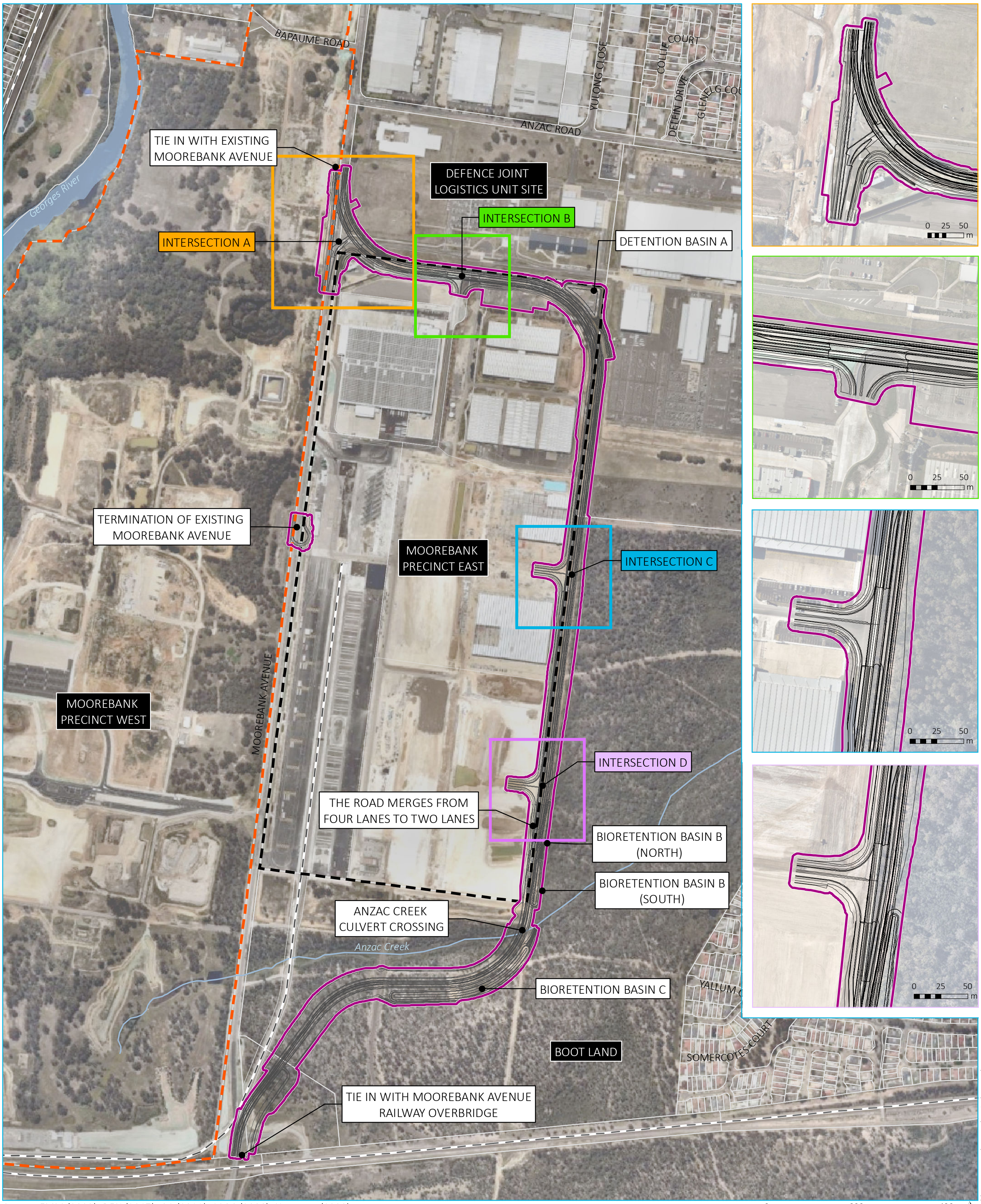
Pavement construction would typically involve select subgrade material and general earthworks material would be placed on top of the road formation to form the subbase courses. An upper pavement layer of concrete would be placed over the lower subbase courses and overlaid with the AC base courses. The wearing course would be a 45 thick AC layer.

5.3.5 Intersections

The Project has been designed with direct connections to the MPE Site. The Project includes four key intersections to replicate current conditions along Moorebank Avenue. The Intersections are named for descriptive purposes and include:

- Intersection A – an at-grade signalised intersection providing connection between the existing Moorebank Avenue alignment and the realigned Moorebank Avenue;
- Intersection B – a three-leg intersection providing access to the northern section of the MPE Site internal road network between Warehouse 1 and Warehouse 2;
- Intersection C – a three-leg intersection providing access to the eastern section of the MPE Site internal road network between Warehouse 3 and Warehouse 4; and
- Intersection D – a three-leg intersection providing access to the eastern section of the MPE Site internal road network between Warehouse 6 and Warehouse 7.

The intersections are shown in Figure 5.11 and are described in further detail in this section, with corresponding intersection figures.



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Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- Cadastral boundary
- Road design
- Rail line
- Watercourse

Intersections

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.11

EMM
creating opportunities

i Intersection A

Intersection A would be an at grade signalised intersection constructed at the northern extremity of the proposed realignment route in the vicinity of the northern boundary of the MLP. The three-leg intersection would provide connection between the existing Moorebank Avenue alignment and the Project. Connection would also be provided to the existing Moorebank Avenue between the MPW Site and MPE Site, providing restricted access to the MLP. The intersection will replace the existing intersection and require the relocation of shared user paths and bus stops. Intersection A is shown in Figure 5.12.

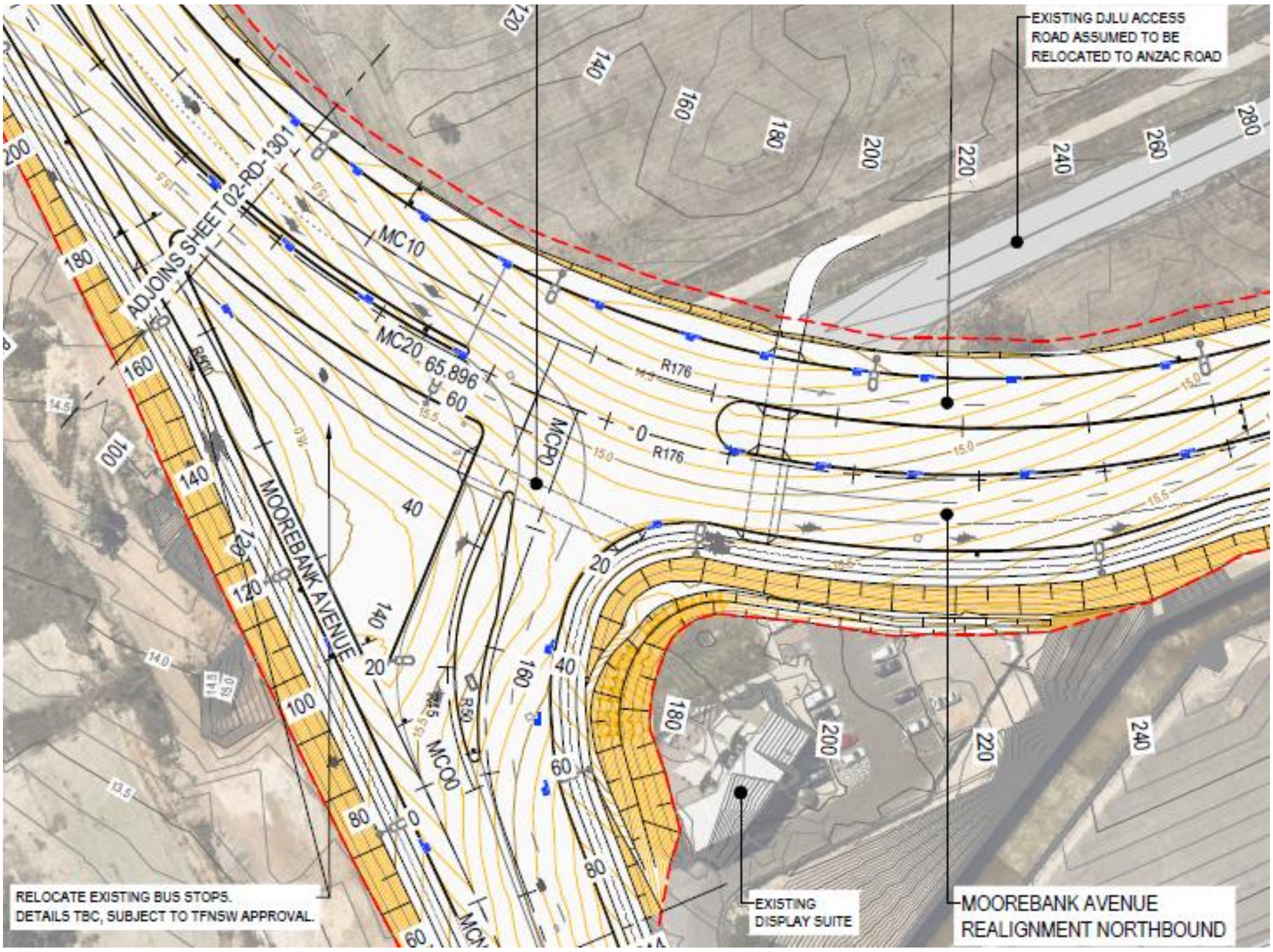


Figure 5.12 Intersection A (indicative only)

ii Intersection B

Intersection B would be established along the northern boundary of the MPE Site between Warehouse 1 and Warehouse 2. The intersection would tie into the internal MPE road network. Turning lanes would be provided to allow for left and right turns into the MPE site and left and right turns out of the MPE site. Intersection B is shown in Figure 5.13.

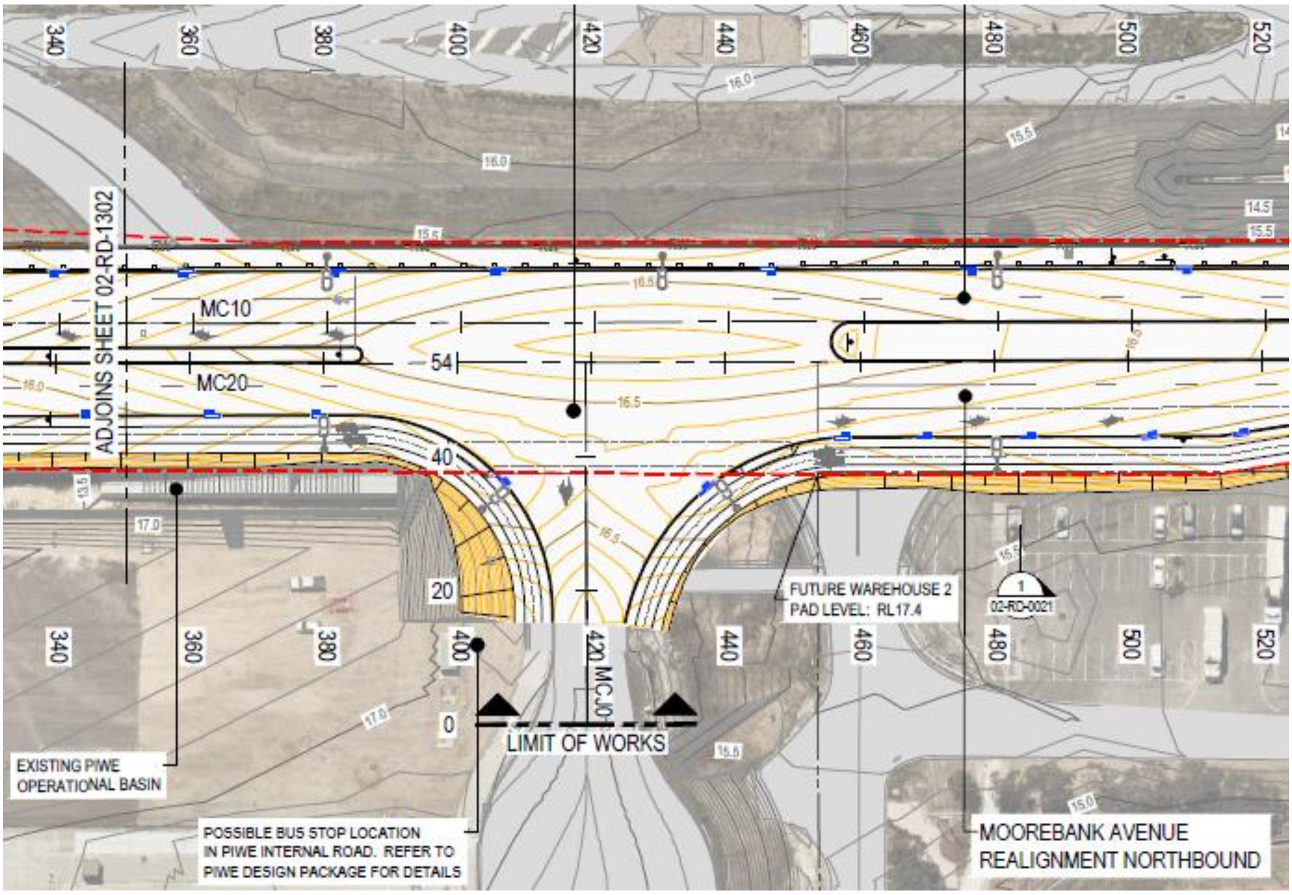


Figure 5.13 Intersection B (indicative only)

iii Intersection C

Intersection C would be established along the eastern boundary of the MPE Site between Warehouse 3 and Warehouse 4. The intersection would tie into the internal MPE road network. Turning lanes would be provided to allow for left and right turns into the MPE site and left and right turns out of the MPE site. Intersection C is shown in Figure 5.14.

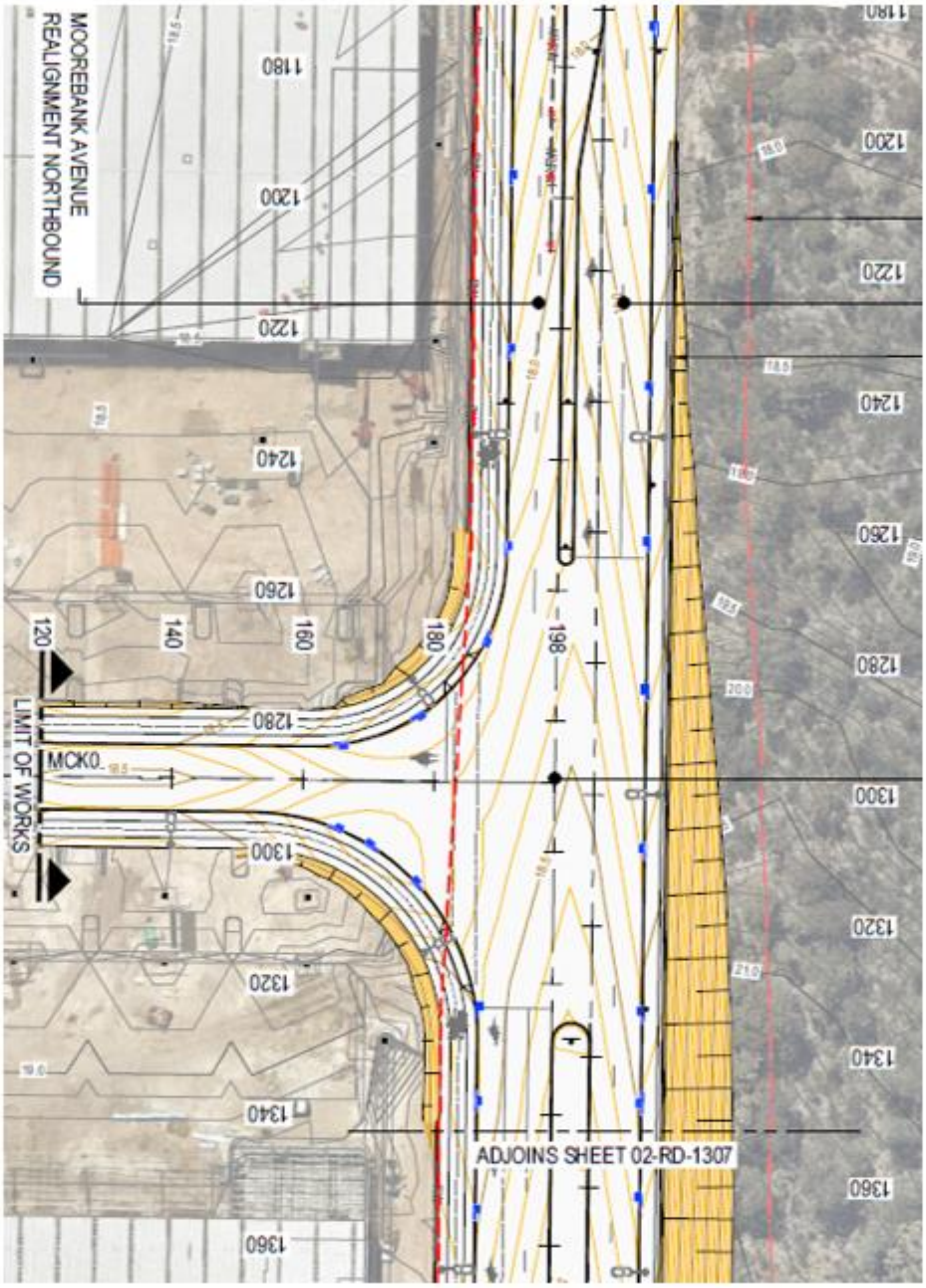


Figure 5.14 Intersection C (indicative only)

iv Intersection D

Intersection D would be established along the eastern boundary of the MPE Site between Warehouse 6 and Warehouse 7. The intersection would tie into the internal MPE road network. Turning lanes would be provided to allow for left and right turns into the MPE site and left and right turns out of the MPE site. Intersection D is shown in Figure 5.15.

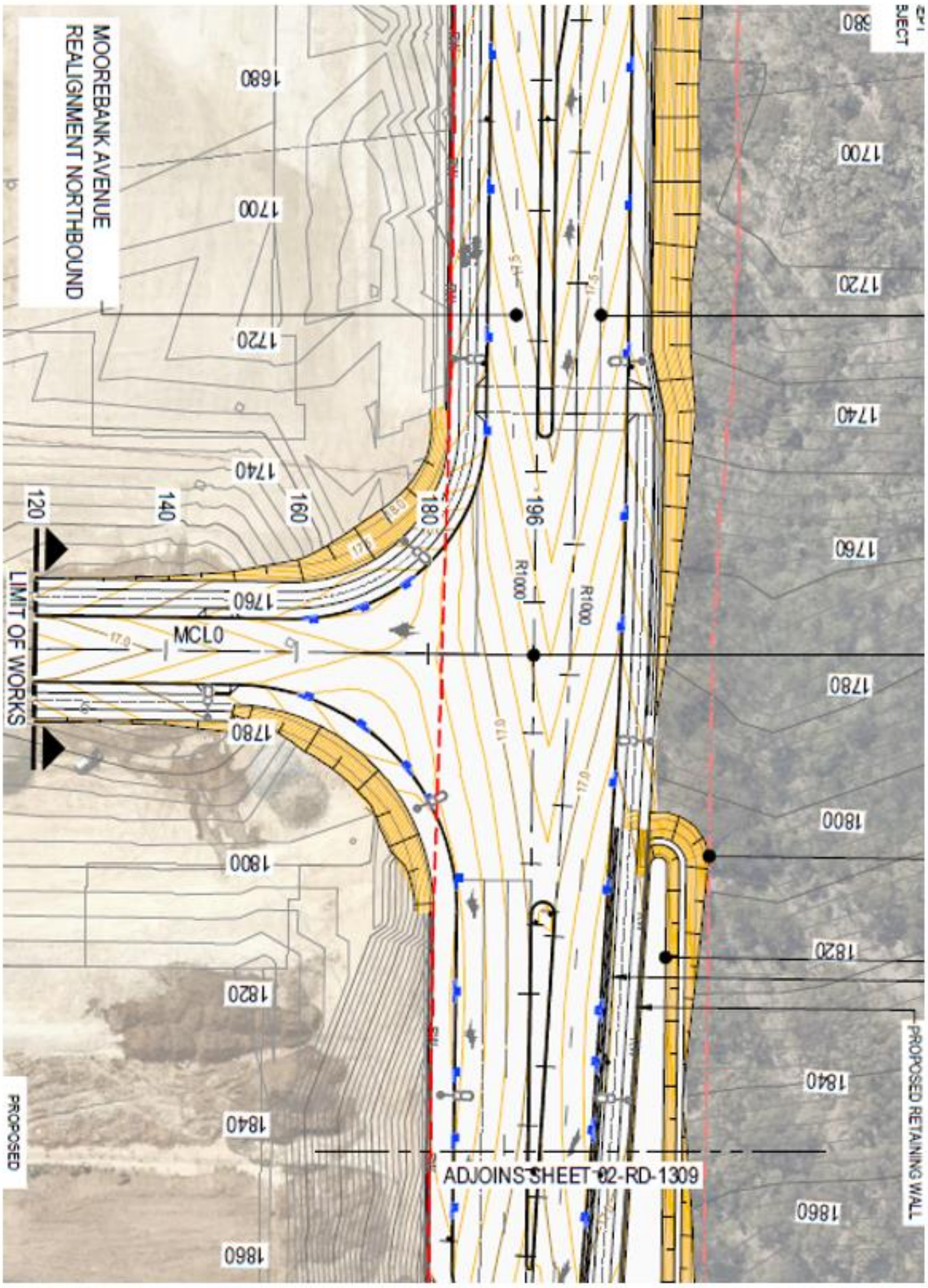


Figure 5.15 Intersection D (indicative only)

5.3.6 Shared user path and verge

A 2.5 m wide shared user path for cyclists and pedestrians would be constructed for the length of the Project. Starting from the northern section of the Project, the shared user path would initially be along the western side of the northbound carriageway before alternating to the eastern side of the southern carriageway in the vicinity of Intersection D.

A section of the existing shared user path at the northern and southern extremity of the alignment would be modified to tie-into the new road section. The existing pedestrian crossing north of Intersection A would be maintained, however minor adjustments and tie-in works may be required.

The road verge would be of varying widths determined by the layout of the new road section. Where the verge incorporates a shared user path it would be approximately 3.5 m wide and, at locations which do not include a shared user path, the road verge would generally be approximately 2 m wide.

The road verge would accommodate landscaping, utilities, street furniture, and barriers.

The shared user path and verges are shown in the typical cross-sections of the Project (Figure 5.6 - Figure 5.10).

5.3.7 Tie-ins

The Project would include tie ins to the existing Moorebank Avenue alignment at the northern and southern extremities of the new road section.

i Northern tie-in to Anzac Road intersection

The Project would involve tie in works (refer to Figure 5.12) with the existing Moorebank Avenue in the vicinity of the existing intersection of Moorebank Avenue and the DJLU Site. Tie-in works would include adjustment of shared user paths and alignment of road and kerbs.

Tie-in works at this location have been designed to integrate with the existing Moorebank Avenue and future upgrade works to the Moorebank Avenue/Anzac Road.

ii Southern tie-in to existing Moorebank Avenue

The new road section would tie back into the existing Moorebank Avenue in the vicinity of the East Hills bridge. The tie-in works would involve integration of the shared user path with the footpath on the eastern side of the bridge over the East Hills Railway bridge, renewing the line marking on the bridge, and replacement of barriers on the approach to the bridge. No substantial alteration modifications to the East Hills bridge itself are required.

5.3.8 Water management

The water management objectives for the Project are to:

- maintain or improve safe passage for road users during storm and flood events;
- maintain or reduce risk and impact to property resulting from flooding;
- maintain existing flow regimes;
- maintain or improve existing water quality; and
- provide accidental spill containment and emergency management during operation.

In operation, the Project would comprise four sub-catchments post development. The sub-catchments would include:

- The north-western (NW) sub-catchment - comprising that part of the alignment between the northern extremity of the Project and Intersection B. This sub-catchment drains stormwater from the DJLU Site and existing stormwater network. Stormwater from this sub-catchment is conveyed via a series of culverts crossing the existing Moorebank Avenue alignment into existing drainage infrastructure.

- Sub-catchment A - comprising that part of the alignment between Intersection B and land immediately south of Intersection C. Sub-catchment A drains stormwater to a bioretention basin in north-eastern corner of the alignment (Bioretention Basin A).

- Sub-catchment B – comprising that part of the alignment between land immediately south of Intersection C and the south-eastern corner of the MPE Site. Sub-catchment B drains stormwater to two bioretention basins in the vicinity of the southern MPE Site intersection (Bioretention Basin B (North) and Bioretention Basin B (South)).

- Sub-catchment C – comprising that part of the alignment from the south-eastern corner of the MPE Site and the southern extremity of the alignment where it re-joins with the existing Moorebank Avenue. Sub-catchment C drains stormwater to a bioretention basin in the vicinity of the south-eastern corner of realignment route (Bioretention Basin C).

The sub-catchment boundaries incorporated in the Project are shown in Figure 5.16.

i Drainage and stormwater management

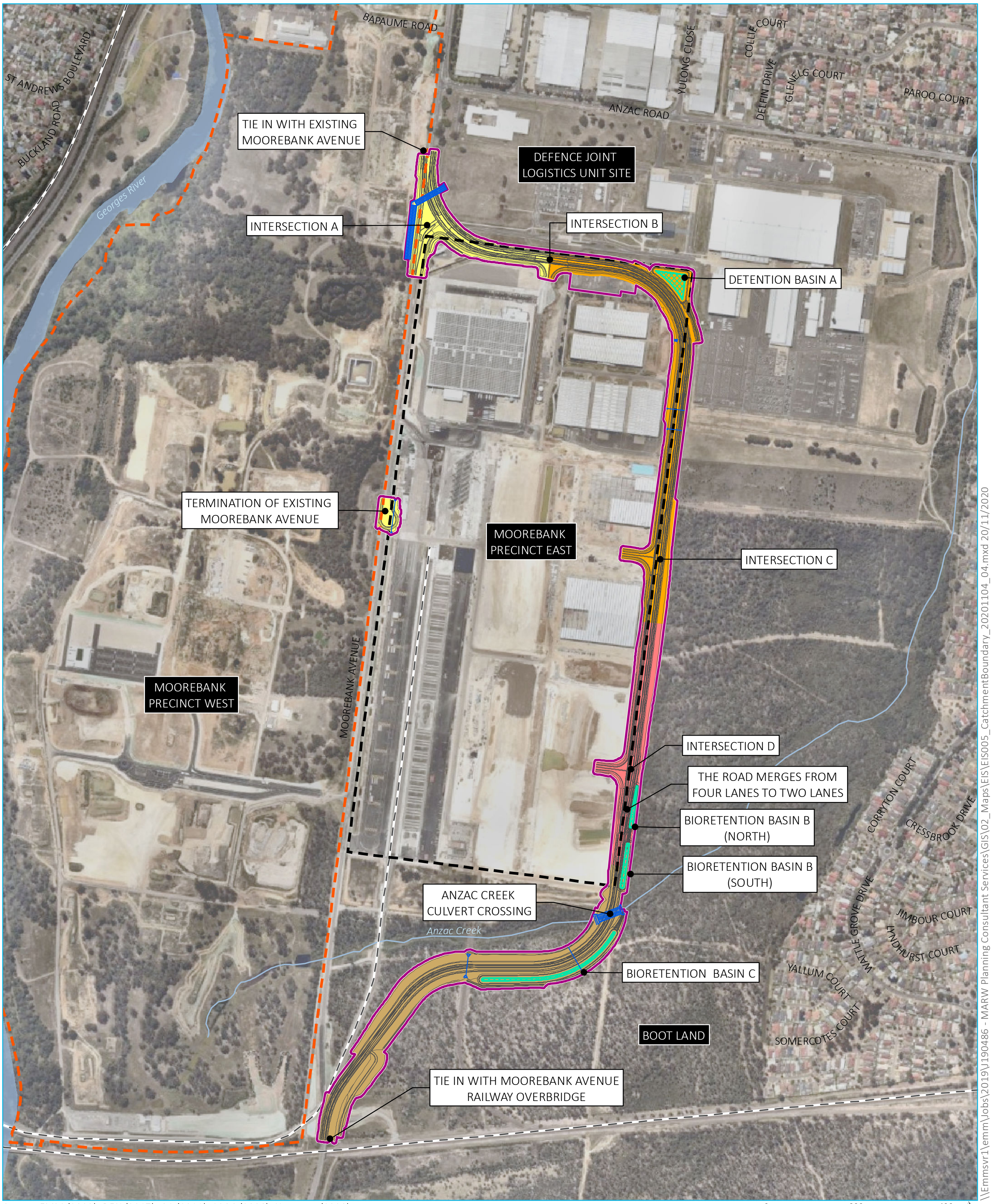
a Water management design criteria

Drainage, stormwater management, and flood mitigation infrastructure would be installed for the Project to provide appropriate water quality outcomes. The infrastructure would comply with the criteria outlined in Table 5.4.

Table 5.4 Design criteria for water management structures

Drainage infrastructure	Design criteria
Channels and open drains	10-year ARI
Piped system (including pits)	10-year ARI
Culverts where surcharge is allowable	100-year ARI
Structures where surcharge is undesirable	20-year ARI
Nil width of flow spread onto traffic lanes	10-year ARI
Gross pollutant traps	1 year-ARI
Pavement drainage wearing surface	10-year ARI
Major storm event check for no property damage	100-year ARI
Temporary Drainage	2-year ARI

Note: Average recurrence interval (ARI) is used to describe the frequency or probability of floods occurring, that would be managed by the various water management structures.



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- Road design
- Rail line
- Watercourse
- Proposed culvert
- Bioretention area

Proposed catchment

- Catchment A
- Catchment B
- Catchment C
- Catchment NW

Proposed catchment boundaries

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.16

creating opportunities

b Drainage stormwater and flood mitigation infrastructure

Cross drainage structures (including concrete box culverts and pipes) would be constructed to maintain existing flow patterns and to keep affluxes within acceptable limits. The final design and configuration of flooding infrastructure would be confirmed during detailed design.

Table 5.5 outlines the proposed flood management measures required for the Project.

Table 5.5 Summary of flood management measures

Catchment	Proposed drainage strategy
NW Catchment	A concrete pipe culvert up to 1,200 mm x 600 mm
Catchment A	An overflow culvert with pipe connection up to 1,050 mm diameter in the vicinity of Bioretention Basin A and a two high flow culverts conveying from Warehouse 2
Catchment B (Anzac Creek tributary)	Eight reinforced concrete pipe culverts sized up to 1,800 mm x 2,100 mm
Catchment C	A high flow culvert up to 1,200 mm diameter

The Project would include longitudinal road pavement drainage comprising drainage pits, pipes, and open drains. These structures would function to collect and convey stormwater runoff from the road pavement and to manage overflow from surrounding catchments.

ii Operational water quality controls

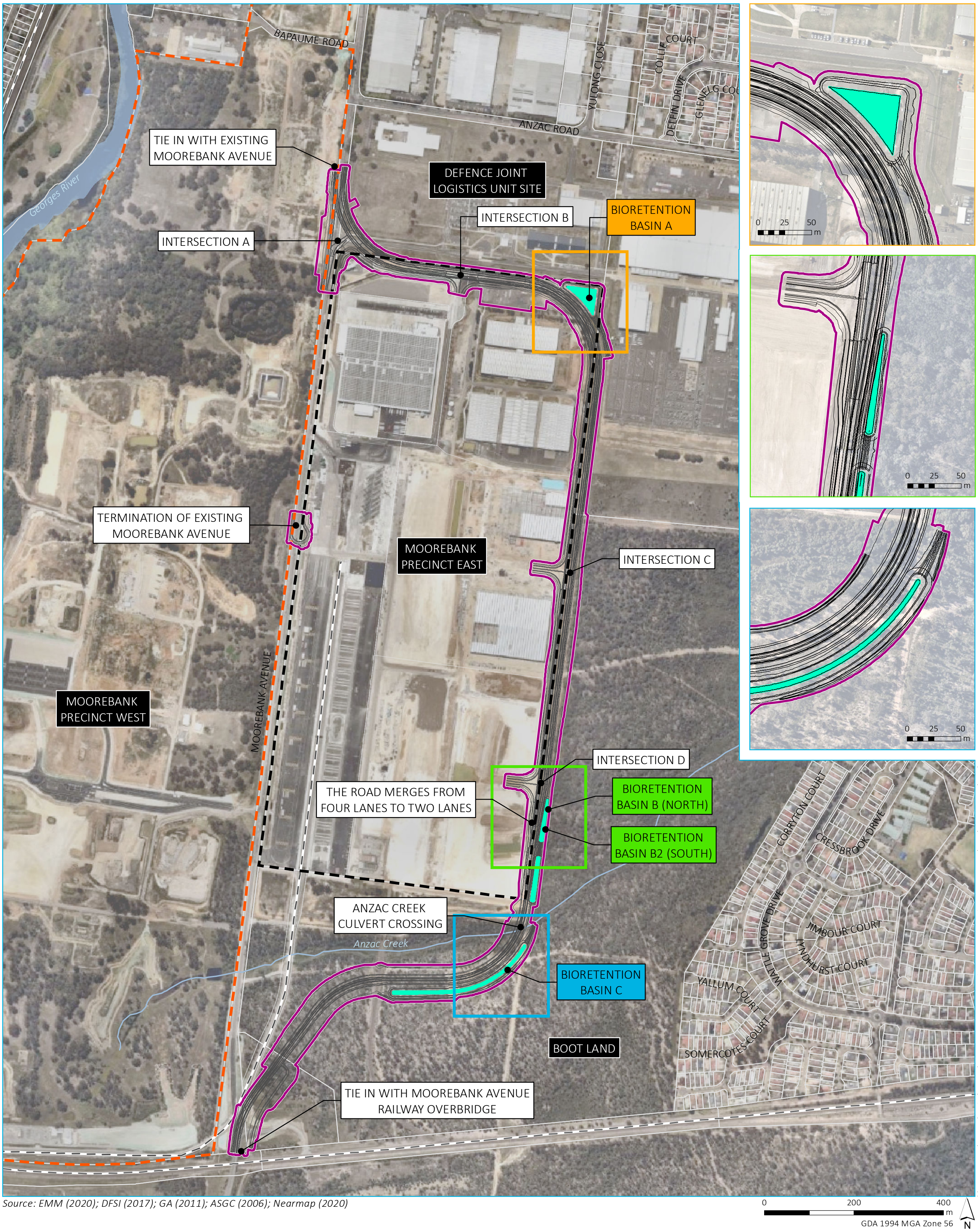
Permanent water quality measures for the operational phase of the Project are outlined in Table 5.6.

Table 5.6 Operational water quality controls

Control	Description	Indicative location	Benefits
Vegetated swale	Vegetated swales are linear features that convey stormwater along the surface within a wide, shallow channel.	Vegetated swales would be used in various locations along the length of the alignment, generally along the eastern perimeter.	Vegetation is used to promote uniform flow in slowing water velocity to encourage the settlement of coarse sediments. Vegetation may also capture and detain litter and organic matter.
Bioretention basins	Bioretention basins operate with the same treatment process as vegetated swales with the exception that they are non-linear and may be designed to detain and treat on-site stormwater runoff.	Bioretention basins would be implemented along the eastern perimeter of the alignment at locations defined below.	Bioretention basins facilitate sedimentation and filtration of stormwater runoff, pollutants, sediments, and nutrients.
Spill containment	Spill containment would be provided via bioretention basins.	Spill containment would be provided in areas considered to be sensitive receiving environments including the Boot Land and Anzac Creek.	Trap spilled liquids (eg hydrocarbons) while allowing stormwater to continue to be discharged during rain events.

a Bioretention system

The proposed locations of permanent bioretention basins are shown in Figure 5.17 and described in this sub-section. The location, design and size of all permanent water quality basins would be subject to refinement during detailed design.



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Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- Bioretention area
- Cadastral boundary
- Road design
- Rail line
- Watercourse

Bioretention basins

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.17

creating opportunities

b Bioretention Basin A

An above ground bioretention basin would be established in the north-eastern corner of the alignment. The basin would take water from Catchment A. The basin would be hydraulically linked to a weir and overflow drain to provide low outflow to the existing DJLU drainage network.

c Bioretention Basin B (North) and Bioretention Basin B2 (South)

Two bioretention basins incorporating a swale would be established in the vicinity of the southern MPE Site intersection. The basins would take stormwater surface flows from Catchment B and would be hydraulically linked via an overflow spillway weir.

d Bioretention Basin C

A linear bioretention basin with a would be established in the vicinity of the south-eastern corner of the realignment route. The basin would take stormwater surface flows from Catchment C. The basin would be hydraulically linked to a low flow outlet pipe to Anzac Creek.

5.3.9 Embankments and batters

Embankments and batters would be designed generally with a slope of four (horizontal) to one (vertical), where practicable and feasible to do so.

Where the alignment is constrained by adjoining uses or land that is sensitive to vegetation clearing, retaining walls and/or steep batters would be constructed in place to minimise the Project footprint.

5.3.10 Retaining walls

Four retaining walls would be constructed along the alignment. The retaining walls would function to give structure to the road and to avoid earthwork batters encroaching upon the adjoining DJLU Site and environmentally sensitive areas. At sections of the alignment, retaining walls would vary in length between 98 m to 360 m and vary in height between 0.5 m to 7.5 m.

5.3.11 Road furniture, line making and lighting

Roadside furniture, line marking, and lighting infrastructure that would be installed for the Project are discussed in this section.

i Safety barriers

Safety barriers would be included adjacent to retaining walls, steep batters, or other hazards. Safety barriers may also be included to provide physical separation of oncoming vehicles.

ii Kerbs

Standard TfNSW profiles for kerbs are to be used throughout the new road section.

iii Fencing

Fencing may be required adjacent to drainage barriers, and to neighbouring properties to maintain security of adjacent properties and to protect the neighbouring biobanking site.

iv Line marking

Line marking would be provided in accordance with the requirements in Australian Standard (AS) 1742 and associated TfNSW supplements and delineation guidelines.

v Signposting

Directional signage would be provided in accordance with AS 1742.15 Manual of uniform traffic control devices – Direction signs, information signs and route numbering and associated TfNSW supplements and delineation guidelines.

vi Lighting

A lighting scheme would be developed for the proposed realignment in accordance with TfNSW's street lighting standards (R0600 Series), the requirements of AS 1158 – 1986 SAA Public Lighting Code, and AS4282 – 2019 Control of the obtrusive effects of outdoor lighting.

Lighting design would be developed during detailed design and consider potential light spill into nearby properties.

5.3.12 Public Transport

i Bus facilities

Up to three kerbside bus stops would be relocated from the existing Moorebank Avenue alignment to locations in both directions along the new alignment. Potential bus stop locations would be sited on the realignment Moorebank Avenue prior to each of the warehouse entrance intersections on the north-bound carriageway. Buses would stop within the 4.2 m wide kerbside lanes. No localised widenings of bus-bays at bus stop locations are proposed.

The existing bus stops are serviced by Route 901 which provides 24 services per day on week days, 12 services on weekends, and 10 services on Sundays and public holidays. Route 901 would therefore require alterations as a result of the Project.

5.3.13 Utility relocation

If the Project is approved, utilities and services within both the existing Moorebank Avenue alignment and realignment corridor will be impacted and may require adjustment, protection, relocation or termination as a result of the Project. The extent of impact to existing utilities cannot be confirmed until the detailed design is finalised and so these details are preliminary only and may be subject to change.

Potential utility modifications or relocations required as a result of the Project are summarised in Table 5.7.

Table 5.7 Potential utility adjustments and relocations

Utility service	Asset owner	Asset type	Location	Potential utility strategy
Electrical	Endeavour Energy	Existing overhead and underground cables.	Cables generally run parallel to the northern boundary of the MPE Site in the vicinity of Intersection B. Cables also extend in the vicinity of Warehouse 3.	Undergrounding of some overhead cables and relocation or protection of existing services during construction of Intersection B.
Communications	NBN, Optus, Telstra, Pipe Networks	Underground cables including optic fibre.	Currently runs underground parallel to the existing Moorebank Avenue on both sides of the road pavement.	Relocation or protection works prior to the construction of Intersection A.
Water	Sydney Water	Two water mains.	Currently located parallel along the existing Moorebank Avenue along both sides of the road pavement.	Prior to the construction of Intersection A, ensure that there is sufficient cover and depth over the existing service, if not, relocate service to correct cover and provide appropriate protection during construction and throughout design life.
Gas	Jemena	HP gas main.	Currently located adjacent to the existing Moorebank Avenue.	Prior to the construction of Intersection A, ensure that there is sufficient cover and depth over the existing service, if not, relocate service to correct cover and provide appropriate protection during construction and throughout design life. Or relocate to within the Project alignment.
Sewerage	Sydney Water	Rising sewer main.	Currently located adjacent to the existing Moorebank Avenue, estimated to be approximately 1.3m below the existing surface.	Relocate to western verge of the existing Moorebank Avenue as a part of other works.
Electrical	Endeavour Energy	Existing electrical overhead and underground cables.	Cables generally run parallel to the northern boundary of the MPE Site in the vicinity of Intersection B. Cables also extend in the vicinity of Warehouse 3.	Relocate and undergrounding of some cables to standard alignments in the east and west verges of the existing Moorebank Avenue as a part of other works. Relocate and undergrounding of other cables under Intersection A, from chainages 180 to 460.
Communications	Department of Defence (DoD)	Optics fibre.	Currently located adjacent and parallel to the eastern boundary of MPE (ie within the northbound road lanes of the Project).	Relocate DoD utilities to the eastern side of the ultimate road corridor. Or relocate to the west verge of the ultimate road corridor, beneath the road corridor.
Electrical	Department of Defence (DoD)	11 kV overhead transmission line.	In Greenhills Road reserve running parallel to MPE eastern boundary.	Relocate DoD utilities to the eastern side of the ultimate road corridor. Or relocate to the west verge of the ultimate road corridor, beneath the road corridor.

Table 5.7 Potential utility adjustments and relocations

Utility service	Asset owner	Asset type	Location	Potential utility strategy
Electrical	Department of Defence	33 kV overhead transmission line.	In Greenhills Road reserve running parallel to MPE eastern boundary.	Relocate DoD utilities to the eastern side of the ultimate road corridor. Or relocate to the west verge of the ultimate road corridor, beneath the road corridor.
Water	Department of Defence	Two water mains.	In Greenhills Road reserve running parallel to MPE eastern boundary.	Relocate DoD utilities to the eastern side of the ultimate road corridor. Or relocate to the west verge of the ultimate road corridor, beneath the road corridor.

On review of detailed design and in consultation with DoD, where it is not considered reasonable or feasible to co-locate the Defence utility or communications assets within the road corridor, they may be sought to be relocated to the east of the project's alignment further into Commonwealth lands, currently held as a biodiversity offset area. If such relocation is required, necessary adjustments to the biodiversity offset area and associated agreement would be made. This may include the identification of alternate or replacement biodiversity credits and/or supplementary measures to maintain the offset credit requirements for the MLP precinct. Additionally, there would be a need to address any additional credit retirement requirements associated with the relocation outside of he defined road corridor.

5.3.14 Urban design and landscaping

The Arcadis concept design incorporated a design verification process and cross discipline review (CDR) of drawings and reports by independent discipline leads to ensure integration, eliminate clashes and to optimise design across disciplines. These experts included drainage engineers, lighting designers, civil engineers, geotechnical engineers, pavement engineers, and structural engineers. This CDR has included experts with constructability experience to verify appropriate integration of other disciplines design components. Following completion of the concept design, EMM's technical experts and spackman mossop michaels have reviewed the concept design in consideration of the expected environmental impacts. Where appropriate, feedback concerning design elements has been provided to SIMTA for consideration into future design iterations and have been included in this EIS as proposed management and mitigation measures.

An objective of the concept design is to apply appropriate urban design, landscape and visual principles in the concept design of project elements. Urban design and landscaping for the Project has been an iterative process and has included a review of related policy documents, guidelines and standards including those listed in the SEARs. Table 5.8 responds to the key guidelines for the urban design and landscape character considerations for the Project.

The concept design has prioritised the technical aspects of the Project including maximising the efficiency of the IMT operations, improving connectivity and safety for general and active transport users, and minimising environmental impacts. Future design packages will incorporate further urban design and landscaping principles to meet the Project's urban and landscape design outcome objectives.

Table 5.8 Consideration of relevant urban design guidelines

Guideline	Objectives	Design response
Designing with Country (Government Architect 2020)	Architecture considers design and people (informed by nature). Architecture without people is just a sculptural object.	Once constructed, the Project will positively impact on the amenity of people through enhancing community access and interaction. Additionally, the project incorporates a shared-user path for pedestrians and cyclists to encourage use outside of road travel.
	Passive design considers design and nature, and when used by people becomes environmental design.	The project will run adjacent to the adjoining biobanking site. The Project considers this nearby feature in design and incorporates a shared-user path to maximise enjoyment of this natural feature.
	Biophilic design considers the innate relationship between people and nature. Informed by design, this relationship could be understood as a genesis for Indigenous architecture.	Given the nature of the Project as a road asset, there is little opportunity for incorporation of indigenous architecture. However certain project elements (including retaining walls, noise mitigation and landscaping) could be used to reinforce the innate relationship between people and nature. Future design packages will consider indigenous architecture in applying urban design and landscaping principles.
Better Placed – An integrated design policy for built environment of New South Wales (Government Architect 2017) Better Placed – Aligning Movement and Place – Outline for understanding places in relation to movement infrastructure (Government Architect NSW, 2019)	Better fit: contextual, local and of its place.	The design of the Project has been informed by its location, context and social setting. It is relevant to the local character of Moorebank, and the historical road network. It also contributes to the evolving and future character and setting of South West Sydney.
	Better performance: sustainable, adaptable and durable.	The Project has been designed to meet the performance standards of relevant Australian and NSW Government road design guidelines (refer to Section 5.3). Sustainability has been a fundamental consideration to option selection and design development. An assessment of the Project's sustainability performance is provided in Section 7.15.
	Better for community: inclusive, connected and diverse.	Allowing for continued access to employment, leisure, open space and other facilities between Moorebank and Glenfield will support engaging places and resilient communities in South West Sydney.
	Better for people: safe, comfortable and liveable.	The Project has been designed to meet the safety standards of relevant Australian and NSW Government road design guidelines (refer to Section 5.3).
	Better working: functional, efficient and fit for purpose.	The Project has been designed to meet the performance standards of relevant Australian and NSW Government road design guidelines (refer to Section 5.3). The Project is required to facilitate the effective and safe operation of the MLP and reduce conflict and congestion for through traffic.
	Better value: creating and adding value.	The inclusion of the shared path in the Project design, allows for shared value of place for both vehicular and active transport users. The realignment of Moorebank Avenue enables the integrated operation of the MPE and MPW which is dependent on the closure of the existing Moorebank Avenue.

Table 5.8 Consideration of relevant urban design guidelines

Guideline	Objectives	Design response
	Better look and feel: engaging, inviting and attractive.	Upon completion, the Project would be welcoming and aesthetically pleasing, encouraging local communities to use and enjoy local places. The visual environment of the MLP and the Boot Lands would contribute to its surroundings and promote positive engagement.
NSW State Design Review Panel Pilot Program (Government Architect NSW, 2018)	The Panel provides a consistent, state-wide approach to reviewing and raising design quality of state significant projects.	The Project has not been referred to the Panel for design review.
Sydney Green Grid – Spatial Framework and Project Opportunities (Tyrrell Studio and Office of the Government Architect 2017)	The Sydney Green Grid is composed of a combination of four of the fundamental landscape layers [or grids] which underpin the geographic and urban structure of Sydney. They are: • The Hydrological Grid • The Ecological Grid • The Recreational Grid • The Agricultural Grid	Ensuring continuity of the future open space network has been a fundamental consideration during the design process that facilitates a continuous north-south vehicular and shared path connection and enables future public open space connections. The drainage design has been prepared to minimise impacts on Anzac Creek and the Georges River catchment. The Boot Lands biobanking site delivered as part of the broader MLP preserves ecological values in the precinct.
Greener Places – Establishing an Urban Green Infrastructure policy for New South Wales (draft for discussion), (Government Architect NSW, 2017)	Integration: combine green infrastructure with urban development and grey infrastructure.	The Project integrates the conservation outcomes of the Boot Lands biobanking site with the functional requirements of providing access to MLP and retaining north-south movement between Glenfield and Moorebank.
	Connectivity: create an interconnected network of open space.	The Project facilitates continued access to and from the open space network of Moorebank (Ernie Smith Reserve, Anzac Creek shared path) and Glenfield (Blinman Oval, Trobriand Reserve, Childs Reserve and Lalor Park).
	Multifunctionality: deliver multiple ecosystem services simultaneously.	The Boot Lands, which have been provided as part of the MLP development, is a biodiverse biobanking reservation which provides complex and multiple ecosystem services simultaneously (refer to Section 7.2)
	Participation: involve stakeholders in development and implementation.	Relevant stakeholders and the community have been involved in project definition, design development and the preparation of the EIS. Stakeholders and the community will continue to be consulted during the delivery of the Project (refer to Chapter 6).
Destination Management Plan (Liverpool City Council, 2018)	Promote Liverpool as a core visitor destination through increased engagement and support from locals.	Moorebank Avenue Realignment facilitates access to local visitors travelling via Moorebank and Glenfield.
	Support local businesses, groups and organisations to build and develop the visitor economy and their tourism products.	Where practicable, construction materials and supplies would be sourced from local suppliers.

Table 5.8 Consideration of relevant urban design guidelines

Guideline	Objectives	Design response
	Celebrate Liverpool's diversity and utilise it to grow and strengthen the visitor market base.	The Project would maintain acceptable levels of connection between Glenfield, Casula, Macquarie fields and Moorebank, Liverpool and Greater Sydney, strengthening visitation to and within Liverpool.
	Attract new businesses, events and investment to engage locals and increase visitation to Liverpool.	The construction and operation and of the Project would facilitate considerable investment in MLP and the local economy.

5.3.15 Detailed design

This EIS seeks approval for elements of the Project described in this chapter. The EIS has been prepared based on a concept design. When approved, a further detailed design process would follow which may include variations to the concept design. This approach is consistent with the approach taken in other environmental assessments of major infrastructure projects. The detailed design process may seek to further minimise impacts and optimise traffic efficiency. In doing so it is likely to necessitate adjustments to a number of project elements but would not affect the key project elements described.

5.4 Construction

This section describes how the Project would be constructed, including the work methodology, construction equipment and workforce, source and quantities of materials, construction traffic, utility adjustments, and duration and timing of construction activities.

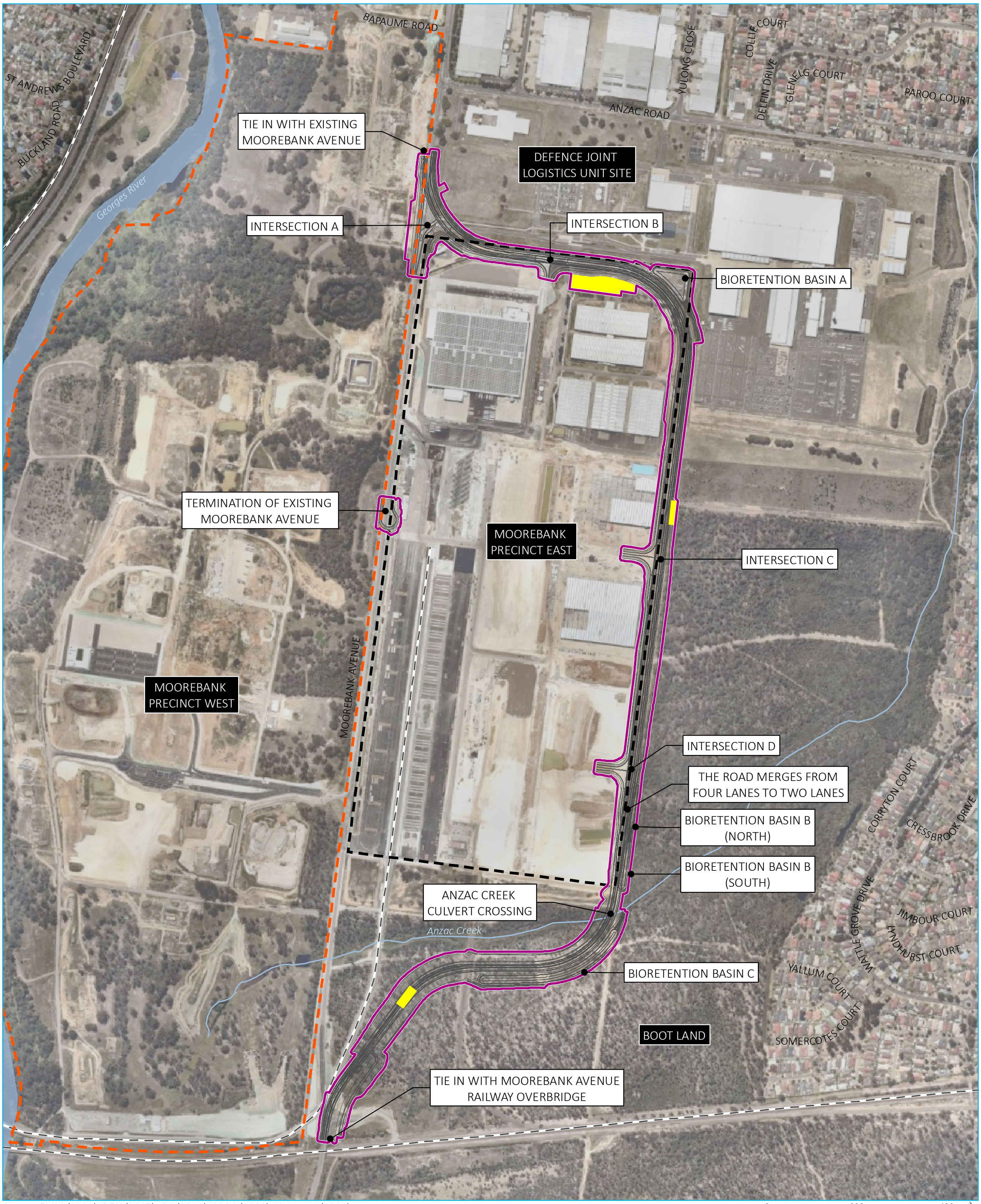
5.4.1 Construction footprint

The construction footprint is the area required to construct the Project. The construction footprint is generally broader than the operational footprint, and includes those areas required for:

- roadworks;
- access for construction vehicles and plant;
- drainage infrastructure;
- temporary sediment basins;
- utilities and service adjustments;
- temporary stockpile and laydown areas; and
- property adjustments.

The construction footprint was established to minimise environmental impacts while providing sufficient room to allow the Project to be constructed in a safe manner. The total construction footprint is approximately 18.96 ha and is shown in Figure 5.18.

The construction footprint is subject to refinement during detailed design and construction.



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

0 200 400 m

GDA 1994 MGA Zone 56

N

KEY

Construction footprint

Moorebank Precinct East

Moorebank Precinct West

Construction compound

Road design

Rail line

Watercourse

Construction footprint for the Project

Moorebank Avenue realignment
Environmental impact assessment
Figure 5.18

EMM
creating opportunities

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5.4.2 Construction phasing

The construction period for the Project is anticipated to be approximately 16 months. Construction would be undertaken in phases to enable site-related traffic to be moved off Moorebank Avenue at an early stage, to separate construction and operation traffic, and to avoid congestion and queuing along Moorebank Avenue while construction works continue and MPE operations commence.

The indicative construction sequencing and phase duration is outlined in Table 5.9. It should be noted that certain phases would overlap by up to 3 months each.

Table 5.9 Indicative construction sequence and duration

Phase	Construction phase	Approximate duration
Phase 1 – Enabling works	Preliminary enabling works.	3.5 months
Phase 2 – Construction of new road section	Demolition/vegetation grubbing	2 months
	Earthworks	6.5 months
	Pavement construction	6 months
Phase 3 – Finishing works	Finishing works	2.5 - 3 months
Total		**16 months**

The Project would be constructed using conventional methods used on most brownfield road infrastructure projects and would be guided by the Construction Environmental Management Plan (CEMP) to effectively manage site environmental impacts. The construction methodology may be refined during the detailed design and construction planning and/or in response to submissions received during the exhibition of this EIS to minimise environmental impacts.

An overview of the construction activities associated with each construction phase are summarised in Table 5.10.

Table 5.10 Overview of construction activities by phase

Phase	Activities
Phase 1 – Enabling works	• Establish temporary construction compound and site utilities; • establish temporary fencing and exclusion zones and demarcation of work site; • traffic management measures such as safety barriers; • temporary environmental safeguards such as erosion, sediment, and water quality controls; • site investigation; • property adjustment works; and • adjustment and relocation of utilities.

Table 5.10 Overview of construction activities by phase

Phase	Activities
Phase 2 – Construction of new road section	• Establish temporary accesses to work site from Moorebank Avenue and MPE Site; • maintain function of existing Moorebank Avenue alignment; • vegetation clearing and grubbing; • demolition of hardstand and pavement; • strip, stockpile, and manage topsoil where required; • bulk earthworks including excavation and stockpiling of controlled fill (either imported or won on site) for pavement construction; • formation of embankments; • construct noise mitigation and retaining walls; • install drainage (bioretention basins, pipes and pits, culverts, and related drainage infrastructure); • placement of select material; • install pavement drainage and subsoil drainage; • construct road pavement including the compaction of select fill, sub-base, and wearing surface; • construct kerb, gutters, and median; • formation of intersections; • pavement of road surface; • construction of shared user paths; and • tie-ins to existing Moorebank Avenue.
Phase 3 – Finishing works	• Install bus stops and signs; • installation of traffic signals at intersections; • road furniture, signs, and line-marking; • rehabilitation of topsoil, revegetation, and landscaping; • commission realigned Moorebank Avenue road section and decommissioning of existing Moorebank Avenue; and • site clean-up and decommissioning of temporary construction compounds.

5.4.3 Work compounds

A temporary construction compound would be established at the northern boundary of the MPE. The compound would be approximately 1.5 ha in size and include temporary offices, workforce facilities (such as parking, storage containers, crib rooms, and ablution sheds), and storage areas for plant, construction materials and spoil.

Transient construction compounds and laydown areas (for the stockpiling of equipment and materials) would also be created within the construction footprint as construction of the Project progresses.

The indicative location for these construction compounds is shown in Figure 5.18. Alternative locations, or minor variations on these identified locations may be confirmed following detailed design and final engagement of construction contractors.

5.4.4 Earthworks

Earthworks would be required along the entire length of the Project and would include:

- topsoil stripping;
- areas of new cut and fill along the proposed realignment route;
- construction of retaining walls;
- vegetation clearing;
- dredging or reclamation at Anzac Creek to facilitate a culvert;
- trenching for utility relocation; and
- installation of road drainage infrastructure.

Excavated material may be reused on site for filling and compaction (including benching areas of the site where required). Where excavated material is determined not to be appropriate for re-use on site, it may be necessary to import additional material to site to make up any identified deficit.

An indicative cut fill balance for the site has been prepared based on the concept design. Table 5.11 summarises the indicative types of volume of materials that would be generated by construction activities and provides a recommended management approach for each material.

Table 5.11 Indicative material types and quantities during construction

Type of material	Approximate quantity	Management approach
Total fill material required (compacted fill)	105,000 m^3	Where possible, source on site from cuts required for the Project. Alternatively, use imported material, to be sourced locally where practical.
Total cut material to be excavated	25,000 m^3	Excavated materials suitable for reuse to be used for filling and compaction (including benching of the site where required). Surplus material or material that cannot be used on site to be appropriately classified prior to removal off site for external re-use or disposal. Where material is not suitable for use it will be replaced with material sourced from off-site.
Total fill deficit to be imported	80,000 m^3	Import material. Where practical, locally sourced.
Selected material zone	30,400 t	Import material, locally sourced where practical.
Pavement:		
• Concrete subbase	11,800 m^3	Import material, locally sourced where practical.
• Asphaltic concrete	21,700 t	Import material, locally sourced where practical.

The indicative calculations identify an initial fill deficit of 80,000 m^3. These figures are subject to adjustment pending detailed design and confirmation of suitability for material use as construction materials on site. It is further noted that the approximate quantity of fill could vary by up to 10% as a result of bulking factors for unconsolidated non-homogenous fill.

5.4.5 Demolition

The Project would require demolition and removal of existing pavement and infrastructure located within the construction footprint. This would include sections of pavement in the north-east corner of the MPE Site and associated works to accommodate the alignment.

Demolition works would generate approximately 1,930 m^3 of pavement materials (asphalt and concrete) and would be taken to an appropriate facility for recycling or reuse as appropriate.

5.4.6 Waste

All waste generated during construction would be reused where appropriate, reasonable and feasible as determined by the construction contractor, or removed, transported and disposed from the site in accordance with the NSW Waste Classification Guidelines (EPA 2014), *Protection of the Environment Operations Act* 1997 (POEO Act) and the Protection of the Environment Operations (Waste) Regulation 2005.

5.4.7 Construction water quality

During construction, extensions to the existing culverts at the legal discharge location are required.

A Soil and Water Management Plan (SWMP) and an Erosion and Sediment Control Plan (ESCP), or equivalent, would be prepared to manage construction water quality. Measures and controls would need to be installed to protect downstream waterways from erosion and sedimentation. These measures include:

- clean water diversions at upslope areas to minimise the volume of construction waters flowing onto the construction footprint, requiring management;
- controls for managing erosion, sedimentation and dust (eg containment bunds, silt traps, sediment basin and fences, turbidity barriers);
- impervious and bunded areas for onsite maintenance and refuelling of construction plant, and storage of hazardous substances;
- scour protection measures to slow velocity and force of flowing surface water; and
- erosion and sediment controls.

These measures would be designed in accordance with RTA's *Technical Guideline – Environmental Management of Construction Site Dewatering* EMS-TG-011 and TfNSW's *QA Specification G38 Soil and Water Management.* Management and mitigation measures to minimise impact to water quality during construction are described in detail in Chapter 7 and the Water Assessment (WA) (Appendix G).

5.4.8 Construction workforce

The core construction workforce would comprise supervisors, tradesmen, labourers, and plant operators. The size and composition of the construction workforce would vary over the duration of the construction period depending on the activities undertaken and the phasing of construction.

The estimated total workforce (that is, not the number on-site at any one time) to be employed over the construction period would be an average of 83 personnel (comprising 72 construction personnel and 11 contractor site staff). At peak construction, up to 122 personnel (comprising 109 construction workers and 13 contractor site staff) would be engaged. These estimates exclude part-time, offsite workers and delivery truck drivers.

5.4.9 Construction hours

Where reasonable and feasible, construction would be carried out consistent with the approved construction hours for the surrounding precinct works and presented in Table 5.12. Most of the nosiest activities would be carried out during standard construction hours.

Table 5.12 Standard working hours

Day	Start time	Finish time
Monday to Friday	7:00 am	6:00 pm
Saturday	7:00 am	1:00 pm
Sundays and Public Holidays	No work	

The Interim Construction Noise Guidelines (DECC, 2009a) identify 'public infrastructure works' as a category of works that may need to be carried out outside the recommended standard hours. Due to technical considerations of the Project and to minimise disruption to the public, it is proposed to undertake certain activities outside of the standard construction hours. These activities would be undertaken in accordance with the *Interim Construction Noise Guidelines* (ICNG) (DECC, 2009) and may include a requirement for consultation with LCC and the EPA.

Activities that generate noise less than 5 dB above the rating background level (RBL) at any residence in or less than the noise management levels (NMLs) specified in Table 3 of the ICNG at any other sensitive land uses would be undertaken in accordance with the CEMP.

Those activities that generate noise more than 5 dB above the RBL at any residence or more than the NML specified in Table 3 of the ICNG at any other sensitive land uses would be undertaken in accordance with an Out of Hours Works Protocol (which will form a part of the CEMP) and in consultation with LCC and the EPA.

Activities that may be required to be undertaken out of construction hours could include, but not be limited to:

- the delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads;
- emergency work to avoid the loss of life or damage to property, or to prevent environmental harm;
- road tie-in work (ie the tie-ins of the Project with the existing Moorebank Avenue to maintain the safety of the travelling public);
- traffic management to reduce inconvenience to road users, avoid traffic delays during daytime or peak traffic periods and to provide safety for construction workers working on the existing highway;
- refuelling operations to ensure plant and machinery operations during the standard construction hours;
- compound operations supporting activities which may be undertaken out of construction hours, including start-up processes and procedures;
- utility relocations to avoid and minimise disruptions for utility customers, particularly the Department of Defence (DoD);
- work as agreed between SIMTA and potentially affected sensitive receivers;
- work as agreed by the Environment Protection Authority (EPA);

- import of clean fill; and
- asphalt and concrete deliveries (to allow the timely delivery of a limited life-span material required to meet TfNSW specifications for paving (QA roadworks specification R81-R93 and R101-R126)).

Access to the site by the construction workforce would generally start one hour before the construction hours to allow for plant and equipment pre-starts and toolbox talks.

5.4.10 Plant and equipment

The typical plant and equipment fleets required for construction works of this nature are summarised in Table 5.13.

Table 5.13 Indicative plant and equipment list

Plant/equipment	Number	Type/size
Phase 1 – Enabling works		
Backhoe	1	Case/CAT/JCB 4WD side shift
Crane	1	50 t
Excavator	1	20 t
Truck	1	10 t
Light vehicles - Fencing subcontractor	4	-
Light vehicles - Utility trades	10	-
Phase 2 - Construction of new road section		
AC placing paver and support	1	-
Backhoe	1	Case/CAT/JCB 4WD side shift
Bulldozer	2	CAT D10
Concrete agitator trucks	Fleet of 6	5.6 m^3 capacity
Concrete pump	1	Truck mounted with boom
Excavator	3	20 t
Hiab truck for deliveries	1	3 t Hiab hoist mounted on rigid truck
Piling rig	1	Truck mounted auger piling rig
Rigid body truck	Fleet of 6	20 t
Rollers/compactors	3	Smooth drum vibrating and padfoot types
Scraper	1	CAT 631 or equivalent
Slipform paver	1	2 lane paver
Traffic management equipment	3 sets	Barriers, signs, VMS
Trench shoring equipment	3 sets	Up to 3 m high
Truck and dog trailer	Fleet of 20	32 t, tri axle truck, dual axle dog trailer
Water cart	2	Truck mounted 5,000 litre tank
Light vehicles	20	

Table 5.13 Indicative plant and equipment list

Plant/equipment	Number	Type/size
Phase 3 – Finishing works		
Backhoe	2	Case/CAT/JCB 4wd side shift
Mobile crane	1	50 t
Truck	2	10 t
Truck mounted HIAB crane	1	3 t Hiab hoist mounted on rigid truck
Light vehicles	12	

5.4.11 Construction traffic

The predicted average and peak daily light and heavy one-way vehicle movements during the construction of the Project are outlined in Table 5.14 and Table 5.15, respectively.

Table 5.14 Average vehicle movements per day

Vehicle type	Average movements per day		
	Phase 1	Phase 2	Phase 3
Light vehicles (cars, utes)	120	246	160
Rigid truck and dog	-	98	2
Concrete agitator	-	28	-
Rigid body truck	6	8	2
Asphalt delivery trucks	-	10	-

Table 5.15 Maximum vehicle movements per day

Vehicle type	Maximum movements per day		
	Phase 1	Phase 2	Phase 3
Light vehicles (cars, utes)	240	500	320
Rigid truck and dog	-	-	2
Concrete agitator	-	210	-
Rigid body truck	10	50	4
Asphalt delivery trucks	-	150	-

The majority of traffic movements would be undertaken during the day. However, a portion of the traffic movement (particularly associated with the delivery of clean fill and construction materials) would be undertaken outside morning and afternoon peak periods.

The timing for construction of the Project would coincide with the construction of warehousing and distribution facilities at MPE (MPE Stage 2 SSD 7628) and MPW. To manage environmental and amenity impacts arising from the Project, construction would be undertaken in a manner that is not inconsistent with the Construction Traffic and Access Management Plan (CTAMP) and Operational Traffic and Access Management Plan (OTAMP) for the MPE and MPW development.

5.4.12 Construction access

Access to the Project site during construction would be initially from the north at the existing DJLU site access and the MPE site. Use of the DJLU access as a construction access will be subject to consent and arrangements with DoD. As the Project progresses, access to the Project would be via the new road section and southern extremity (near East Hills Railway Corridor).

5.5 Existing Moorebank Avenue works

After opening of the Project to public thoroughfare, the existing alignment would be converted into a dedicated access to the MLP. A cul-de-sac would be established along the existing alignment to truncate the road and to allow for MLP-related vehicles to turn around. The proposed works in the existing Moorebank Avenue are identified in Figure 5.19.

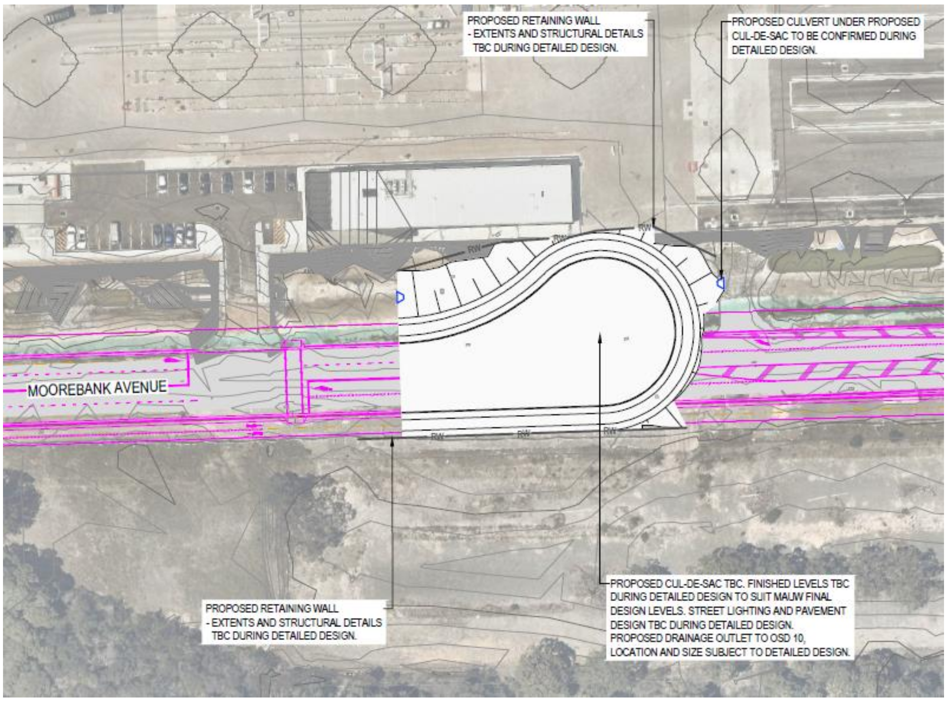


Figure 5.19 Proposed works in the existing Moorebank Avenue

During construction, access would be retained to the TAHE land adjacent to the East Hail railway corridor.

5.6 Sustainability in construction

This chapter and the EIS in general, identifies impacts from the construction and identify mitigation measures to improve the sustainability of the Project. Sustainability initiatives during construction would include:

- striving to achieve as close to a balanced earthworks as possible, in an effort to minimise fill importation;
- using recycled materials and sources such as crushed pavement for select fill, fly ash as an additive to concrete production, and reclaimed water, where possible;
- using green energy for ancillary facilities and measures to minimise greenhouse gas emissions;
- identifying opportunities to minimise waste generation during construction;
- minimising construction impacts on terrestrial and aquatic habitats. This would be achieved by minimising the removal of trees and minimising the area of disturbance around riparian habitat and waterways; and
- management and mitigation measures as summarised in Chapter 8 of this EIS.

The principles of Ecologically Sustainable Development (ESD) have been considered throughout the Project design development and would continue through construction and operation. Consideration of ESD is addressed in Chapter 7.

6 Consultation

6.1 Introduction

This chapter presents an overview of the community and stakeholder activities carried out to inform the design phase and during the preparation of this EIS. It outlines the approach for future consultation activities to be carried out for the Project. This chapter also presents a summary of issues raised by the community and stakeholders and where they are addressed in this EIS.

6.2 Consultation process

The consultation and engagement activities carried out for the Project have occurred in five main phases, as shown in Figure 6.1 and described below:

- Concept development – the strategic need for the Project arose through the MPW project. Consent could not be granted to the MPW Stage 2 development application (SSD 7709) until the Planning Secretary certified in writing to the consent authority that satisfactory arrangements had been made to contribute to the provision of relevant State public infrastructure in relation to that land. This required SIMTA to enter into a voluntary planning agreement with RMS (now TfNSW). SIMTA can satisfy part of its obligations under the Planning Agreement if it carries out the realignment of Moorebank Avenue. As part of this process, SIMTA liaised with TfNSW and other key stakeholders.

- Scoping phase – late-2019 to mid-2020, included

  - the submission of a scoping report and SSI application to the NSW DPIE in May 2020;

  - the submission of an EPBC referral to DAWE in November 2020;

  - the carrying out of the various technical specialist studies, including a Social Impact Assessment which included a letter box notification of surrounding residents and an online survey; and

  - the preparation of the EIS for public exhibition.

- Consultation to be carried out during the public exhibition of the EIS (November 2020) – This includes the display of the EIS and the preparation of a submissions report.

- Future planned consultation activities to be carried out after preparation of the submissions report. This would include consultation activities to be carried out before construction.

- Future planned consultation activities to be carried out during construction.

As noted in Section 1.4.2 the Project is a requirement of the Planning Agreement between Qube and RMS (now TfNSW) and accordingly, there is limited opportunity for substantial changes to the scope and design of the project in response to stakeholder feedback. Where feasible, feedback concerning a particular aspect of the design or proposed mitigation measure has been considered in the design of the Project. As an example, the DoD provided feedback that noise mitigation would be required where the Project interfaces with the DJLU site. As a result of this feedback, noise mitigation now forms a part of the Project at this location.

6.2.1 Consultation objectives

The main objectives of consultation activities are to provide regular and targeted information to community and stakeholders about the progression of development approval, construction works and the likely impacts and benefits of the Project. Ongoing consultation activities are designed to ensure community and stakeholder views are captured and incorporated into the Project as it develops.

6.3 Consultation requirements

6.3.1 COVID-19 response

To respond to the public health risk of COVID-19 and its possible consequences, the NSW Minister for Health and Medical Research has made a number of Orders under section 7 of the *Public Health Act 2010.* These orders have included restrictions on public gatherings and movement.

To comply with these Orders, the consultation strategy for the Project has sought to minimise public gatherings and sought stakeholder and community involvement through online tools.

6.3.2 Stakeholder identification

Key stakeholders were identified as those parties that may have an interest in or have the potential to be affected by the Project as well as those identified in the SEARs. The key stakeholders engaged for the Project include:

- landowners including the Commonwealth Department of Defence and Transport Asset Holding Entity of New South Wales (TAHE);
- nearby residents and businesses potentially directly or indirectly affected by the Project;
- government stakeholders including:
  - Commonwealth Department of Agriculture, Water and the Environment (DAWE);
  - NSW Government agencies:
    - DPIE (Fisheries);
    - DPIE (Water);
    - DPIE (Environment, Energy and Science);
    - Heritage NSW;
    - NSW Environment Protection Authority; and
    - Transport for NSW.
  - Liverpool City Council;
  - local councillors;
  - State and Federal members of parliament (MPs);

- utility and service providers;
- local Aboriginal Land Councils; and
- Cubbitch Barta Native Title Claimants Aboriginal Corporation.

A number of engagement channels were established for the MLP to seek input from stakeholders and communities and facilitate ongoing community and stakeholder engagement. These include:

- A project email address to receive feedback from the community and provide updates to subscribers – simta@elton.com.au;
- A toll-free project phone number for feedback, enquiries and complaints – 1800 986 465;
- A postal address to receive written feedback (PO Box 1488 Bondi Junction NSW 2022); and
- A project website (https://simta.com.au/) that provides background information on the project, along with maps, project updates and announcements, and information on how to provide feedback on the project.

The Project consultation process is presented visually in Figure 6.1.

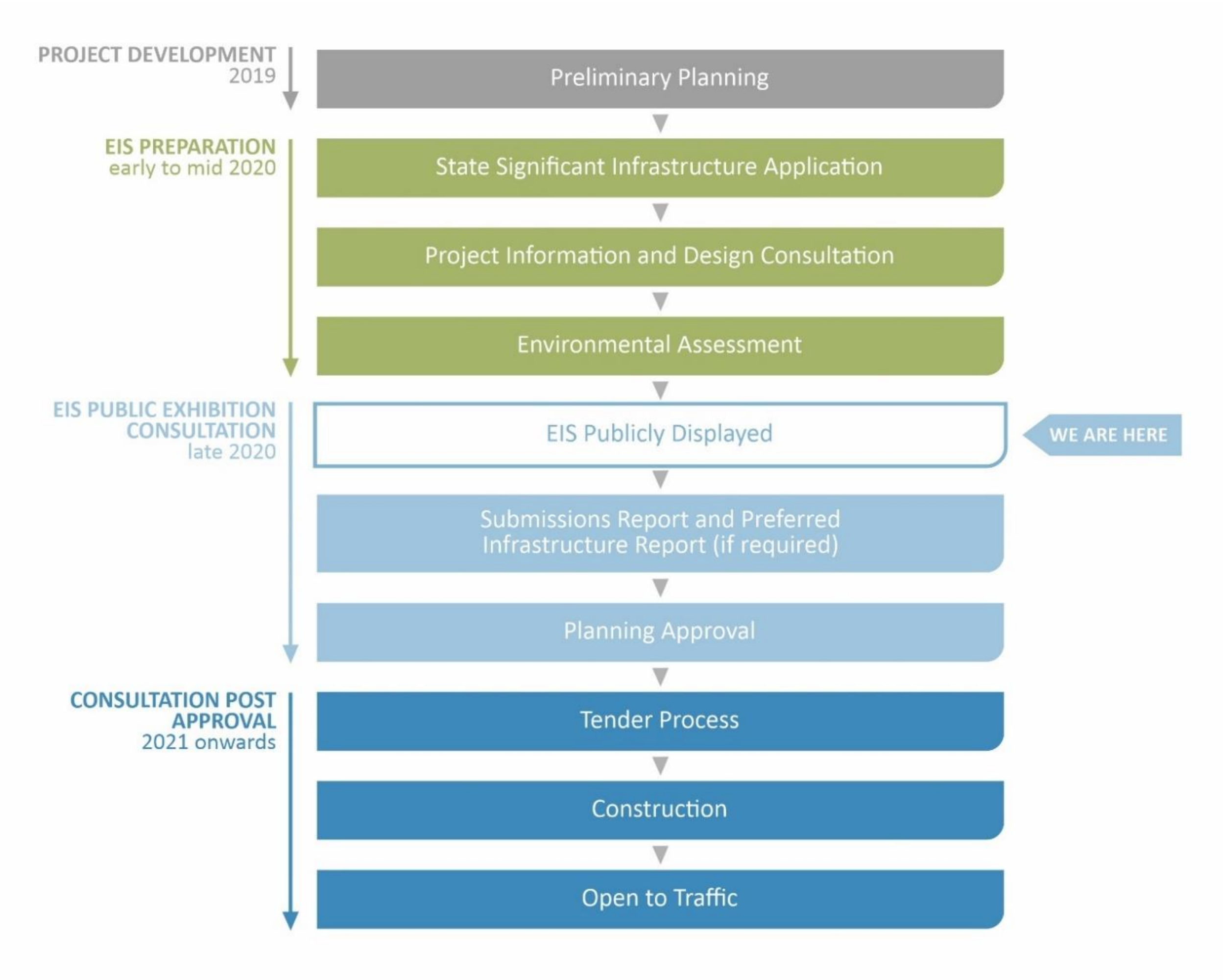


Figure 6.1 Project consultation process

6.4 Feedback received before public exhibition of the EIS

Feedback provided by government agencies, Councils, key stakeholders and the wider community was recorded and considered during the preparation of the EIS. A summary of feedback received from relevant stakeholders and community members is presented in Table 6.1.

Table 6.1 Responses to feedback received before public exhibition of the EIS

Stakeholder	Feedback	Outcome	Where addressed in this EIS
Transport for NSW (TfNSW)	On 24 February 2020, SIMTA met with TfNSW to discuss the progress of the design development and the engagement of EMM Consulting for the preparation of the EIS for the Project. In May 2020, SIMTA met with TfNSW to discuss the Arcadis Concept Design. On 15 December 2020, TfNSW undertook a high level review of the draft EIS and provided further comments for consideration. DPIE incorporated some of these comments into its consistency review. On 2 February 2021, a further meeting was held with TfNSW to address comments raised regarding the draft EIS and information requirements.	SIMTA will provide additional information to TfNSW to address its comments. Consultation with TfNSW regarding detailed design matters will be undertaken concurrent to the environmental impact assessment process.	Section 5.3 Section 7.4
Commonwealth Department of Defence (DoD)	On 14 September 2020 and 4 October 2020 wrote to the DoD providing additional assessment requirements and design considerations for the Project. SIMTA would address these requirements in the EIS and as part of design development. On 14 October 2020, pursuant to clause 193(4)(b)(i) of the *Environmental Planning and Assessment Regulation 2000,* SIMTA notified the Department of Defence (as a landowner) of its intention to lodge an EIS for the Project. This notification does not necessitate the DoD's approval or endorsement.	SIMTA to continue to liaise with the DoD during detailed design, project construction, and in operation of the new road section. The objectives of this consultation will be to refine scale, nature and extent of any further construction and operational impacts to the DJLU and DoD operations including proposed mitigation. The consultation would affirm mechanisms to maintain vehicular access to DJLU through construction and commissioning of the new road section.	Section 5.3 Section 5.2.3

Table 6.1 Responses to feedback received before public exhibition of the EIS

Stakeholder	Feedback	Outcome	Where addressed in this EIS
Transport Asset Holding Entity of New South Wales (TAHE)	On 14 October 2020, pursuant to clause 193(4)(b)(i) of the *Environmental Planning and Assessment Regulation 2000,* SIMTA notified TAHE (as a landowner) of its intention to lodge an EIS for the Project. On 3 December 2020, SIMTA made a presentation to the Configuration Change Board (CCB) to explain the scope of the Project and the impacts to Sydney Train assets near the East Hills Railway bridge. This notification does not necessitate the TAHE's approval or endorsement.	CCB raised that its primary concern was the relocation of the existing asset. CCB accepted the concept design with conditions, including that: • ground height alterations and access route changes must not restrict maintenance of assets or impact compliance (to be further considered during detailed design); • access be maintained during and post construction 24 hours per day 7 days per week; • access to the Sydney Trains 733 high-voltage feeder and poles and the proposed embankment must not affect existing transmission line heights; and • SIMTA to provide advice as to how close to boundary fence and fibre route the Project will encroach. This information will be made available during detailed design.	Section 5.2.3
Department of Infrastructure, Transport, Regional Development and Communications (DITRDC)	On 14 October 2020, pursuant to clause 193(4)(b)(i) of the *Environmental Planning and Assessment Regulation 2000,* SIMTA notified the Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) (as a landowner) of its intention to lodge an EIS for the Project.	SIMTA to continue to liaise with the DITRDC during detailed design and during project construction.	Section 5.2.3
Commonwealth Department of Agriculture, Water and the Environment (DAWE)	SIMTA met online with DAWE on 7 October 2020 to summarise the key aspects of the proposal, and the key outcomes of the assessment of impacts on MNES and Commonwealth land associated with the proposal. A referral (Referral Number 2020/8839) was made to the DAWE online portal on 11 November 2020.	On 8 February, the Project was determined to be a controlled action and will be assessed under the bilateral agreement with NSW (Appendix A). On 16 February 2021, DAWE provided project assessment notes to DPIE.	Section 7.2
Heritage NSW	On 14 August 2020 SIMTA wrote to DPIE seeking its consideration of a proposal to vary Requirement 8 of the SEARs relating to Aboriginal Cultural Heritage Assessment Requirements. Heritage NSW declined to amend the SEARs. On 14 December, Heritage NSW provided high level comment on the adequacy of the draft EIS and the PAHA. Heritage NSW reinforced the need for an ACHAR to be prepared.	SIMTA is presently commissioning the preparation of an ACHAR in accordance with the SEARs. In agreement with DPIE, the ACHAR will be submitted in SIMTA's response to submissions.	Section 7.8 Section 7.9

Table 6.1 Responses to feedback received before public exhibition of the EIS

Stakeholder	Feedback	Outcome	Where addressed in this EIS
Liverpool City Council (LCC)	On 2 November 2020 SIMTA provided a copy of the Costin Roe Consulting Overland Flow report prepared for the Project in accordance with Requirement 7 of the SEARs. On 16 December 2020, LCC provided high level comment on the draft EIS. DPIE incorporated some of these comments into its consistency review.	SIMTA will provide additional information to LCC to address its comments. This information, including design details and plans will be made separately to LCC when made available.	Section 7.7
State Emergency Services (SES)	On 2 November 2020 SIMTA provided a copy of the Costin Roe Consulting Overland Flow report prepared for the Project in accordance with Requirement 7 of the SEARs.	SIMTA to continue to liaise with SES during detailed design and during project construction.	Section 7.7

6.5 Consultation during public exhibition of the EIS

6.5.1 Display of the EIS

DPIE will place this EIS on public exhibition for a minimum of 28 days in accordance with the EP&A Regulation. During the exhibition period, government agencies, project stakeholders and community members will be able to review the EIS and provide feedback via a written submission to DPIE for consideration in its assessment of the Project.

Advertisements will be placed in newspapers to advise the community of the public exhibition and other relevant information. This will include details of planned consultation activities. The EIS would be available for viewing and download from the DPIE website.

6.5.2 Supporting EIS display

Activities planned to support the display of the EIS include:

- project updates via community update letterbox drop;
- local newspaper notices and advertisements to promote the exhibition of the EIS and community information sessions;
- roadside signage (variable message signs);
- media releases;
- email and/or SMS to contacts on the established SIMTA distribution list;
- website updates – visit https://simta.com.au/;
- a project email address (simta@elton.com.au) and phone number (1800 986 465) to manage enquiries and provide information on the EIS; and

- a postal address to receive written feedback (PO Box 1488 Bondi Junction NSW 2022).

6.5.3 Preparation of the submissions report

During the public exhibition period, community members, government agencies and other interested parties may send written submissions regarding the Project to DPIE.

At the end of the public exhibition period, SIMTA will review any submissions received and prepare a submissions report. This report would respond to the issues raised and outline any proposed changes to the Project. This report will be made available to the public.

Refer to Chapter 2 for further information on the approvals process following EIS exhibition.

6.6 Ongoing stakeholder consultation

6.6.1 Approach to consultation during construction

SIMTA and its construction contractor(s) would be responsible for consultation with stakeholders and the community.

The community and stakeholder consultation carried out during construction would include project updates on planned construction activities and the construction program. Consultation would seek to minimise potential impacts where possible and respond to enquiries and concerns in a timely manner.

The key objectives of ongoing communications and consultation are to:

- keep the community informed about the Project including construction activities, program of works, and associated impacts;
- ensure there are opportunities for the community to provide feedback or to register complaints and impacts, and that the community is aware of these opportunities; and
- provide a process to resolve complaints and issues raised.

During detailed design, SIMTA will carry out the following:

- further consultation with government agencies, Councils and key stakeholders with relevant detailed design details and information previously requested as made available; and
- ongoing liaison with key stakeholders, including TfNSW to respond to additional stakeholder feedback.

During construction, a dedicated community relations team would carry out the following:

- provide updates to the Project webpage (https://simta.com.au/) on project news, community updates, community consultation reports, environmental assessment documents and construction management documents;
- notify residents, business owners and other stakeholders before any construction work is started in a new location;
- issue project updates to announce the start of construction and announce key construction milestones and community engagement activities;

- advertise in the local media to announce the start of construction and significant milestones; and major detours, traffic disruptions or controls;
- use Variable Messaging Signs (VMS) to communicate traffic changes to road users;
- maintain the Project email address (simta@elton.com.au) to provide an opportunity for the community and stakeholders to contact the SIMTA project team;
- maintain a 24-hour, toll-free Project information and complaints line, a dedicated email address and postal address; and
- prepare and implement a detailed Community Communication Strategy to detail the processes to facilitate communication and feedback between the project team and the community.

6.6.2 Complaints management procedure

During the development and delivery of the Project, a dedicated community relations team would handle and investigate complaints.

All contact relating to the Project, including suggestions and complaints, would be collected, documented and stored in the Consultation Manager database. This would include incoming and outgoing correspondence, phone and verbal contact, written submissions and any corresponding actions taken.

Regular reports summarising community issues and complaints would be used to help inform the delivery process. Consultation Manager would be used to record, track and respond to enquiries and would include the following details:

- method of communication;
- full name, address and contact details of enquirer;
- date and time of enquiry;
- nature of the enquiry;
- names of people involved throughout;
- action taken in response;
- details on whether a resolution was reached; and
- monitoring to confirm the complaint/issue was resolved.

Complaints would be acknowledged within one working day. When a complaint cannot be responded to immediately, a follow-up verbal response on what action is proposed would be provided to the complainant or enquirer within three working days. A written response to the person raising a complaint would also be provided within 10 working days.

Follow-up monitoring would be carried out to ensure any issues/complaints were resolved satisfactorily. The complaints management procedure outlined above would be in place for the duration of construction.

7 Impact assessment

This chapter provides a summary of the key environmental matters associated with the construction and operation of the Project. It recommends, where required, mitigation and monitoring measures to manage potential impacts.

Where relevant, technical reports have been prepared and appended to the EIS (refer to Appendices B to L).

A summary of mitigation and management measures is included in Chapter 8.

7.1 Risk analysis

7.1.1 Overview

Prior to lodging the SSI project application, SIMTA reviewed the outcomes of preliminary investigations and community and stakeholder consultation and identified those environmental issues of most importance for the Project through a preliminary environmental risk analysis.

The findings formed the basis of the Scoping Report (EMM 2020) and was intended to guide the Secretary in the preparation of the 'key issues' for the Project as outlined in the environmental assessment requirements. SIMTA also referred the Project to the Commonwealth DAWE under the EPBC Act. The referral provided an overview of the potential impacts of the Project.

The process of environmental risk analysis continued during preparation of the EIS. The emphasis was on using the detailed information gathered during the assessment process to review the environmental aspects of the Project. More specifically, the analysis:

- identified environmental issues, including key issues identified in the SEARs (refer to Appendix A);
- examined potential impacts (during both construction and operation) and proposed mitigation measures in relation to the identified issues; and
- identified the nature and extent of impacts likely to remain after mitigation measures are applied.

Based on this analysis, an environmental risk category was assigned to each potential impact to enable the identification of any matters that might be considered as additional key environmental impacts. The environmental risk categories are described in Table 7.1.

Table 7.1 Risk categories

Risk category	Description
Key issue	High or moderate impact (actual and perceived) requiring further investigation (specialist studies) to identify management and mitigation measures.
Other issue	Moderate or low impact that can be managed effectively with standard and best practice management and mitigation measures.

7.1.2 Summary

A summary of the environmental risk analysis is provided in Table 7.2.

Table 7.2 Environmental risk analysis summary

Issue	Potential risks	Proposed mitigation measures (refer to Table 8.1)	Risk category	EIS assessment reference
Biodiversity	Ongoing management	BIO01	Key issue	Section 7.2
	Location of road and associated work compounds	BIO02, BIO03, BIO04, BIO05, BIO06, BIO07		
	Removal of vegetation and threatened species habitat	BIO08, BIO09, BIO10, BIO11		
	Increase in weeds and pathogens	BIO12, BIO13, BIO14, BIO15, BIO16, BIO17		
	Increase in predatory and pest species.	BIO18, BIO19		
	Light, vibration and noise pollution	BIO20		
	Changes to runoff regimes and sedimentation	BIO21, BIO22, BIO23, BIO24, BIO25, BIO26		
	Fragmentation	BIO27, BIO28, BIO29		
Bushfire	Ongoing management	BUS01	Key issue	Section 7.3
	Bushfire risk to assets	BUS02, BUS03, BUS04, BUS05		
	Responder access	BUS06, BUS07, BUS08, BUS09, BUS10, BUS11, BUS12, BUS13, BUS014		
	Potential ignition sources	BUS15, BUS16, BUS17, BUS18, BUS19, BUS20, BUS21, BUS22, BUS23, BUS24, BUS25		
	Location and adequacy of services	BUS26, BUS27		
	Construction emergency management	BUS28, BUS29, BUS30, BUS31, BUS32, BUS33, BUS34, BUS35		
Traffic and transport	Ongoing management	TRA01	Key issue	Section 7.4
	Traffic control	TRA02, TRA03, TRA03		
	Licencing	TRA05		
	Road safety	TRA06		
Noise and vibration	Ongoing management	NVI01	Key issue	Section 7.5
	Work practices	NVI02, NVI02, NVI04, NVI05, NVI06, NVI07		
	Plant and equipment	NVI08, NVI09, NVI10		

Table 7.2 Environmental risk analysis summary

Issue	Potential risks	Proposed mitigation measures (refer to Table 8.1)	Risk category	EIS assessment reference
Contamination	Ongoing management	CON01	Key issue	Section 7.6
	Stockpiled materials	CON02		
	Exploded ordnance	CON03		
	Soil and sediments	CON04		
	Unexpected finds	CON05		
	Acid sulfate soils	CON06		
Water	Ongoing management	WAR01	Key issue	Section 7.7
	Construction water impact	WAR02, WAR03, WAR04		
	Operational water impacts	WAR05, WAR06, WAR07, WAR08, WAR09, WAR10		
	Flooding	WAR11		
Historic heritage	Ongoing management	HIH01	Key issue	Section 7.8
	Unexpected finds	HIH02		
	Human remains	HIH03		
	Viewshed from Glenfield Farm	HIH04		
Aboriginal heritage	Ongoing management	ABH01	Key issue	Section 7.9
	Consultation with Aboriginal stakeholders	ABH03, ABH04		
	Cultural landscape	ABH02		
	AHIMS site recording	ABH05		
	Staff and contractor briefing	ABH06		
Air quality	Ongoing management	AIR01	Key issue	Section 7.10
	Complaint management	AIR02, AIR03		
	Incident recording	AIR04		
	Dust management	AIR05, AIR07, AIR08, AIR09, AIR10, AIR11, AIR12, AIR13, AIR14, AIR15, AIR16, AIR17, AIR18, AIR20		
	Site inspections	AIR06, AIR21, AIR23		
	Equipment maintenance	AIR09		
	Vehicle emissions	AIR19		
	Site monitoring	AIR22		
	Operational emissions	AIR24		

Table 7.2 Environmental risk analysis summary

Issue	Potential risks	Proposed mitigation measures (refer to Table 8.1)	Risk category	EIS assessment reference
Social	Ongoing management	SOC01	Key issue	Section 7.11
	Employment	SOC02		
	Physical and mental health	SOC03		
	Procurement	SOC04		
Visual	Project design	VIS01	Key issue	Section 7.12
	Structures	VIS02, VIS03, VIS04		
	Drainage	VIS05		
	Lighting	VIS06		
	Landscape	VIS07, VIS08, VIS09		
Waste and resource management	Inappropriate handling and/or disposal of waste	WAS01, WAS02	Other issue	Section 7.13
	Unexpected waste volumes and types during construction	WAS03		
Economic	Local economic and employment generation benefits	–	Other issue	Section 7.14
Sustainability	Resource preservation	SUS01, SUS02	Other issue	Section 7.15
	Greenhouse gas emissions	SUS03, SUS04		
Cumulative	Coordination with other major projects	CUM01	Other issue	Section 7.16

7.2 Biodiversity

7.2.1 Overview

A Biodiversity Development Assessment Report (BDAR) (Appendix B) was prepared in accordance with the following legislation and policy:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- NSW *Environmental Planning and Assessment Act 1979* (EP&A Act);
- NSW *Biodiversity Conservation Act 2016* (BC Act);
- NSW *Fisheries Management Act 1994* (FM Act);
- NSW *Biosecurity Act 2015* (BS Act); and
- the *Biodiversity Assessment Method* (BAM) (NSW OEH 2017).

The BDAR documents the terrestrial biodiversity assessment methods and results, the initiatives built into the Project design to avoid and minimise impacts to terrestrial biodiversity, and the mitigation and management measures, including offset requirements, proposed to address any unavoidable residual impacts.

Table 7.3 outlines the SEARs that relate to biodiversity and identifies where they are addressed in this EIS.

Table 7.3 SEARs for the Project - Biodiversity

Requirement	Where addressed in this EIS
1. Biodiversity	
1. Biodiversity impacts in accordance with section 7.9 of the Biodiversity Conservation Act 2016 (BC Act), the Biodiversity Assessment Method (BAM), and be documented in a Biodiversity Development Assessment Report (BDAR).	Biodiversity impacts are assessed within Section 7.2.3 of this EIS and Chapter 7 of the BDAR (Appendix B).
2. The BDAR must include information in the form detailed in section 6.12 of the BC Act, clause 6.8 of the Biodiversity Conservation Regulation 2017 and the BAM.	The BDAR includes all relevant information in the form detailed in the BC Act, the Biodiversity Conservation Regulation 2017 and the BAM.
3. The BDAR must be submitted with all digital spatial data associated with the survey and assessment as per Appendix 10 of the BAM.	This EIS and BDAR has been submitted with all digital spatial data associated with surveys as per Appendix 10 of the BAM.
4. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under section 6.10 of the BC Act.	The BDAR (Appendix B) has been prepared by Steven Williams and Steven Ward who are accredited in accordance with the Accreditation Scheme for the Application of the BAM Order 2017 under section 6.10 of the BC Act.
5. The BDAR must include details of the measures proposed to address offset obligations.	Measures proposed to address offset obligations are described in Section 7.4 of the BDAR (Appendix B).
6. Impacts on biodiversity values not covered by the BAM. This includes a threatened aquatic species assessment (Part 7A *Fisheries Management Act 1994* (FM Act) to address whether there are likely to be any significant impact on listed threatened species, populations or ecological communities listed under the FM Act.	Section 3.2.4 of the BDAR and Appendix G of the BDAR (Appendix B).
7. Identify whether the project, or any component of the project, would be classified as a Key Threatening Process (KTP) in accordance with the listings in the BC Act, FM Act and the EPBC Act.	Section 7.2.1 and Section 7.1.3v of the BDAR (Appendix B).
12. Environmentally Sensitive Lands and Processes	
1. Environmentally sensitive land and processes (and the impact of processes on the project) including, but not limited to:	
(a) protected areas (including land and water) managed by Environment, Energy and Science Group (EESG) and/or Regions, Industry, Agriculture & Resources, (RIAR) of DPIE under the NSW National Parks and Wildlife Act 1974 (NP&W Act) and the Marine Estate Management Act 2014 (MEM Act);	No protected areas in footprint. Visual impacts on Leacock Regional Park are assessed in Section 7.12.3.
(b) Key Fish Habitat (KFH) as mapped and defined in accordance with the FM Act;	Section 7.2 (no Key Fish Habitat identified in study area).
(c) waterfront land as defined in the NSW Water Management Act 2000 (Water Management Act);	Section 7.7 (no waterfront land – Anzac Creek is Strahler order 1).

Table 7.3 SEARs for the Project - Biodiversity

Requirement	Where addressed in this EIS
(d) land or waters identified as Critical Habitat under the FM Act or EPBC Act or areas of outstanding biodiversity value under the BC Act; and	Section 7.2 (no critical habitat or areas of outstanding biodiversity value).
(e) biodiversity stewardship sites, private conservation lands and other lands identified as offsets.	Section 7.2.1 (biobanking sites provided as part of the MLP are considered throughout the EIS).

The BDAR also assessed the impacts of the Project on MNES within the Project site. This assessment was undertaken to determine whether referral of the Project to the Commonwealth Minister for the Environment was also necessary on the basis of impacts to threatened species.

The study area for the BDAR includes the directly impacted area (ie the footprint of construction) and an indirect impact area, delineated as a 20 m buffer from the construction footprint.

7.2.2 Existing environment

i Landscape features

The Project is sited both within and adjacent to the Boot Land, a large area of intact remnant vegetation. Part of the Boot Land, outside the boundary of the Project, is a registered Biobanking site (agreement No. 341) under the now repealed NSW *Threatened Species Conservation Act 1995 Act* (TSC Act) to meet the offset obligations for the MLP development. Whilst the TSC Act is now repealed, the Biobanking site remains in force under the BC Act.

There is little habitat connectivity to the west, north and east of the Boot Land, as it is bounded by residential and commercial development with little to no patches of intact native vegetation.

The southern edge of the Project site is bound by the East Hills Railway, beyond which is an extensive vegetated area. The fenced railway corridor would prevent the passage of many fauna species, limiting connectivity of Boot Land to habitat in the south. Although birds and bats would easily traverse this barrier, it would limit the passage of larger terrestrial and arboreal fauna species into and out of the site.

There is a lack of significant geological features, such as karst, caves, crevices or cliff and there are no soil hazard features across the study area. Similarly, there are no soil hazard features that occur within the study area or buffer area.

There are no areas of geological significance or areas of outstanding biodiversity, as declared by the NSW Minister for Energy and Environment, in the study area.

a Bioregions

The study area is in the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and the Cumberland IBRA Subregion. The Project is within the BioNet Landscape Georges River Alluvial Plain.

b Watercourses and wetlands

The Project is within the Sydney Metropolitan catchment. Anzac Creek, a first order watercourse, intersects the study area in the vicinity of the south-east corner of the MPE. The Georges River, a seventh order watercourse, runs to the west of the Project site, passing within about 600 m of the south-western corner of the study area.

A portion of the Boot Land is mapped as coastal wetlands under the Coastal Management SEPP 2018 (CM SEPP). The Project does not interact with these mapped wetlands. There are no other listed wetlands within the study area.

c Groundwater dependent ecosystems

As noted in Section 5.2.2, much of the Project site is identified under the GDE Atlas (BOM 2020) as GDEs. The ecosystem types include Castlereagh Ironbark Forest, Castlereagh Scribbly Gum Woodland and Castlereagh Swamp Woodland. These identified GEDs align with three of the four PCTs identified within the study area. Groundwater in the vicinity of MPE is present between 5 mbgl and 11 mbgl. Groundwater flow is generally radial from the topographic high with the location of the Georges River, indicating that groundwater flow underlying the area would be predominantly westerly.

ii Native vegetation

a Overview

The extent and type of native vegetation was assessed by a review of regional vegetation and habitat mapping as well as a site survey, carried out in accordance with the BAM guidelines and tools. Surveys were undertaken by EMM between December 2019 and September 2020. The study area was predominantly traversed on foot, with vegetation mapped and aligned with NSW PCTs and vegetation zones. Following the stratification of vegetation zones, native vegetation integrity was assessed.

Vegetation within the study area has been identified as either being of a derived grassland or a relatively intact nature.

The alignment of the Project will utilise the road corridor of Greenhills Road corridor which runs between the MPE site and Boot Land. Vegetation within this area is derived from the adjacent identified vegetation communities within the Boot Land. A narrow corridor of Boot Land vegetation that runs adjacent to Greenhills corridor will be impacted on. While this narrow corridor of vegetation remains relatively intact and of high condition it experiences edge effects from vehicles that use the access track and from the construction of MPE. Some canopy species have been planted along internal roads and carparks of the MPE.

The majority of the vegetation observed within the DJLU site is subject to on-going maintenance such as mowing and fallen timber removal. A small area of regenerated vegetation was observed immediately north of the fence line of the Boot Land and has experienced past landscape disturbances. At the very north of the study area three mature canopy species have been planted as streetscaping from past road upgrades.

b Plant community types

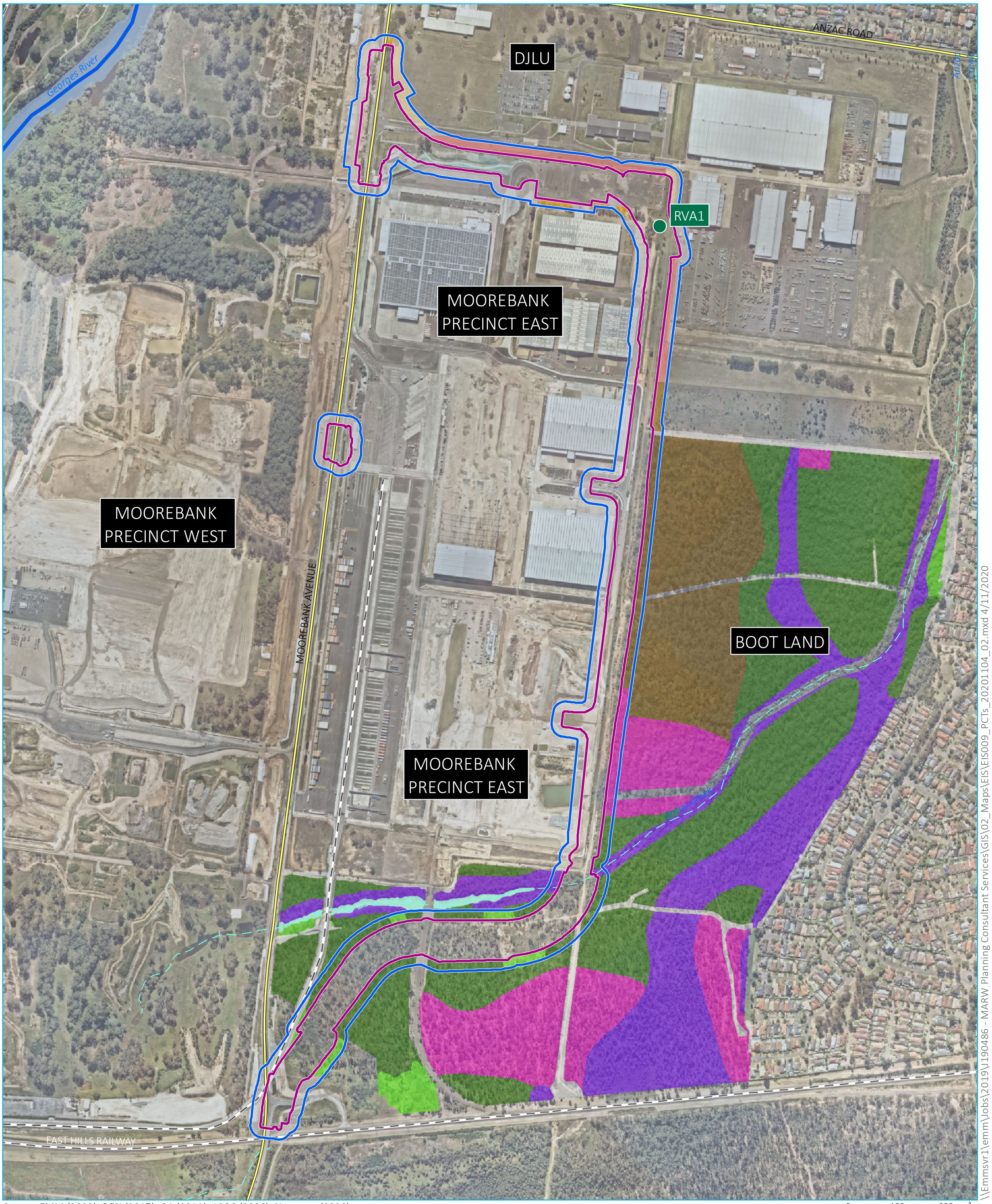
Four PCTs were identified within the study area from vegetation mapping and site surveys. Descriptions of each PCT are provided in Table 5.5 to Table 5-8 within the BDAR (Appendix B). Ten vegetation zones were identified following stratification of PCTs based on broad condition state. Vegetation zones mapped within the study area are presented in Table 7.4 and Figure 7.1.

Table 7.4 Vegetation zones mapped within the study area

Plant Community Type	Condition	Direct impacts (ha)	Indirect impacts (ha)	Study area (ha)	Status
0 - Cleared	n/a	9.98	7.18	17.16	
0 - Exotic	n/a	0.47	1.26	1.73	-
724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	High	0.76	1.01	1.80	Listed under the NSW BC Act - Shale Gravel Transition Forest in the Sydney Basin Bioregion Endangered Ecological Community (EEC). Listed under the EPBC Act - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest Critically Endangered Ecological Community (CEEC). Vegetation integrity score: 60
	Medium	0.13	0.20	0.34	Listed under the NSW BC Act - Shale Gravel Transition Forest in the Sydney Basin Bioregion EEC. Listed under the EPBC Act - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest CEEC. Vegetation integrity score: n/a (merged with High zone)
	Poor	0.21	0.23	0.44	Listed under the NSW BC Act - Shale Gravel Transition Forest in the Sydney Basin Bioregion EEC. Not listed under the EPBC Act. Vegetation integrity score: 19.7
	Derived native grassland (DNG)	1.61	0.53	2.14	Listed under the NSW BC Act - Shale Gravel Transition Forest in the Sydney Basin Bioregion EEC. Not listed under the EPBC Act. Vegetation integrity score: 24.7
725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	High	0.16	0.52	0.68	Listed under the BC Act - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion EEC. Listed under the EPBC Act - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion CEEC. Vegetation integrity score: 53.4
	DNG	0.45	0.00	0.45	Listed under the BC Act - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion EEC. Not listed under the EPBC Act. Vegetation integrity score: 17.5

Table 7.4 Vegetation zones mapped within the study area

Plant Community Type	Condition	Direct impacts (ha)	Indirect impacts (ha)	Study area (ha)	Status
883 - Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion description	High	3.77	2.34	6.11	Listed under the BC Act - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion Vulnerable Ecological Community (VEC). Listed under the EPBC Act - Castlereagh Scribbly Gum and Agnes Banks Woodlands in the Sydney Basin Bioregion EEC. Vegetation integrity score: 53.9
	Medium	1.64	0.62	2.25	Listed under the BC Act - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion VEC. Listed under the Act - Castlereagh Scribbly Gum and Agnes Banks Woodlands in the Sydney Basin Bioregion EEC. Vegetation integrity score: 33.8
	DNG	0.26	0.03	0.29	Listed under the BC Act - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion VEC. Not listed under the EPBC Act. Vegetation integrity score: 11.5
1067 - Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion	High	0.15	0.14	0.30	Listed under the BC Act - Castlereagh Swamp Woodland Community EEC. Not listed under the EPBC Act. Vegetation integrity score: 37.8



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

KEY

- Construction footprint
- Indirect impact area
- Rail line
- Major road
- Rapid vegetation assessment

Strahler stream order

- 1st order
- 7th order

Plant community type

- Cleared
- Exotic grassland

724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion

- High
- Medium
- DNG

725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion

- High
- DNG

883 - Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion

- High
- Medium
- DNG

1067 - Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion

- High

Plant community type and vegetation zone mapping within the proposed Moorebank Avenue realignment

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.1

EMM
creating opportunities

A bushfire went through the southern section of the Boot Land, which is dominated by PCT 883, in April 2018. Due to the intensity of the fire, it was determined that the integrity of the vegetation would be temporarily compromised, and data collected would not provide a true representation of the vegetation if there had been no recent fire. Consequently the extent of the bushfire was mapped by walking and locating the boundary of the burnt vegetation with handheld GPS.

While vegetation within the study area was not burnt in the 2019-2020 fire season, feedback from EES indicated that the Guideline for applying the Biodiversity Assessment Method at severely burnt sites (DPIE 2020) should be applied. Due to the effects of the bushfire, wherever possible, plots were located in unburnt vegetation within the project area. Where necessary surrogate plots (ie option 2 for vegetation integrity assessment) were performed within vegetation in the Boot Lands.

For vegetation zone 883 medium it was not possible to conduct any plots within unburnt vegetation, as this vegetation was disturbed by historic use as a grenade practice range, and all of vegetation in this condition was burnt by the 2018 bushfire. A plot was carried out to sample the medium condition areas within the southern section as no surrogate site was able to be identified due to access restrictions. For vegetation, integrity calculations plot data from vegetation zone PCT 883 high was utilised.

iii Habitat assessment

A habitat assessment was undertaken at the same time as vegetation mapping to identify potential fauna habitats within the study area such as hollow-bearing trees, flowering shrubs and feed trees. This assessment determined that most of study area is relatively undisturbed and would provide adequate habitat for a range of fauna species. There was some indirect evidence of fauna, as well as direct observations of a range of species.

In the northern portion of the study area there is abundant woody debris and leaf litter, providing good habitat for ground dwelling fauna and invertebrates. Eighteen hollow bearing trees were identified within the study area, with a higher density observed in the southern portion of the study area.

One first order watercourse, Anzac Creek, intersects the Project site. This watercourse flows intermittently and so does not have any capability to support fish species, given the lack of permanent water or the presence of any pools. However, it may contain potential frog habitat.

iv Threatened species

An assessment of habitat constraints was undertaken to indicate the likelihood of threatened species being present. The presence of most of the relevant threatened species was able to be ruled out due to the lack of suitable habitat or based on species distribution. A total of 21 threatened flora species and six threatened fauna species were identified as having the potential to be present in the Project site.

Targeted flora and fauna surveys were undertaken during between December 2019 and September 2020 to identify the presence or absence of these key species in the study area. Due to the fire that burnt a portion of the Boot Land in April 2018, and the high number of threatened species recorded on site before the fire, threatened species records identified during previous survey efforts were combined with EMM records.

Multiple threatened species were recorded within the study area opportunistically and whilst performing targeted transect surveys. Where completion of targets surveys was not feasible, candidate species were assumed present.

A list of threatened species predicted to occur within the Project site, along with an assessment of whether the species will be impacted, is provided in Table 7.5.

Table 7.5 Threatened species and survey results

Scientific name	Common name	Habitat present with the construction footprint	Recorded during field surveys	Impacted by development
Acacia bynoeana	Bynoe's Wattle	Yes	Yes	Yes
Acacia pubescens	Downy Wattle	Yes	Yes	Yes
Allocasuarina glareicola	-	Yes	No	No - Not recorded during targeted surveys.
Callistemon linearifolius	Netted Bottle Brush	Yes	No	No - Not recorded during targeted surveys.
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	Yes	No	No - Not recorded during targeted surveys.
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	Yes	Yes	Yes
Gyrostemon thesioides	-	Yes	No	No - Not recorded during targeted surveys in Project area.
Hibbertia fumana	-	Yes	No	No - Not recorded during targeted surveys in direct and directed impact areas (both EMM and previous targeted surveys for this species).
Hibbertia puberula (subsp. *puberula*)	-	Yes	Yes	Yes
Hibbertia sp. *Bankstown*	-	Yes	No	No - Not recorded during targeted surveys.
Marsdenia viridiflora subsp. *viridiflora* – endangered population	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas.	Yes	No	No - Not recorded during targeted surveys.
Micromyrtus minutiflora	-	Yes	No	No - Not recorded during targeted surveys.
Persoonia nutans	Nodding Geebung	Yes	Yes	Yes
Pimelea curviflora var. *curviflora*	-	Yes	No	No - Not recorded during targeted surveys.
Fauna				
Burhinus grallarius	Bush Stone-curlew	Yes	Assumed presence	Yes
Cercartetus nanus	Eastern Pygmy-possum	Yes	No	No - Not recorded during targeted surveys.
Litoria aurea	Green and Golden Bell Frog	Yes	No	No - Not recorded during targeted surveys.

Table 7.5 Threatened species and survey results

Scientific name	Common name	Habitat present with the construction footprint	Recorded during field surveys	Impacted by development
Meridolum corneovirens	Cumberland Plain Land Snail	Yes	Yes	Yes
Petaurus norfolcensis	Squirrel Glider	Yes	No	No - Not recorded during targeted surveys.
Phascolarctos cinereus	Koala	Yes	Assumed presence	Yes - Previously recorded by Cumberland Ecology in 2020.

v Weeds

Weeds were identified during vegetation integrity surveys. These weeds have been assessed against the *Greater Sydney Regional Strategic Weed Management Plan 2017–2022* (Local Land Services Board 2019), identifying whether they are state determined priority species and/or regional priority species in Table 7.6.

Table 7.6 Weeds identified as a state determined priority species and/or a regional priority species

Scientific name	Common name	Strategic Weed Management		Regional concern	Biosecurity Act 2017	Weed of National Significance
		A1.1	A1.2			
Ageratina adenophora	Crofton Weed	-	-	Environmental/ agricultural	General biosecurity duty	No
Ageratina riparia	Mistflower	-	-	-	General biosecurity duty	No
Alternanthera philoxeroides) – observed upstream of the Project Area	Alligator weed	Yes	Yes	-	General Biosecurity duty Prohibition on dealings Regional Recommended Measure	Yes
Araujia sericifera	Moth Vine	-	-	Environmental	General biosecurity duty	No
Conyza bonariensis	Fleabane	-	-	-	General biosecurity duty	No
Eragrostis curvula	African lovegrass	-	-	Environmental	General biosecurity duty	No
Senecio madagascariensis	Fireweed	Yes	-	-	General Biosecurity Duty; and Prohibition on dealings	No

Notes: A1.1 - *Biosecurity Act 2015* and regulations provide specific legal requirements. These specific regulatory requirements include Prohibited Matter, Biosecurity Zones, Mandatory Measures, Control Orders.
A1.2 - "outcomes to demonstrate compliance with the General Biosecurity Duty" and "Strategic responses in the region" to achieve the relevant management objective (ie Prevention, Eradication, Containment or Asset Protection).

Many of these species are prevalent in areas previously disturbed, especially within the existing powerline easement and along the boundary of the MPE construction site. Key weed species of concern within the study area include Crofton Weed, Moth Vine, African Lovegrass and Fireweed. These were recorded in BAM plots carried out within and/or in proximity to areas of disturbance such as the powerline easement, adjacent to the drainage line along the north eastern boundary of the MPE site and adjacent Moorebank Avenue. While Alligator weed was not recorded within any plots, it was observed within Anzac Creek upstream from the study area near the disused rail line and the new RALP rail line.

7.2.3 Assessment of impacts

i Key threatening processes

The BC Act, EPBC Act and FM Act provides for the identification of Key Threatening Processes (KTPs). Those KTPs applicable to the Project include:

- alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands;
- clearing of native vegetation;
- degradation of native riparian vegetation along New South Wales water courses;
- infestation of frogs by amphibian chytrid causing the disease chytridiomycosis;
- infection of native plants by *Phytophthora cinnamomi*;
- installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams;
- loss of hollow-bearing trees;
- predation by the European Red Fox (*Vulpes Vulpes*);
- predation by the Feral Cat Felis (*Felis catus*); and
- removal of dead wood and dead trees.

ii Potential direct and indirect impacts

The main direct impacts of the Project are generally associated with clearing works during construction. Potential direct impacts that could arise from the Project, prior to any avoidance, minimisation or mitigation, include:

- clearing of areas of significant native vegetation;
- clearing of high-quality threatened species habitat;
- clearing of threatened ecological communities (TECs);
- disturbance of waterway beds and banks including scouring and erosion; and
- disturbance of riparian vegetation.

During construction and operation, the direct disturbance of waterway beds and banks, as well as indirect disturbance from runoff and sedimentation, has the potential to occur at the culver crossing which will be constructed within Anzac Creek. Direct disturbance of waterway beds and banks has the potential to impact up to 0.05 ha of ephemeral aquatic habitat. While this impact is unavoidable, the area to be disturbed is relatively small in relation to the remainder of the habitat available within Anzac Creek.

The Project also has the potential in indirect impacts, prior to any avoidance, minimisation or mitigation, including:

- potential for increased vehicle strike of fauna species;
- fragmentation of habitat;
- increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour);
- lighting for night works, security and/or operational requirements, resulting in disturbance to fauna species and changes in occupancy or behaviour;
- increase in weeds and pathogens, resulting in degradation of retained native vegetation and habitat;
- increase in predatory and pest animal species, resulting in increased predation and competition and a consequent reduction in populations; and
- runoff and sedimentation to waterways associated with construction activities.

Increased vehicle movements associated with the construction of the Project will have the potential to increase the risk for fauna strikes and near misses. Once completed, the Project will increase traffic driving within proximity to the Boot Land.

The Project will partially fragment the southern section of the Boot Land. This partial fragmentation will occur to areas of vegetation between the MPE southern boundary, RALP rail line and Project western boundary. Fragmentation of these areas will result in a restriction of fauna species movements, potentially reducing fauna reproduction and gene flow, as well as influencing opportunities of pollination by reducing movements of pollinating vectors. Culverts will be installed within Anzac Creek, provide some connectivity for local fauna such as frogs, small mammals and reptiles. However, these culverts will only be accessible in dry conditions when water flow within Anzac Creek is minimal. Consequently, it is unknown whether larger mammals such as wallabies, wallaroos and koalas will utilise the culverts.

Construction activities will result in increased levels of noise and vibration which has been observed to modify animal behaviour, including calling behaviour in frog species and bird species. These activities may also result in increased dust levels, covering adjacent vegetation and inhibiting growth.

The Project will require lighting to be installed during the construction phase of the Project as well as new street lighting lining the new road. This lighting has potential to affect the foraging, reproduction, migration and communication of local ecological populations.

Increased movement of vehicles and people into the area have the potential to transport weeds and pathogens into the Project site and surrounding vegetation. Weeds have the potential to result in degradation of retained vegetation and fauna habitat. There is potential for weed species including Crofton Weed, Moth Vine, African Lovegrass and Fireweed, recorded in disturbed areas of the Project site, to be transported further into the southern section of the Boot Land during construction activities.

Infection of native plants by *Phytophthora cinnamomi,* a key threat to trees and shrubs and could result in rot during the construction phase of the Project. The Project may also cause the spread of Chytrid fungus (*Batrachochytrium dendrobatidis*) between infected and uninfected populations. This disease has been linked to extinction and declines in several frog species across Australia and is listed as a key threat to the Green and Golden Bell Frog (NPWS 2003). Increased human activity also has the potential to attract feral animals including an increase in feral Cat (*Felis catus*) and Red Fox (*Vulpes vulpes*) activity and consequent impacts on native animals. Predation by feral Cats and Red Foxes are listed as KTPs under the BC Act and EPBC Act. Introduced predators are also considered a threat to the Eastern Pygmy-possum (NSWSC 2001).

Unmitigated, it would have been likely that erosion, runoff and sedimentation would occur as a result of construction of the Anzac Creek culvert. This would have had the potential to smother ephemeral aquatic habitat and ephemeral aquatic vegetation and reduce the quality of habitat available for use by aquatic fauna, including threatened species. After inclusion of those water quality management measures specified under (Section 7.2.4 and Section 7.7.5), the risk of significant impacts occurring is considered unlikely.

Following completion of construction, impacts arising from the operation of the Project will be limited to key areas of ongoing operation. These potential operational impacts are expected to include:

- indirect impacts from noise, vibration, and lighting;
- indirect impacts to retained habitat due to weeds and pathogens;
- indirect impacts to fauna species as a result of predatory and pest animal species; and
- prescribed impacts to fauna species due to vehicle strike.

iii Serious and irreversible impacts

The Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion is identified in the DPIE's Biodiversity Data Collection database as potential serious and irreversible impacts (SAII) entities, as per section 6.5 of the BC Act.

An intact patch of this community was identified adjacent to the existing powerline easement east of the MPE site, located just north of Anzac Creek. To accommodate the proposed Project, a thin strip of intact vegetation will need to be removed as well as the patch of derived native grassland (DNG) within the powerline easement. While avoiding any removal of this EEC is preferred, clearing will be minimal, 0.16 ha will be directly impacted on with a further 0.52 ha experiencing indirect impacts.

Information required by Section 10.2.3 of the BAM (OEH 2017) regarding this SSAI entity is provided in Appendix E of the BDAR (Appendix B).

iv Impacts requiring offsets

Some impacts will require offsetting in accordance with section 10 of the BAM. Impacts to native vegetation (both direct and indirect) requiring offsets include:

- impacts on 4.72 ha of PCT 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion;
- impacts on 1.13 ha of PCT 725 - Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion;
- impacts on 8.65 ha of PCT 883 - Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion description; and

- impacts on 0.30 ha of PCT 1067 - Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion.

A total of 189 ecosystem credits are required to offset the residual impacts of the Project. A credit report is provided in Appendix F of the BDAR (Appendix B).

Impacts to threatened species habitat requiring offsets include:

- impacts on 0.86 ha of habitat for Bynoe's Wattle;
- impacts on 1.07 ha of habitat for Downy Wattle;
- impacts on 0.76 ha of habitat for Nodding Geebung;
- impacts on 3.76 ha of habitat for Small-flower Grevillea;
- impacts on 6.73 ha of habitat for *Hibbertia puberula* subsp. *puberula*;
- impacts on 14.80 ha of potential habitat for Eastern Australian Underground Orchid;
- impacts on 14.80 ha of habitat for Bush Stone-curlew;
- impacts on 14.80 ha of habitat for Cumberland Plain Land Snail; and
- impacts on 11.58 ha of habitat for Koala.

A total of 876 species credits are required to offset the residual impacts of the Project. A credit report is provided in Appendix F of the BDAR (Appendix B)

Consistent with precinct wide approvals for the Moorebank Intermodal Precinct, SIMTA has the option to meet the Project's terrestrial ecosystem and species credit requirements though one, or a combination of, the following:

- retirement of credits currently held from the Biobank sites established within the Wattle Grove Offset Area, Casula Offset Area and Moorebank Conservation Area;
- purchase and retire credits available on the biodiversity credit register; or
- payment into the Biodiversity Conservation Fund (BCF).

A Biodiversity Offset Strategy (BOS) for the project will be prepared for the Project.

v Matters of national and state environmental significance

An assessment of impacts for listed TECs, threatened flora and fauna, and migratory species predicted to occur in the region by the PMST search was undertaken to determine whether referral of the Project to the Commonwealth Minister for the Environment is required.

MNES relevant to the Project are summarised in Table 7.7.

Table 7.7 Assessment of the Project against the EPBC Act

Name		Survey undertaken	Recorded/assumed presence	Potential for significant impact
Threatened ecological community				
Shale Sandstone Transition Forest of the Sydney Basin Bioregion		Yes	Recorded	Possible
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion		Yes	Recorded	Unlikely
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion		Yes	Recorded	Possible
Flora				
Acacia bynoeana	Bynoe's Wattle	Yes	Recorded	Unlikely
Acacia pubescens	Downy Wattle	Yes	Recorded	Unlikely
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	Yes	Recorded	Unlikely
Persoonia nutans	Nodding Geebung	Yes	Recorded	Unlikely
Fauna				
Anthochaera phrygia	Regent Honeyeater	Yes	Not recorded	Unlikely
Hirundapus caudacutus	White-throated Needletail	Yes	Recorded	Unlikely
Lathamus discolor	Swift Parrot	Yes	Not recorded	Unlikely
Phascolarctos cinereus	Koala	Yes	Assumed presence	Possible
Pteropus poliocephalus	Grey-headed Flying-fox	Yes	Recorded – incidental sighting	Unlikely
Migratory species				
Pandion haliaetus	Eastern Osprey	Yes	Recorded – incidental sighting	Unlikely
Chrysococcyx basalis	Horsfield's Bronze-Cuckoo	Yes	Not recorded	Unlikely
Myiagra cyanoleuca	Satin Flycatcher	Yes	Not recorded	Unlikely
Rhipidura rufifrons	Rufous Fantail	Yes	Recorded	Unlikely

A likelihood of occurrence assessment considering each entity individually is provided in Appendix J of the BDAR (Appendix B).

The assessment concluded a potential significant impact on the following entities:

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion EEC;
- Thick Lip Spider Orchid;
- Woronora Beard-heath; and
- Koala.

Accordingly, the Project was referred to the Commonwealth Minister for the Environment for assessment.

7.2.4 Management and mitigation measures

The focus of the design and option selection has been to minimise and mitigate impacts from the Project. The following processes were implemented to avoid and minimise impacts to the greatest extent possible:

- identification of biodiversity values through biodiversity surveys;
- communication of identified values to the Project team;
- consultation with key government stakeholders, including DPIE and species experts, to seek input and discuss measures proposed to avoid minimise and mitigate impacts; and
- finalisation of measures to avoid, minimise and mitigate impacts.

Measures to avoid, minimise and mitigate impacts to biodiversity values are detailed in section 7.2 of the BDAR (Appendix B).

Mitigation measures to be implemented for potential biodiversity impacts are summarised in Table 7.8.

Table 7.8 Management and mitigation measures for biodiversity

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of biodiversity protection measures	BIO01	A biodiversity management plan (BMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The BMP plan will provide details for the ongoing management and maintenance of biodiversity protection measures during the construction phase of the Project.
Location of road and associated work compounds	BIO02	Work compounds, temporary laydown and stockpile areas will be located within the existing MPE construction site and/or within the road construction footprint.
Location of road and associated work compounds	BIO03	Survey and fencing of the Biobanking site boundary to be the first works completed. The construction footprint avoids direct impacts on the Biobanking site, to ensure this the inclusion of details about the Biobanking site boundary, and the importance of avoiding impacts within these lands as part of worker induction program.
Location of road and associated work compounds	BIO04	Use of the existing road network to minimise requirement for removal of native vegetation, minimising fragmentation to existing areas.
Location of road and associated work compounds	BIO05	Minimisation of clearing during construction, wherever possible.
Location of road and associated work compounds	BIO06	Detailed design will seek to minimise changes to runoff regimes that may impact Anzac Creek and the natural drainage lines that flow into Boot Land.
Location of road and associated work compounds	BIO07	Sediment controls will be developed and implemented at Anzac Creek crossing.
Removal of native vegetation and threatened species habitat	BIO08	Exclusion zones will be established around retained vegetation, including fencing and signage.

Table 7.8 Management and mitigation measures for biodiversity

Aspect/impact	Reference	Mitigation measure
Removal of native vegetation and threatened species habitat.	BIO09	Pre-clearing surveys will be conducted prior to clearing, including translocation of fauna into areas of retained vegetation.
Removal of native vegetation and threatened species habitat.	BIO10	Vegetation clearing will be undertaken in accordance with the two-stage process.
Removal of native vegetation and threatened species habitat.	BIO11	Hollows logs and limbs will be retained for placement within the Biobanking site retained vegetation.
Increase in weeds and pathogens	BIO12	Weed control prior to construction works will be undertaken, where possible.
Increase in weeds and pathogens	BIO13	Weeds will be actively controlled in areas where significant weeds occur.
Increase in weeds and pathogens	BIO14	Construction of wash-down stations at a suitable location.
Increase in weeds and pathogens	BIO15	Re-vegetation of cleared areas as quickly as possible following construction.
Increase in weeds and pathogens	BIO16	Screening of water that is used for dust suppression.
Increase in weeds and pathogens	BIO17	Appropriate disposal and management of weeds during clearing works.
Increase in predatory and pest species.	BIO18	Waste to be stored appropriately in inaccessible bins and disposed off-site.
Increase in predatory and pest species.	BIO19	No waste will be left outside in open areas accessible to feral animals.
Light, vibration and noise pollution	BIO20	Use of directional lighting to retain lighting within works area and road alignment and to minimise light spill as much as possible.
Changes to runoff regimes and sedimentation	BIO21	Siting of infrastructure away from sensitive receiving environments such as Anzac Creek.
Changes to runoff regimes and sedimentation	BIO22	Use of natural erosion controls incorporating organic materials, micro water capture and contour shaping.
Changes to runoff regimes and sedimentation	BIO23	Diversion of clean water around construction areas, rather than through them.
Changes to runoff regimes and sedimentation	BIO24	Stabilisation and rehabilitation of works areas as soon as practicable.

Table 7.8 Management and mitigation measures for biodiversity

Aspect/impact	Reference	Mitigation measure
Changes to runoff regimes and sedimentation	BIO25	Siting of sediment basins to manage run-off from construction areas and use of captured water for dust suppression.
Changes to runoff regimes and sedimentation	BIO26	Management of sedimentation via sediment and erosion control plans for the entire construction footprint.
Fragmentation	BIO27	Incorporating the construction of a dry culvert allowing for local fauna populations to pass between fragmented areas ensuring all available habitats are accessible during all types of weather events. Construction of fauna fencing to guide fauna towards the culvert entrances to maximise the effectiveness of the culvert.
Fragmentation	BIO28	Construction of fauna exclusion fencing excluding fauna from the road corridor but allows them to escape from the road.
Fragmentation	BIO29	To mitigate the risk of fauna vehicle mortality during construction a driver's code of conduct is to be prepared and implemented, with a recommended maximum speed limit of 40 km per hr within Boot Land in the morning period (prior to 7 am and after 5 pm).

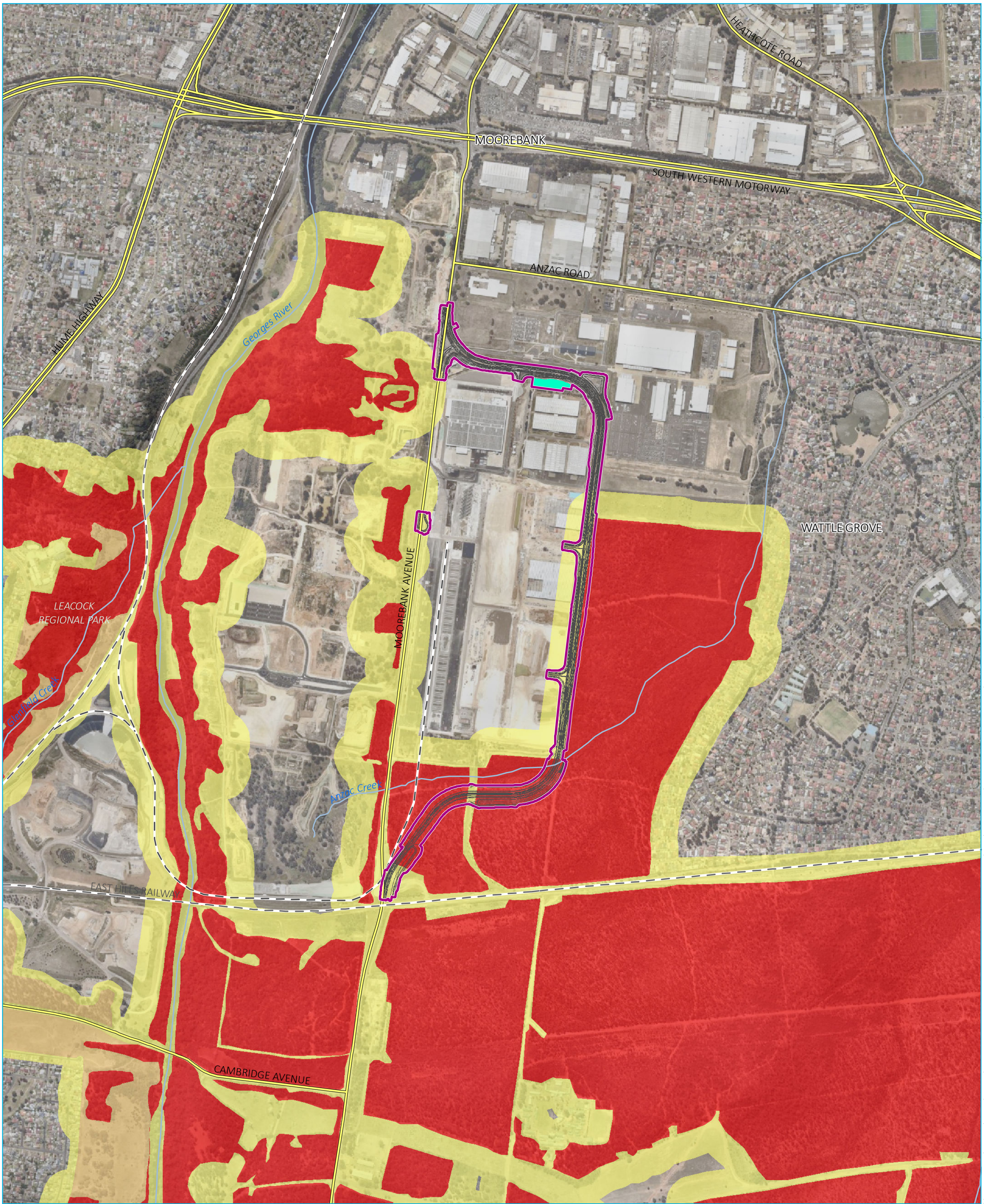
7.3 Bushfire

7.3.1 Overview

The SEARs do not require an assessment of the potential bushfire hazards associated with the Project. However, due to the nature of works and the proximity to forest surrounding the Project, a bushfire hazard assessment (BFHA) (Appendix C) was undertaken by EMM and is included in Appendix C. It provides an overview of the existing environment related to bushfire hazard and an assessment of the potential bushfire hazards associated with the Project. This section of the EIS provides a summary of the findings.

The Project site is partially mapped as Bushfire Prone Land (Vegetation Category 1 and Buffer) on the LCC Bushfire Prone Land Map (refer Figure 7.2). The land mapped bushfire prone is in the eastern and southern portions of the Project. Vegetation buffer is considered the highest risk for bushfire and includes areas of forest, woodlands, heaths, forested wetlands and timber plantations. Vegetation Category 1 is given a buffer of 100 m, also representing Bushfire Prone Land. Therefore, bushfire risks associated with the Project have been assessed in accordance with the *Planning for Bushfire Protection 2019* (PBP) (RFS 2019).

For the purposes of the BFHA and in keeping with the PBP, the Project is considered 'other development', therefore Australian Standard 3959 - 2018 Construction of Buildings in Bushfire-prone Areas (AS 3959-2018) or the National Association of Steel Framed Housing (2014) Steel Framed Construction in Bush Fire Areas (NASH Standard) do not apply. Therefore, only a set of 'deemed to satisfy' provisions and only the general fire safety provisions of the PBP apply.



Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020); RFS (2016)

0 0.5 1 km
GDA 1994 MGA Zone 56
N

KEY

Project area (construction footprint)
Indicative construction compound
Road design
Rail line
Major road
Named watercourse

Bushfire prone land
Vegetation category 1
Vegetation category 2
Buffer

Bushfire prone land mapping

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.2

EMM
creating opportunities

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7.3.2 Existing environment

i Regional fire weather

The Forest Fire Danger Index (FFDI) is based upon the LGA Fire Weather District, as determined by NSW RFS, where the development is to be located. The 1:50 year fire weather scenario for most of NSW is determined as FFDI 80, however a number of areas, including Greater Sydney, have higher FFDIs which are set at 100 (NSW RFS 2017), and is the FFDI that has been used to inform bushfire behaviour on land within the Project site. The Project is within the Macarthur Bush Fire Management Committee (BFMC) area, which comprises the following regional weather characteristics:

- a warm temperate climate;
- high summer rainfalls between January and March;
- low relative humidity with little variation throughout the year;
- predominant northwest to southerly winds in summer;
- the warmest months are November to March; and
- the cooler, drier months are May to August.

Prevailing weather conditions associated with the bushfire season in the Macarthur BFMC are north-westerly winds accompanied by temperatures above 30 degrees and low relative humidity. The greatest period of fire danger within the Macarthur BFMC area occurs after a dry winter and spring before the onset of rain in summer. Occasional strong winds with cold fronts during summer can lead to extreme fire danger.

ii History of bushfire and existing ignition sources

The Macarthur BFMC area has on average 417 bushfires per year, of which five on average can be considered to be major fires (Macarthur BFMC 2012).

Major fire activity occurred near the Project site in September 1965, October 1968, November and December 1990 and December 2001 (Macarthur BFMC 2012). The portion of the study area to the south of Anzac Creek was burnt during 2018. The main source of ignition is from deliberate misuse of fire and arson related activities.

iii Vegetation assessment and slope

The predominant vegetation classification, as per the PBP, is Grassland, Forest and Forested Wetland. The topography within the Project site is predominantly flat with isolated areas of steeper slopes associated with water courses and drainage lines, as well as ground disturbance related to access tracks and powerline easements.

The forest vegetation classification is the most prevalent of the vegetation mapped adjacent to the Project. Although derived from PCTs that are forest formation, some areas of the vegetation are mapped as DNG, based upon the lack of woody vegetation, predicted fuel load and best fit. Vegetation, including corresponding vegetation formation, mapped within a 500 m buffer of the Project is listed in Table 7.9 and Figure 7.3.

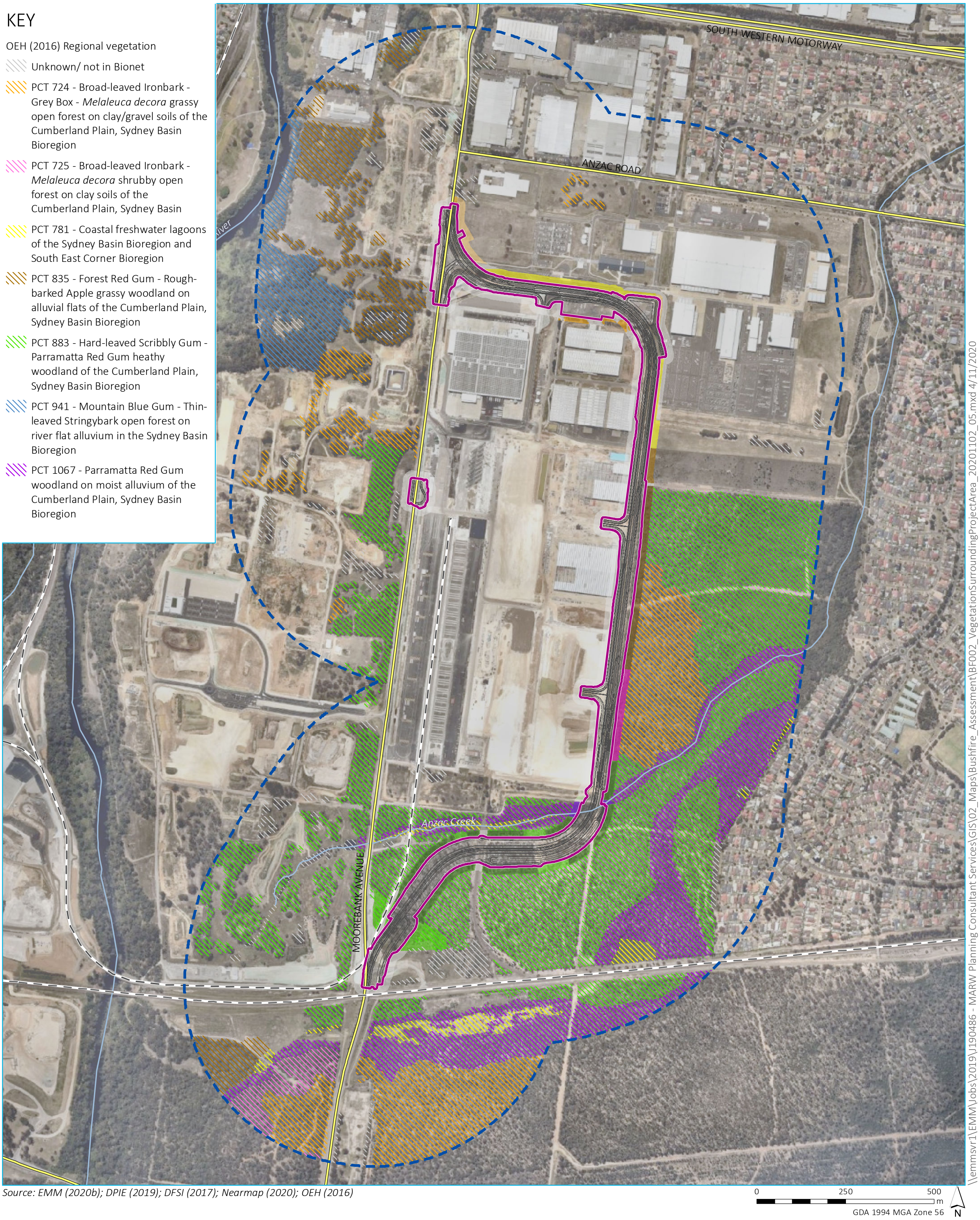
Those areas of forest surrounding the Project site are likely to contain four main categories of fuel, being the relatively compact surface layer of fine fuels and decaying leaf litter, the elevated and relatively well aerated near surface and shrub layers, the canopy, and the bark. Fires in forest result in a different set of challenges for fire suppression as fuel loads in these vegetation types can be more readily available to fire, with fires burning for a longer time and producing more embers.

Those areas of forest surrounding the Project site are likely to contain four main categories of fuel, being the relatively compact surface layer of fine fuels and decaying leaf litter, the elevated and relatively well aerated near surface and shrub layers, the canopy, and the bark. Fires in forest result in a different set of challenges for fire suppression as fuel loads in these vegetation types can be more readily available to fire, with fires burning for a longer time and producing more embers.

Table 7.9 Vegetation within and surrounding the Project site

Plant Community Type	Condition[1]	Vegetation formation (Keith 2004)	PBP classification
Exotic grassland	-	Grasslands	Grassland[2]
724 – Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	High	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Forest
	Med	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Forest
	Poor	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Forest
	DNG	Grassland	Grassland
725 – Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	High	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Forest
	DNG	Grasslands	Grassland
883 – Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion description	High	Dry Sclerophyll Forests (Shrubby sub-formation)	Forest
	Med	Dry Sclerophyll Forests (Shrubby sub-formation)	Forest
	DNG	Grasslands	Grassland
1067 – Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion	High	Dry Sclerophyll Forests (Shrubby sub-formation)	Forest
835[3] – Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	-	Forested Wetlands	Forested Wetland
941 – Mountain Blue Gum – Thin-leaved Stringybark open forest on river flat alluvium in the Sydney Basin Bioregion	-	Forested Wetlands	Forested Wetland
781 – Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	-	Freshwater Wetlands	Freshwater Wetland

Note:
1. Based upon condition classes assigned by EMM, (OEH 2016) mapping do not assign condition. DNG = derived native grassland.
2. Exotic vegetation within or in close proximity to the Project site has been assigned to a vegetation formation as per the conversions presented within Table A1.9 of PBP and using EMM vegetation data.
3. PCTs 835, 941 and 781 were not directly surveyed and so no condition class was assigned.



Source: EMM (2020b); DPIE (2019); DFSI (2017); Nearmap (2020); OEH (2016)

KEY

- Project area (construction footprint)
- 500m
- Road design
- Rail line
- Major road
- Named watercourse

EMM (2020b) vegetation mapping
- Cleared/unvegetated
- Exotic grassland

PCT 724 - Broad-leaved Ironbark - Grey Box - *Melaleuca decora* grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- High
- Medium
- Poor
- DNG

PCT 725 - Broad-leaved Ironbark - *Melaleuca decora* shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
- High
- DNG

PCT 883 - Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion
- High
- Medium
- DNG

PCT 1067 - Parramatta Red Gum woodland on moist alluvium of the Cumberland Plain, Sydney Basin Bioregion
- High

Vegetation surrounding the Project area

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.3

creating opportunities

7.3.3 Assessment of impacts

Fire is capable of damaging infrastructure associated with the Project and consequently impacting upon the safety of staff and contractors during the construction of the Project and/or the safety of the public during the operation of the Project. Fire emanating from the Project poses a human safety risk and property threat within the locality, as well as threatening native flora, fauna and ecosystems within the locality of the Project. As noted in Section 7.3.2, the bio-physical characteristics of the surrounding area can make fire suppression operations more challenging (eg vegetation characteristics, terrain and aspect, and existing potential ignition sources).

The potential ignition of unplanned bushfires from the construction phase of the Project are likely to be from the following sources:

- diesel generators;
- storage of flammable liquids (eg fuel) and other chemicals;
- vehicle and machine movement over long grass;
- sparks generated from hot works (eg welders and grinders); and
- human error, such as non-compliance of hot works procedures or incorrect disposal of cigarette butts.

The potential of ignition of unplanned bushfires from the operation of the Project are likely to be from the following sources:

- car accidents; and
- littering (eg incorrect disposal of cigarette butts).

Accordingly, bushfire prevention and protection measures will be implemented and are outlined in Section 7.3.4.

7.3.4 Management and mitigation measures

Detailed mitigation measures for managing bushfire risk are set out in Section 3 of the BFHA (Appendix C).

A Bushfire Management Plan (BFMP), prepared in accordance with PBP as well as any additional requirements from RFS and Fire and Rescue NSW, will be prepared as part of the CEMP for the construction phase of the Project.

Mitigation measures to be implemented for potential bushfire impacts are summarised in Table 7.10.

Table 7.10 Management and mitigation measures for bushfire

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of bushfire protection measures	BUS01	A BFMP will be developed for the Project post-approval and will be encompassed within the CEMP. BFMP will provide details for the ongoing management and maintenance of bushfire protection measures during the construction phase of the Project, and will encompass the provisions outlined within Section 3.4 to Section 3.8 of the BFHA (Appendix C) including: • APZ locations and management details (if required); • access provisions such as access locations and alternative emergency access; • management of potential ignition sources; • landscaping requirements including indicative design layout and vegetation density thresholds; • water supplies (eg static water supple, location of hydrants etc); • details regarding bushfire emergency management procedures (refer BHF26); and • any other essential bushfire safety requirements.
Bushfire risk to assets	BUS02	Where temporary construction compounds as well as temporary stockpile and laydown areas require access roads, on-site parking, and hardstand/loading areas, these facilities will be located in the most appropriate location in order to establish defendable space for fire-fighting purposes, as well as to mitigate the potential for ignition of surrounding bushland from project sources.
Bushfire risk to assets	BUS03	Temporary construction buildings will also have fully compliant fire safety systems in accordance with AS and National Construction Code requirements and as appropriate to the building type, including some or all of the following features: • fire extinguishers; • fire hose reels; • fire hydrant systems; and • automatic sprinkler systems.
Bushfire risk to assets	BUS04	Temporary construction compound will be constructed and routinely serviced to comply with the specific requirements, as relevant to the structure type.
Bushfire risk to assets	BUS05	Road furniture (eg safety barriers, kerbs, fencing, signposting, bus facilities), line marking and lighting will be designed in accordance TfNSW standards and guidelines, as well as in accordance with the relevant AS.
Responder access	BUS06	Consultation with RFS and Fire and Rescue NSW (FRNSW) will be undertaken during construction to ensure emergency access is maintained during and after construction.
Responder access	BUS07	All site offices will be accessible via access roads suitable for firefighting appliances similar to NSW RFS category 1 tankers.
Responder access	BUS08	All access roads and tracks must be inspected annually and management actions undertaken if roads and tracks are considered unsuitable for emergency vehicle passage (inspect for erosion, fallen timber, locked gates, and dead end tracks). Where locked gates are required, keys will be provided to RFS and FRNSW (if required).
Responder access	BUS09	Gates will be kept in good condition for entry and exit of fire fighting vehicles.
Responder access	BUS10	Ongoing maintenance to ensure a minimum 4 m vertical clearance through the removal of overhanging branches or objects that would prevent access within the Project site.
Responder access	BUS11	All pumps and water sources will be maintained in working order, clearly marked and easy to find.
Responder access	BUS12	All fittings will be compatible with RFS and FRNSW fire trucks.
Responder access	BUS13	Security clearances, communication and access arrangements will be kept updated and confirmed with RFS and FRNSW in readiness for upcoming season.

Table 7.10 Management and mitigation measures for bushfire

Aspect/impact	Reference	Mitigation measure
Responder access	BUS14	APZs and/or defendable space will be kept free of obstacles to provide access for RFS and FRNSW fire-fighting appliances and personnel.
Potential ignition source	BUS15	Diesel generators and associated fuel storage tanks will be designed, housed, and maintained so as not serve as an unacceptable risk to surrounding forest. Diesel generators and associated fuel storage tanks will be located away from the hazard, wherever possible.
Potential ignition source	BUS16	Hazardous materials will be located away from the hazard wherever possible.
Potential ignition source	BUS17	Equipment will be maintained in good working order.
Potential ignition source	BUS18	Plant and equipment will be fitted with appropriate spark arrestors, where practical, and limiting vehicle movement over long grass.
Potential ignition source	BUS19	All vehicles will be provided with portable fire extinguishers that comply with relevant AS.
Potential ignition source	BUS20	Site staff will be informed of the site rules included designated smoking areas and putting rubbish in designated bins.
Potential ignition source	BUS21	Hot work permits will be obtained where required and no hot works on total fire bans and/or conditions associated with severe fire weather.
Potential ignition source	BUS22	Adequate storage and handling requirements for potentially flammable substances in accordance with relevant guidelines.
Potential ignition source	BUS23	Emergency services will be immediately notified of the location and nature of any accidental ignition of surrounding vegetation and/or structures, that was unable to be successfully extinguished.
Potential ignition source	BUS24	The Project will assist RFS/FRNSW in the investigation of the cause of any unplanned fires in proximity to the Project, should they occur.
Potential ignition source	BUS25	The contractor will appropriately design landscape treatments along the road corridor to reduce potential fuel risk, including use of low combustibility vegetation and regular maintenance (through slashing) and in accordance with TfNSW guidelines and relevant AS.
Location and adequacy of services	BUS26	The temporary construction compound will be constructed and routinely serviced to comply with the specific requirements, as relevant to the structure type and to be determined by the contractor at the detailed design stage.
Location and adequacy of services	BUS27	The road alignment will be designed in accordance with TfNSW standards and guidelines, as well as in accordance with AS (refer to Chapter 2 of the EIS), which will include the provisions of fire hydrants.
Construction emergency management	BUS28	Where applicable and as suitable for the scale and size of the development type, emergency management procedures will be developed for the construction phase of the Project, in line with the requirements and approach of: • *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan* (NSW RFS 2014); and • Australian Standard 3745-2010 *Planning for emergencies in facilities* (Standards Australia 2010).
Construction emergency management	BUS29	Emergency management procedures will be reviewed after incidents of bushfire or other fires as well as annually at the end of each bushfire season and amended, if required, to improve the effectiveness of the plan.

Table 7.10 Management and mitigation measures for bushfire

Aspect/impact	Reference	Mitigation measure
Construction emergency management	BUS30	Bushfire awareness training/induction will be provided to all new staff members and contractors, prior to and during the bushfire season for bushfire specific awareness and regularly for other fire awareness (eg structure fire and ignition sources).
Construction emergency management	BUS31	Details of requirements for pre-season fire drills will be provided during staff briefings.
Construction emergency management	BUS32	Formal meetings will be conducted with relevant stakeholders prior to the bushfire season, when higher fire weather is forecast or there are fire events in the surrounding area. Potential participants to include staff, contractors, neighbouring community representatives and external fire authorities and land managers (eg RFS and FRNSW).
Construction emergency management	BUS33	Fire weather warnings, severe weather warnings and total fire bans will be communicated daily during the bushfire danger season to all staff, contractors, and visitors at the Project. Information can be found on the fire information page (Fire danger ratings and total fire bans) of the RFS website.
Construction emergency management	BUS34	The recognition of very high or greater fire danger days triggering will be used as a requirement to view the fire information page (Fires Near Me, Major fire updates) on the RFS website (NSW RFS 2020).
Construction emergency management	BUS35	Staff, contractors, and visitors will be made aware of and required to respond accordingly to the three levels of alert under the national bushfire warning system (Advice, Watch and Alert, Emergency Warning).

7.4 Transport and traffic

7.4.1 Overview

A Traffic Impact Assessment (TIA) (Appendix D) was undertaken in accordance with the relevant governmental assessment requirements, guidelines and policies, and in consultation with relevant government agencies.

Table 7.11 sets out the SEARs that relate to transport and traffic and identifies where they are addressed in this EIS.

Table 7.11 SEARs for the Project – Traffic and transport

Requirement	Where addressed in this EIS
2. **Transport and Traffic**	
1. Construction transport and traffic (vehicle, pedestrian, cyclists, bus services and train operations) impacts, including, but not necessarily limited to:	
(a) a considered approach to route identification and scheduling of transport movements, particularly outside construction hours;	Route identification and traffic distribution is provided in Section 7.4.3 and Table 7.15 of this EIS and Section 5.4 of the TIA (Appendix D).
(b) the indicative number, frequency and size of construction related vehicles (light and heavy vehicles) including those related to the establishment of ancillary facilities;	Traffic generation is provided in Section 7.4.3, Table 7.16 and Table 7.17 of this EIS and Section 5.11 of the TIA (Appendix D).
(c) construction worker parking;	Construction worker parking is assessed in Section 7.4.4 of this EIS and Section 5.11 of the TIA (Appendix D).

Table 7.11 SEARs for the Project – Traffic and transport

Requirement	Where addressed in this EIS
(d) the nature of existing parking, and traffic on construction access routes;	Existing parking conditions are discussed in Section 4.1 of the TIA. Existing traffic levels are discussed in Section 7.4.1 of this EIS and Section 4.4 of the TIA (Appendix D).
(e) access constraints and impacts on public transport, pedestrians and cyclists;	Impacts on public transport, pedestrians, and cyclists are discussed in Section 7.4.4 of this EIS and Sections 5.8, 5.16 and 5.17 of the TIA (Appendix D) respectively.
(f) the need to close, divert or otherwise reconfigure elements of roads, car parking and pedestrian and cycle network associated with the construction of the project and the duration of these changes;	Road closures and pedestrian access arrangements are discussed in Section 7.4.4 of this EIS. Road closures are discussed in Appendix D Section 5.10 and pedestrian access arrangement is discussed in Appendix D Section 5.9.
(g) safe access and egress to/from the classified road network; and	Safe access to and from the realigned Moorebank Avenue would be via the tie ins to the existing Moorebank Avenue.
(h) cumulative impacts with other construction activities occurring in the vicinity of the project.	Construction cumulative impacts are discussed in Section 7.4.4 of this EIS and Section 5.22 of the TIA.
2. Assess and model the operational transport impacts of the project including, but not necessarily limited to:	
(a) estimation of daily and peak traffic movements at key intersections along the proposed alignment;	The peak hour traffic movements at the new intersections are identified in Section 7.4.4 of this EIS and Section 6.2 of the TIA.
(b) intersection performance analysis of key intersections using SIDRA (or an equivalent traffic modelling software) considering scenarios of 2020, 2026, 2036 and the year of completion of the Moorebank Avenue Realignment. A sensitivity test should be undertaken for the feasible redistribution of the Moorebank Intermodal Terminal traffic as a result of the Cambridge Avenue Upgrade project;	SIDRA modelling has been undertaken for 2020, 2026, 2036 and year of completion of the Moorebank Avenue realignment (2024). Results of this modelling are presented in Section 6.3 of the TIA. Consideration has been given to the feasible redistribution of the MPE Intermodal Terminal and warehouse traffic as a result of the Cambridge Avenue Upgrade project. A sensitivity test to investigate the potential effects of this traffic redistribution is presented in Section 7.4.4 of this EIS and Section 6.6 of the TIA.
(c) forecast travel demand and traffic volumes generated by the operation of the project and other surrounding developments (light and heavy vehicles);	Operational traffic generation, inclusive of nearby development is discussed in Section 7.4.4 of this EIS and Section 6.2 of the TIA. A future annual traffic growth rate of +1.7% is included for the Moorebank Avenue bypassable traffic to allow for future through traffic growth and other development generated traffic growth in the locality.
(d) travel time impacts;	Travel time impacts are described in Section 7.4.4 of this EIS and Section 6.3 of the TIA.
(e) traffic signal warrant assessment and justifications for all proposed signalised intersections in accordance with the requirements set out in the TfNSW Traffic Signal Design Guidelines;	A traffic signal warrant assessment is summarised in Section 7.4.4 of this EIS and included in Section 6.3 of the TIA.
(f) performance of key interchanges and intersections undertaking a level of service analysis at key locations;	The performance of key intersection is identified in Section 7.4.4 of this EIS and Section 6.3 of the TIA.
(g) Impacts on cyclists and pedestrians and safety;	Cyclist, pedestrian and safety impacts are described in Section 7.4.4 of this EIS and Section 6.8 of the TIA.

Table 7.11 SEARs for the Project – Traffic and transport

Requirement	Where addressed in this EIS
(h) Property and business access and on street parking (where relevant); and	Impacts to property and businesses and on street parking are described in Section 7.4.4 of this EIS and Section 6.9 of the TIA.
(i) An explanation for the scope of the modelled area, including justification of the nominated boundaries.	Section 7.4.4.

Comments and submissions to the SEARs received from LCC and TfNSW and where addressed are provided for in Section 3.2 and 3.3 of the TIA, respectively.

7.4.2 Existing environment

Moorebank Avenue provides local and regional connections between Heathcote Road and Cambridge Avenue, Moorebank. The realignment will result in a detour of approximately one additional km for traffic along Moorebank Avenue. The surrounding road network is comprised of State, regional and local roads. Figure 7.4 shows the nearby state and regional roads.

The road network surrounding the Project is further described in Chapter 4 of the TIA (Appendix D).

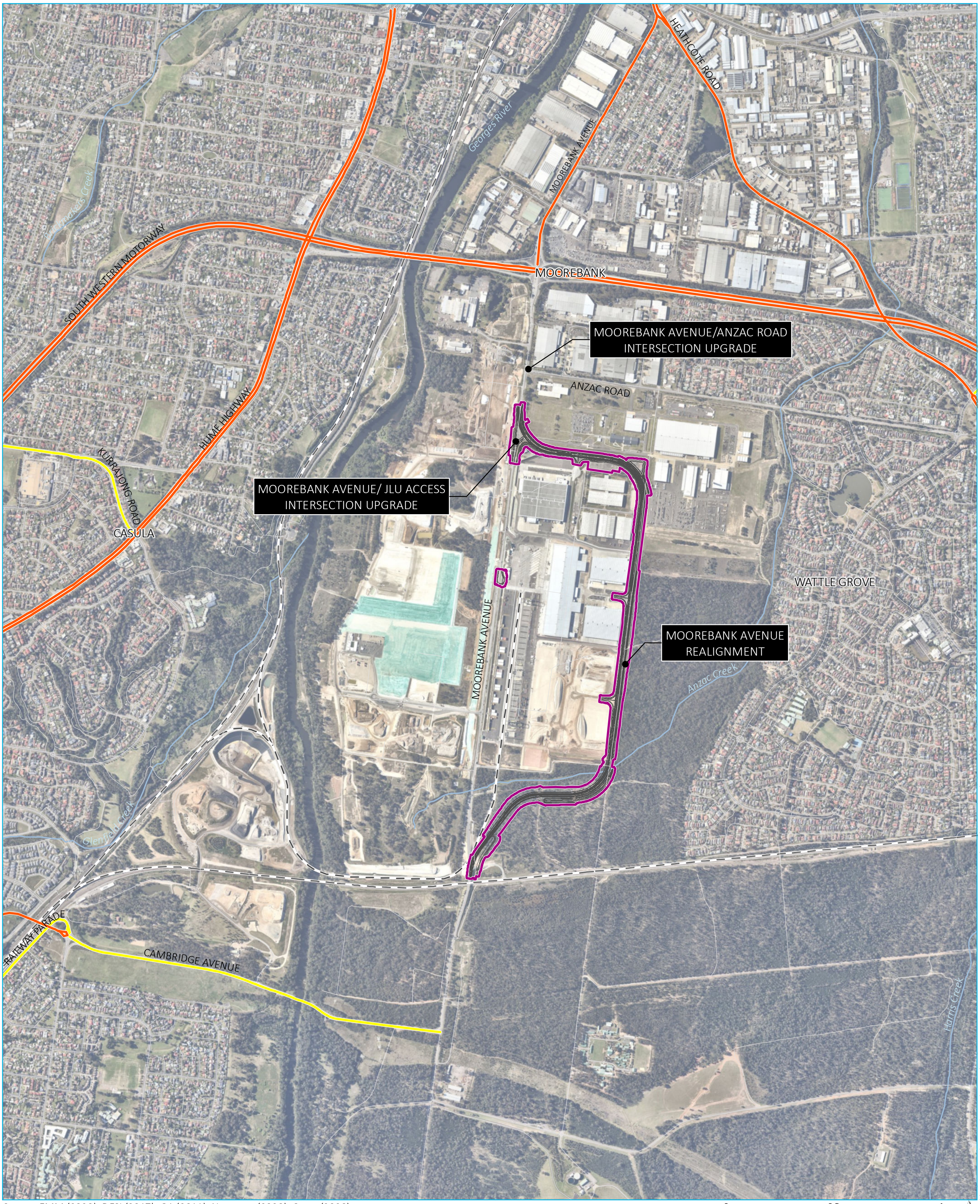
The TIA has identified a number of key intersections within the Project study area which will be directly affected by the construction and operation of the Project. The modelled area considered by the TIA includes the M5 Motorway/Moorebank Avenue intersection to the north and the Cambridge Avenue/Canterbury Road/Glenfield Road intersection to the south. Beyond these intersections, the estimated traffic volumes are marginal and further intersections beyond the modelled area is considered unnecessary.

These intersections are listed below, together with their characteristics:

- M5 Motorway/Moorebank Avenue – interchange with on and off-ramps in both directions;
- Moorebank Avenue/Anzac Road –signalised T-intersection;
- Moorebank Avenue/DJLU Access –signalised T-intersection;
- Moorebank Avenue/Cambridge Avenue – priority-controlled T-intersection; and
- Cambridge Avenue/Glenfield Road/Railway Parade/Canterbury Road – four arm roundabout.

These key intersections in the vicinity of the Project are shown in Figure 7.5.

In addition to the above key intersections, currently there are also two signalised intersections on Moorebank Avenue between the DJLU access and the East Hills Railway which are Moorebank Avenue/IMEX Terminal access and Moorebank Avenue/Chatham Avenue intersections. Currently the Moorebank Avenue/IMEX Terminal access intersection is operating under portable traffic signals only and new traffic control signals are to be constructed as part of the Moorebank Avenue upgrade works under MPE Stage 1 and 2 SSD approval.



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Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020); Carto (2020)

0 0.5 1 km
GDA 1994 MGA Zone 56
N

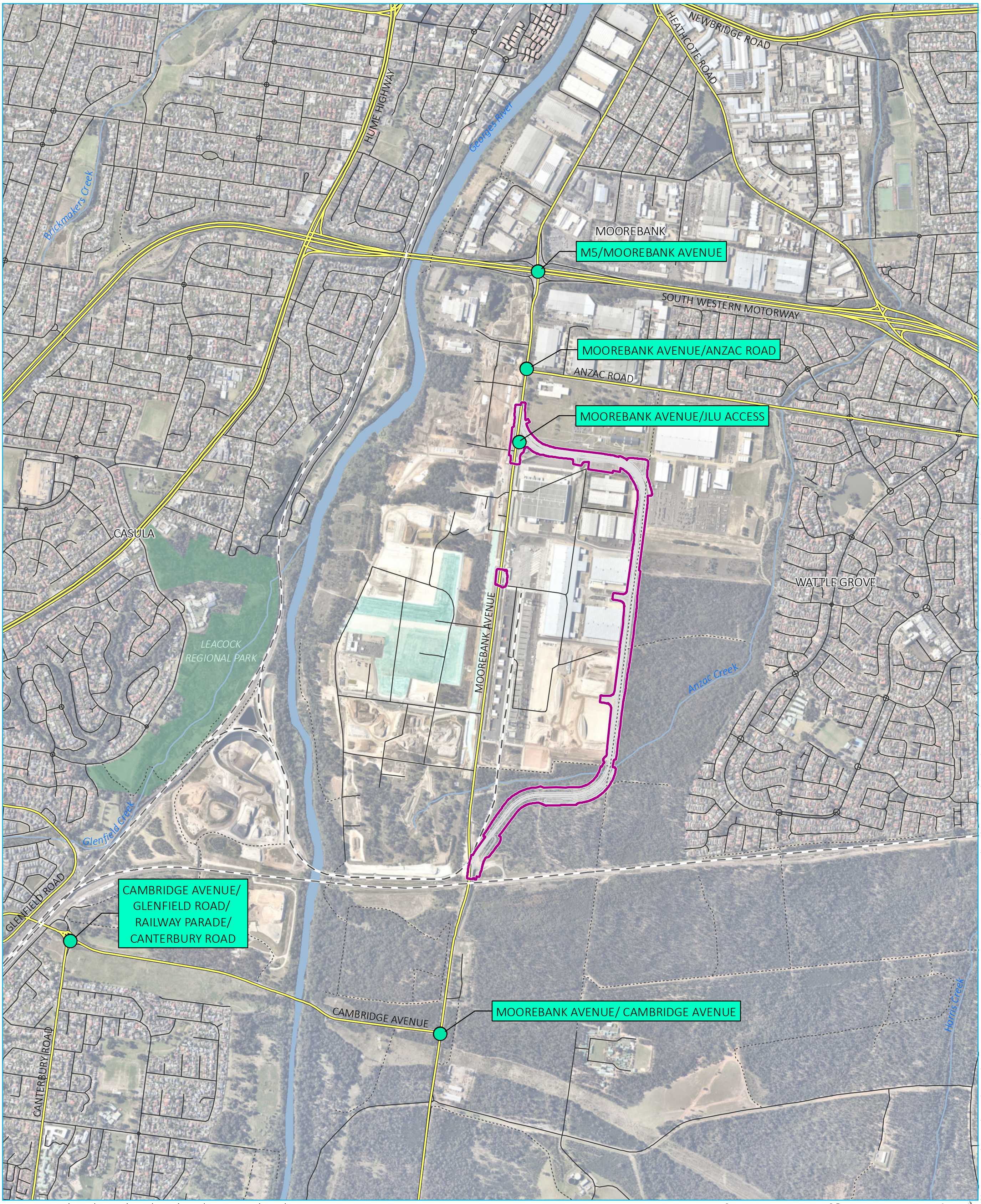
KEY

Construction footprint
Road design
Rail line
Watercourse
Existing road hierarchy
State Road
Regional Road
General road

Road hierarchy

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.4

EMM
creating opportunities



Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

0 0.5 1 km
GDA 1994 MGA Zone 56

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KEY

- Construction footprint
- Key intersection
- Road design
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse
- NPWS reserve

Key intersections

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.5

EMM
creating opportunities

i Traffic volumes and capacity

An intersection count survey was undertaken from 7:00am to 9:00am and from 4:00pm to 6:00pm on 4 March 2020 (prior to COVID 19 'lockdown' period) at the five key intersections listed above. The results of the intersection survey are presented in Appendix B of the TIA (Appendix D).

The following AM and PM peak hours have been identified based on the traffic volumes from the survey:

- AM peak hour 7:15am to 8:15am; and
- PM peak hour 4:00pm to 5:00pm.

Tube counters were installed at Moorebank Avenue between the M5 Motorway and Bapaume Road on 28 February 2020 for a 7-day period. The results of the tube survey are presented in Table 7.12.

Table 7.12 Tube count results

	Southbound	Northbound	Combined
5-day AADT[1]	10,179	10,402	20,581
Weekly 85th percentile speed	63	63	63
Heavy vehicle classification	20.4%	21.9%	21.1%

Note: 1. AADT = Annual Average Daily Traffic which is the average daily traffic over a year.

The traffic data shows that Moorebank Avenue carried over 20,000 vehicles per day. The recorded weekly 85th percentile speed is just over the posted speed limit of 60 km/h.

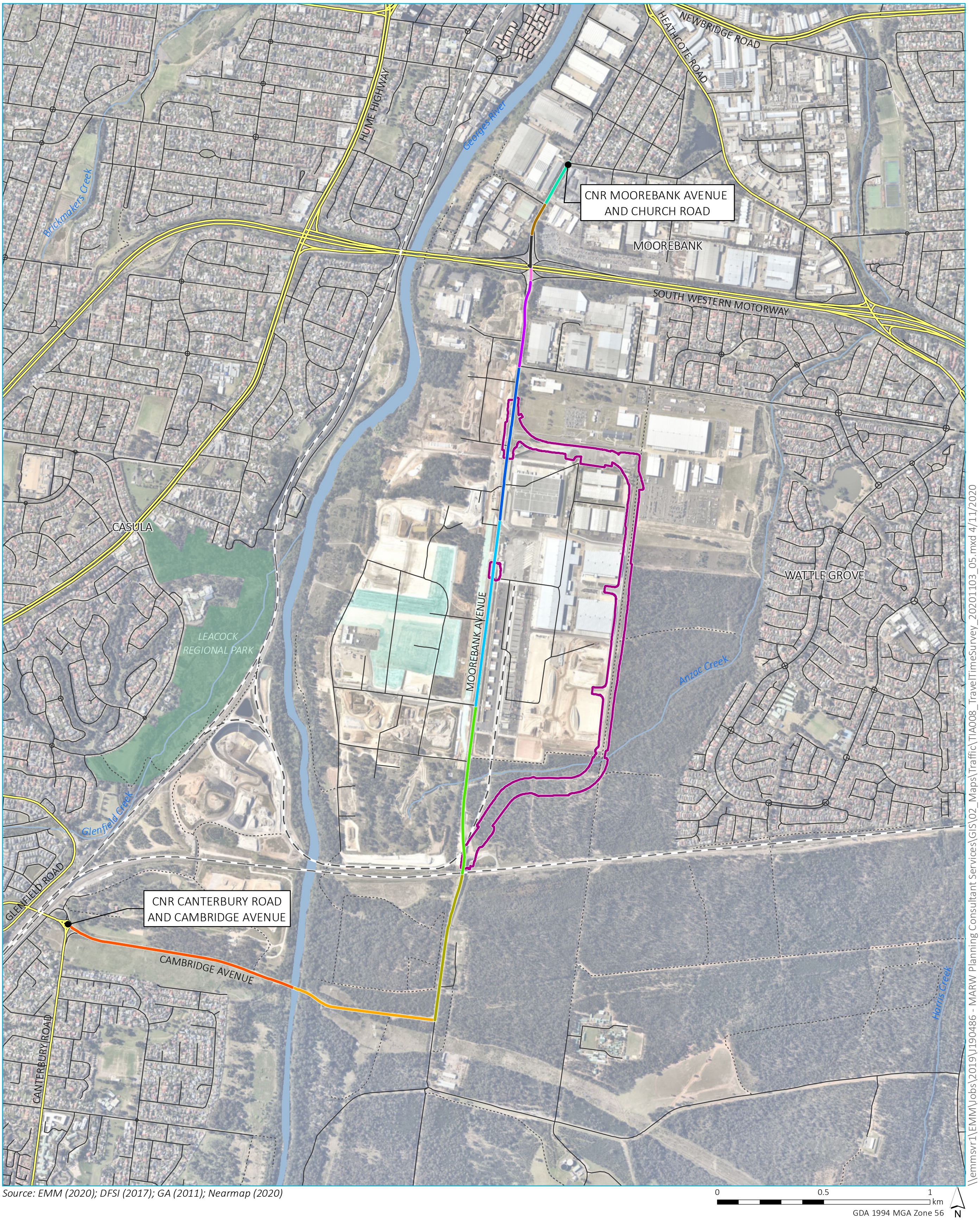
The recorded heavy vehicle proportion was over 20% but most heavy vehicles recorded were 2 axle courier vans or larger utility vehicles and the proportion of larger trucks (with 3 or more axles) recorded was much lower at between 4–5% on a typical weekday. This is considered reasonable given the current Moorebank Avenue traffic usage is a combination of through traffic from the south which is primarily a residential zone and traffic from the existing industrial precincts located at the northern end of Moorebank Avenue and along Anzac Road.

A travel time survey was also undertaken by EMM along Moorebank Avenue and Cambridge Avenue between Church Road (north) and Canterbury Road (south) on 26 February 2020 and 27 February 2020. Five survey periods were undertaken including:

- AM peak –7.00am-9.00am – Five trips in each direction;
- AM off-peak – 9.00am-10.00am – Three trips in each direction;
- PM off-peak – 3.00pm-4.00pm – One trip in each direction; and
- PM peak –4.00pm-6.00pm – Six trips in each direction.

The full extent of the survey is presented in Figure 7.6. The surveyed route has been divided into sections shown with different colour coding to further investigate travel speeds for specific sections of the route.

The results of the survey are presented in terms of the average journey times during each survey interval in Table 7.13 (northbound) and Table 7.14 (southbound). The greyed and bolded sections depict the length of Moorebank Avenue that is to be realigned.



Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

KEY

- Construction footprint
- Rail line
- Major road
- Minor road
- Vehicular track
- Watercourse
- NPWS reserve

Travel time segment

- Canterbury Rd - Georges River
- Georges River - Moorebank Ave
- Moorebank Ave - Rail line overbridge
- Rail line overbridge - Chatham Ave
- Chatham Ave - Site Access (MLP)
- Site Access (MLP) - Defence logistics complex
- Anzac Ave - M5 south access
- Defence logistics complex - Anzac Ave
- M5 south access - M5 north access
- M5 north access - Helles Ave
- Helles Ave - Church Rd

Travel time survey extent

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.6

EMM
creating opportunities

Table 7.13 Average travel times (northbound)

From (south)	To (north)	Distance (m)	Chainage	AM peak (min:sec)	AM off-peak (min:sec)	PM peak (min:sec)	PM off-peak (min:sec)
Canterbury Road Roundabout	Georges River	1,118	1,118	1:08	1:07	1:06	1:09
Georges River	Moorebank Ave T Junction	668	1,786	0:49	0:49	0:47	0:53
Moorebank Ave T Junction	Rail Line Overbridge	717	2,503	0:41	0:41	0:41	0:43
Rail Line Overbridge	**Chatham Ave**	**783**	**3,286**	**0:49**	**0:50**	**0:46**	**0:47**
Chatham Ave	**Site Access (MLP)**	**848**	**4,134**	**1:16**	**0:57**	**0:53**	**0:52**
Site Access (Moorebank Logistics Park)	**Defence Logistics Complex**	**448**	**4,582**	**0:30**	**0:30**	**0:32**	**0:28**
Defence Logistics Complex	Anzac Ave	309	4,891	0:43	0:44	0:32	0:24
Anzac Ave	M5 Access (South)	410	5,301	1:09	1:09	1:24	0:58
M5 Access (South)	M5 Access (North)	90	5,391	0:07	0:08	0:08	0:09
M5 Access (North)	Helles Ave	263	5,654	0:18	0:20	0:17	0:19
Helles Ave	Church Road	222	5,876	0:16	0:16	0:13	0:16
Total				**7:50**	**7:35**	**7:23**	**6:58**
Total for existing section of Moorebank Avenue to be realigned				**2:35**	**2:17**	**2:11**	**2:07**

For northbound travel time surveys, the average total journey time between the Cambridge Avenue/Glenfield Road/Railway Parade/Canterbury Road roundabout and Church Road varied by up to 52 seconds between the different survey periods and the travel time during the AM peak hour experienced the longest delays, compared to other times of the day.

For the section of Moorebank Avenue to be realigned, the typical existing northbound journey times varied between 2 minutes 07 seconds and 2 minutes 35 seconds, with the longest journey occurring during the AM peak period which is a reflection of the generally higher northbound route traffic volumes and increased delays at the three traffic signal controlled intersections on this section during the busy periods of the day.

Table 7.14 Average travel times (southbound)

From (north)	To (south)	Distance (m)	Chainage	AM peak	AM off-peak	PM peak	PM off-peak
Church Road	Helles Ave	222	222	0:14	0:13	0:15	0:13
Helles Ave	M5 Access (North)	263	485	0:34	0:25	0:56	0:34
M5 Access (North)	M5 Access (South)	90	575	0:06	0:05	0:06	0:05
M5 Access (South)	Anzac Ave	410	985	0:39	0:30	0:44	0:32
Anzac Ave	Defence Logistics Complex	309	1,294	0:26	0:38	0:25	0:25
Defence Logistics Complex	**Site Access (Moorebank Logistics Park)**	**448**	**1,742**	**0:37**	**0:36**	**0:44**	**0:42**
Site Access (Moorebank Logistics Park)	**Chatham Ave**	**848**	**2,590**	**0:52**	**1:01**	**0:55**	**0:59**
Chatham Ave	**Rail Line Overbridge**	**783**	**3,373**	**0:47**	**0:48**	**0:47**	**0:49**
Rail Line Overbridge	Moorebank Ave T Junction	717	4,090	0:44	0:42	0:55	0:55
Moorebank Ave T Junction	Georges River	668	4,758	0:51	0:50	0:47	0:52
Georges River	Canterbury Road Roundabout	1118	5,876	1:13	1:11	1:12	1:08
Total				**7:08**	**7:03**	**7:52**	**7:01**
Total for existing section of Moorebank Avenue to be realigned				**2:16**	**2:25**	**2:26**	**2:30**

For the southbound travel time surveys, the overall journey times were generally consistent with the northbound direction, for example the average travel time for the local section between Helles Avenue and the M5 Access (north) during the PM peak period was typically over 20 seconds longer, than during the other daily periods.

The average total journey times southbound between Church Road and the Canterbury Road roundabout varied by up to 51 seconds between the different survey periods and the southbound travel time during the PM peak hour experienced the longest delays, compared to other times of the day.

For the section of Moorebank Avenue to be realigned, the typical existing southbound journey times varied between 2 minutes 16 seconds and 2 minutes 30 seconds, with the longest journey times occurring during both the PM peak and off peak periods, which is again a reflection of the generally higher southbound route traffic volumes and increased traffic delays at the three traffic signal controlled intersections on this section during busy periods of the day.

A comparison of the average travel time between the northbound and southbound directions were found to be close with slight fluctuations at various times of the day, but with no definite patterns.

ii On-street parking

An on-street parking inventory survey has been undertaken by EMM along Moorebank Avenue south of the M5 and along Anzac Road to determine the existing parking restrictions and any potential parking impact due to the proposal. At present, the eastern part of Anzac Road is unrestricted and the remaining sections of Anzac Road and Moorebank Avenue are no stopping restricted.

iii Crash analysis

From 2014 to 2018, 40 crashes of varying severity have occurred in the vicinity of the Project site. A summary of the recorded crashes are provided below:

- Moorebank Avenue between the M5 and Cambridge Avenue – 33 crashes, comprising:
  - non-casualty – 14 crashes;
  - minor/other injury – 7 crashes;
  - moderate injury – 6 crashes; and
  - serious injury – 6 crashes.
- Anzac Road between Moorebank Avenue and Wattle Grove Drive – 7 crashes, comprising:
  - non-casualty – 4 crashes;
  - moderate injury – 2 crashes; and
  - serious injury – 1 crash.

Of these, light trucks were involved in eight of these crashes while heavy trucks were not involved in any crashes. Only one crash involved speeding which resulted in a non-casualty. Five of these crashes involved fatigue, of which three resulted in serious injury. Nevertheless, these crashes are scattered along relatively long road sections and they are therefore considered a low occurrence.

iv Public transport facilities

There are multiple bus stops along Moorebank Avenue and Anzac Road. Route service 901 provides connectivity between Liverpool and Holsworthy train stations via Moorebank and Anzac Avenues. It generally provides hourly services between 5:30am and 9:30pm during the weekdays and between 7:00am and 6:00pm on weekends. Additional bus services are also available during the weekday peak hours to reduce the service intervals to 30 minutes. There is a limited service to Moorebank Avenue south of Anzac Road, with only one service in the early morning and one in the afternoon which terminates at Chatham Avenue. There are no published public bus routes that travel along the Moorebank Avenue to or from Cambridge Avenue.

v Active transport facilities

Liverpool Bike Plan 2018-2023 (LCC 2018) is a high-level planning document which identifies strategic cycle routes in the Liverpool LGA. In the context of the Project, the identified off-road strategic route (Chipping Norton) runs along Moorebank Avenue and Anzac Road which establishes regional north-south connections.

A pedestrian footpath is currently provided along the western side of Moorebank Avenue. The road is surrounded by and completely within an industrial precinct where significant pedestrian movements are not expected.

7.4.3 Traffic demands for construction

i Access routes

Consistent with the access arrangements of the MLP, construction-related heavy vehicles will be required to approach the Project site from the north either via the M5 Motorway or the 'alternative route' (identified in conditions of consent in previous MLP approvals). The alternative route includes heavy vehicles travelling north along Moorebank Avenue, over the M5 Motorway up to the intersection with Newbridge Road.

Vehicles transporting fill will generally use the nominated construction truck routes, ie M5 Motorway and Moorebank Avenue to access the Project site, as noted above. Heavy vehicles transporting spoil and demolition material will exit the Project site and head north on Moorebank Avenue towards the M5 Motorway.

All concrete batch plants likely to be utilised for the Project are located to the north/west of the precinct, mainly in the suburbs of Moorebank or Prestons. The concrete delivery vehicles will approach the Project site possibly via M5 from the east or west with an even split or further north (eg Moorebank Avenue, Heathcote Road).

The asphalt plants likely to be utilised for the Project are located at Prestons (State Asphalts), Minto (Fulton Hogan), Prospect and Greenacre (Boral) and Rosehill (Downer). These would all access the Project site from the north. Only Minto is geographically located south of the Project site, however, the quickest heavy vehicle route to Moorebank is via the M5 Motorway.

In the event that the nominated route was not available, vehicles will be restricted to travel via TfNSW's approved B-double routes and adhere to existing posted load limits on roads. No heavy vehicle associated with the Project is expected or required to use Anzac Road or Cambridge Avenue.

The Construction Traffic Impact Assessment for MPW Stage 2 (Arcadis 2016a) and MPE Stage 2 (Arcadis 2016b) assumes the following construction traffic distribution:

- for light vehicles:
  - 90% to the M5 Motorway and further north; and
  - 10% to Anzac Road.
- for heavy vehicles:
  - all traffic to the M5 Motorway and further north; and
  - a number of smaller trucks via Cambridge Avenue for disposal of unsuitable material. Further discussion has been held in subsequent section of this report.

It is assumed that Project construction workforce and deliveries will have similar origins, with a small number of light vehicles (say 5%) coming from the south instead of Anzac Road and all heavy vehicles travelling to/from the north. Traffic generation has been distributed proportionally with the existing directional traffic splits as detailed in Table 7.15.

The existing Moorebank Avenue route north of the DJLU access is a TfNSW approved route capable of accommodating heavy vehicles up to 26 m B-Doubles. The proposed realignment carriageway is designed to accommodate future 36.2 m long A-double and 30 m long Super B-double trucks. The unfinished pavement will be required to cater for all relevant heavy vehicle movements during construction.

Table 7.15 Peak hour traffic distribution (Construction)

Directions	Light vehicles		Heavy vehicles	
	Turn volume (sum of AM and PM peak, inbound and outbound traffic)	Percentage	Turn volume (sum of AM and PM peak, inbound and outbound traffic)	Percentage
M5 Motorway west	1,249	35%	94	44%
M5 Motorway east	1,013	29%	64	29%
Moorebank Avenue north of M5 Motorway	918	26%	58	27%
Total		**90%[1]**		**100%**

Note: 1. The remaining 10% light vehicles will come from Anzac Road or Cambridge Avenue.

ii Site access and safety

There are three points of access to the work site – in the north-east corner adjacent to the main site compound; at In-terminal vehicle (ITV) road, which is an internal access road within MPE near intersection C, to provide earthworks and structures access; and at the southern end of the Project, near the bridge over the East Hills railway. A traffic controller will mitigate vehicular-pedestrian conflict at site accesses.

To mitigate the vehicular-pedestrian conflict at the site accesses, a traffic controller is proposed to mitigate pedestrian safety risks.

iii Traffic-generating activities

The staging and timing of construction is described in Section 5.4.2 and presented in Table 5.8.

There are three points of access to the Project site:

- at the north-east corner adjacent to the main construction compound;
- at In-terminal vehicle road to provide earthworks and structure access; and
- at the southern end of the Project, near the bridge over East Hills railway.

Construction hours for the Project would be consistent with the approved construction hours for the surrounding precinct works as described in Section 5.4.9 and presented in Table 5.11.

The estimated total workforce over the duration of the Project is an average of 72 construction personnel and 11 contractor staff. In any respective peak stage, there will be 109 construction workers and 13 contractors. Car parking will be provided within the construction footprint of the Project and the MPE construction site so as to eliminate any on-street parking demand. Notwithstanding, the contractor will discourage car usage in the form of transportation assistance of workers to and from the Project site, in addition to advising of available public transport options nearby. Car sharing of workers will also be encouraged.

Construction traffic is described in Section 5.4.11. The estimated daily construction traffic movements associated with each of the activities are presented in Table 7.16 (note that one return trip counts as two movements). It should be noted that this estimate excludes part-time and offsite worker vehicle movements, and delivery truck movements.

Table 7.16 Daily construction traffic movements

Stage	Average movement		Maximum movement	
	Light vehicle[1]	Heavy vehicle	Light vehicle	Heavy vehicle
Preliminary work and enabling work	120	6	240	10
Construction of carriageway	246	144	500	410[2]
Finishing works	160	4	320	6

Note: 1. Light vehicle traffic includes employee generated traffic and utility trade utes, assuming each employee drives to and from the Project site individually.

2. This is based on a peak paving day – placing Selected Material Zone (SMZ) material, pouring 500m^3 lean mix concrete subbase and placing 1,500 tonnes of AC.

Peak hour traffic is taken as 10% of the daily traffic as expressed in Table 7.16, which is considered to be appropriate and on the conservative side due to the following reasons:

- construction will substantially spread across 11 hours daily (7:00am to 6:00pm); and
- the employee traffic will, for the most part, arrive before the network AM peak hour (7:15am to 8:15am) and depart after the network PM peak hour (4:00pm to 5:00pm).

Accordingly, the peak hour traffic movement is presented in Table 7.17. Scheduling of transportation of construction materials will be coordinated outside the peak hours, where feasible.

Table 7.17 Peak hour traffic generation (Construction)

	Average traffic movement	Maximum traffic movement
Light vehicles (including employee traffic)	25 (24.6)	50 (50.0)
Heavy vehicles	15 (14.4)	41 (41.0)

Note: Rounding has been applied. Numbers in brackets represent the calculated value before rounding is applied.

Out of hours work (including heavy vehicle movements) will be subject to an out of hours works protocol and the requirements of a Construction Noise and Vibration Management Plan.

iv Other requirements

To ensure security to the construction site and safety of the general public, temporary road barriers and fences will be used to secure the construction footprint boundary. All access points will be securely locked when construction activities are not in progress. Safety barriers will also be installed along sections of the Project near to the rail link to prevent the risk of vehicles on the new road section losing control and crashing onto the rail track below.

7.4.4 Assessment of impacts

i Construction impacts

a impact to intersections

A cycle time of 140 seconds has been adopted in determining impact to the M5/Moorebank Avenue intersection. For other intersections, a cycle time of 70 seconds has been adopted. The average cycle times were found to be between 70 to 110 seconds for the M5/Moorebank Avenue intersection and between 50 to 90 seconds for Moorebank Avenue/Anzac Road intersection.

The results demonstrate that for M5/ Moorebank Avenue intersection, the queue on the north approach stretches up to 635 m which has not been observed on site. For the other two signalised intersections, the SIDRA results are more representative with a 70 second cycle time, however, the observed queue lengths were slightly different. The 140 seconds cycle time has no influence on the unsignalised intersections.

As the modelled queue lengths of these signalised intersections do not match the observed queue lengths, a sensitivity test has been undertaken using the cycle time captured in the video footage at these intersections with appropriate phasing and total cycle time. The model results are then validated by comparing the observed delay and queue length at each approach of the intersections.

The performance of those key intersection identified in Section 7.2.2 and shown in Figure 7.6 have been modelled using SIDRA Intersection 9.0 software with the adjusted cycle time. SIDRA provides a number of performance indicators which are described in Section 5.14 of the TIA (Appendix D).

The existing and forecast SIDRA intersection capacity analyses are presented in Table 7.18.

Table 7.18 Validated SIDRA results with and without forecast development (construction) traffic

Intersection	Peak hour	DOS[1]		LOS[2]		DEL[3]		Q95[4]	
		Existing	Construction	Existing	Construction	Existing	Construction	Existing	Construction
M5 Motorway/ Moorebank Avenue	AM	0.745	0.745	B	B	25.0	25.1	86.7	86.7
	PM	0.837	0.837	C	D	38.5	45.0	183.0	183.0
Moorebank Avenue/Anzac Road	AM	0.688	0.694	B	B	17.5	18.3	149.6	162.3
	PM	0.804	0.804	B	B	18.5	18.5	107.9	117.2
Moorebank Avenue/ DJLU Access	AM	0.681	0.731	A	A	5.2	6.2	80.2	82.8
	PM	0.874	0.889	B	B	20.3	23.3	285.4	296.6
Moorebank Avenue/ Cambridge Avenue[5]	AM	0.690	0.692	A	A	8.4	8.4	51.0	51.4
	PM	0.644	0.646	B	B	19.3	19.4	58.1	58.7
Cambridge Avenue/ Glenfield Road/Railway Parade/Canterbury Road	AM	0.654	0.656	C	C	31.6	32.2	53.8	54.8
	PM	0.319	0.320	A	A	11.8	11.8	14.5	14.5

Note: 1. DOS (degree of saturation) - the total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation (eg 0.8=80% saturation).

2. LOS (level of service) - this is a categorization of average delay, intended for simple reference (eg an LOS of A represents good operation and a LOS of F represents Unsatisfactory operation with excessive queuing).

3. DEL (average delay) - the average delay encountered by all vehicles passing through the intersection.

4. Q95 (95% queue lengths) - is defined to be the queue length in metres that has only a 5-percent probability of being exceeded during the analysed time period. It transforms the average delay into measurable distance units.

5. For priority-controlled intersections, the LOS and DEL of the movement with highest delays are reported.

With regards to Table 7.18, the following results are noted:

- M5 Motorway/Moorebank Avenue – during the AM and PM peaks, the intersection has an overall level of service (LOS) B with 25.5% and 16.3% spare capacity, respectively. It was also noted that during the PM peak, the right turn queue on the northern approach (westbound on-ramp traffic) exceeds the storage length of the facility. The construction of the Project will have a very minor impact on the performance of the intersection. Additionally, there will not be any deterioration on the queue length for the right turn movement at the northern approach.

- Moorebank Avenue/Anzac Road – this intersection currently operates at LOS B on both AM and PM peak hours, with spare capacity (31.2% in the AM and 19.6% in the PM) to accommodate additional traffic. There is heavy southbound traffic during the AM peak and northbound traffic during the PM peak which represents longer queues. However, it is observed that generally vehicles are able to clear the stop line in one cycle in all approaches.

- Moorebank Avenue/DJLU access – this intersection currently operates overall LOS A and B during the AM and PM peak hour respectively with reasonable spare capacity, especially during the AM peak hour. The maximum queue length of the southern and northern approach will increase to 82.8 m and 296.6 m in the AM and PM peak hour respectively which will queue back to the Moorebank Avenue/Anzac Road intersection during the PM peak. However, the intersection will still have 11.1% to 26.9% spare capacity with the construction traffic.

- Moorebank Avenue/Cambridge Avenue – the priority-controlled intersection has LOS A for all movements in the peak hours, except for the right turn movement in the western approach would operate at LOS B for both existing and construction traffic. This intersection will experience construction related light vehicles only, hence net traffic impact at this intersection will be marginal. With construction traffic, all individual movement and the overall intersection will have the same LOS.

- Cambridge Avenue/Canterbury Road/Glenfield Road/Railway Parade – this dual lane roundabout operates lot better during the PM peak, compared to the AM peak. The existing and development LOS would remain the same (eg LOS C during the AM peak and LOS A for the PM peak). This intersection will not have any additional construction related heavy vehicle, hence, the traffic impact due to the construction related light vehicles (predominantly workforce) will be marginal and unlikely to be noticeable to the general road users.

Accordingly, the construction of the Project will not result in changes to LOS for all key intersections and impacts are unlikely to be noticeable to road users.

b Impact to road network compliance

The mid-block level of service on urban roads is assessed on a vehicle's average travel speed. The Austroads Guide to *Traffic Management Part 3: Traffic Studies and Analysis* (Austroads 2020) sets out typical mid-block capacities for various types of urban roads. Moorebank Avenue has a peak directional capacity of 900 vehicles per hour per lane where there is interrupted traffic flow at traffic signal controlled intersections. Cambridge Avenue, being an uninterrupted road (eg no traffic lights), has a higher directional capacity of 1,400 vehicles per hour per lane.

The maximum urban road peak hour flows for each level of service are shown in Table 7.19, based on the comparable rural road volume/capacity ratios applicable for roads in level terrain with no sight distance restriction on overtaking.

Table 7.19 Urban road peak hour flows for each level of service

Level of Service	Flow based on capacity of 900 (vehicles/h) for interrupted flow	Flow based on capacity of 1,400 (vehicles/h) for uninterrupted flow
A	120	180
B	240	370
C	380	590
D	570	880
E	900	1,400

The existing morning and afternoon peak hour surveyed traffic volumes for Moorebank Avenue and Cambridge Avenue are compared with the maximum lane capacity limits in Table 7.20.

Table 7.20 Mid-block capacity assessment for existing traffic usage

Road	Direction	Capacity per lane per direction per hour	Peak hour volume	Level of service
Moorebank Avenue	Northbound	900	1,117 (AM) / 848 (PM)	F
	Southbound	900	783 (AM) / 948 (PM)	F
Cambridge Avenue	Eastbound	1,400	1,256 (AM) / 341 (PM)	E
	Westbound	1,400	341 (AM) / 1087 (PM)	E

The current morning and afternoon peak hourly traffic usage of Moorebank Avenue does not comply with the maximum urban capacity threshold of 900 vehicles per lane per hour for interrupted flow. Cambridge Avenue does comply with the threshold of 1,400 vehicles per lane per hour, with a LOS E. The existing non-compliance of mid-block capacity of Moorebank Avenue is not expected to have any significant impact on construction traffic.

c Impact to public transport, pedestrians and cyclists

Moorebank Avenue is serviced by bus route 901 which provides half hourly service during peak hours between Liverpool and Holsworthy. However, there is only a limited service in the respective AM and PM peak hour periods at the IMEX terminal entrance on Moorebank Avenue. Due to the limited servicing area, the capacity of existing public transport services would not be impacted.

Due to the nature of the surrounding area, any impact on existing pedestrian demand will be minimal as the existing Moorebank Avenue will remain publicly accessible throughout the span of this Project.

The existing Moorebank Avenue will remain publicly accessible for cyclists throughout the construction of the Project. At the Project site access points, heavy vehicles will be managed by traffic controllers ensuring cyclist safety.

d Impact to adjoining properties

As part of separate works, the DJLU site access will be relocated to Anzac Road (subject to development consent from LCC). The Project corridor will abut MPE to the west which is currently under construction and the Boot Land to the east which is a biobanking site. Access would be maintained to the Sydney Trains/TAHE land adjacent to the East Hills Railway. Hence, the Project will not impact on formal access to adjoining premises.

e Impact to on-street parking

Any construction worker parking demand will be met within the Project site and dependence on street parking will be minimised.

f Heavy vehicle adequacy

The existing Moorebank Avenue is an TfNSW approved road capable of accommodating heavy vehicles up to 26 m B-doubles. Therefore, the construction related heavy vehicles, ie 19 m trucks, could easily be accommodated along Moorebank Avenue. In addition, the realigned carriageway has been designed to accommodate 36.2 m A-double and 30 m Super B-double. Therefore, the unfinished pavement/road base will cater for heavy vehicles during construction.

g Emergency vehicle access

Throughout all stages of construction, emergency vehicles will be able to access the Project site at the site accesses.

h Access to adjoining properties

As part of a separate project, the DJLU access will be relocated to Anzac Road (subject to development consent from LCC). The Project will abut the MPE Terminal areas of the west which is currently under construction and to the east the neighbouring land (Boot Land) is currently undeveloped. Maintenance vehicle access would be maintained to the Sydney Trains/TAHE land adjacent to the East Hills Railway. Hence, there will be no formal impact on vehicle access to adjoining premises.

i Safe access and egress to/from the classified road network

Access and egress to/from the site during construction is described and illustrated in Section 5.21 of the TIA. These include the existing access to MPE on Moorebank Avenue, the use of the DJLU access intersection (subject to approval from DoD) and the existing Sydney Trains access south of the railway overbridge (subject to approval from TAHE). Overall, all three proposed site access along Moorebank Avenue currently exist and operate effectively. There are no safety implications associated to these site access/ egress.

j Cumulative impacts

Requirement 1(h) of the Traffic SEARs requires the assessment of cumulative traffic impacts of the Project. To assess the potential cumulative impacts of the Project, the year 2022 was chosen as the likely peak cumulative impact period for traffic movement associated with the construction of the MLP, partial operation of MPE (153,435 m^2 GFA), and construction of the MAR.

The cumulative traffic impact assessment undertaken for the likely peak impact period in 2022 (refer to Section 5.22 of Appendix D) demonstrates that the local traffic network will continue to operate at a satisfactory level, without any significant additional traffic impacts generated by the Project. SIDRA modelling results are associated with this assessment are included at Appendix E to Appendix D (Traffic assessment).

ii Operational impacts

The existing road network in the vicinity of the Project is currently operating below capacity (ie it is not being suppressed by the traffic capacity of the two-lane section between MPE and MPW), so there will not necessarily be any jump in traffic volumes due to the future extra capacity of the four lane road.

Traffic projections were prepared by Arcadis is 2016 for the new road diversion (referred to as Scenario 2 Blue Option) and incorporated all future regional road future regional road network and traffic growth assumptions (including improvements to Cambridge Avenue) that were known to Arcadis at that time. The Arcadis growth rate projection was noted as applying to both the Anzac Road and Moorebank Avenue routes and being + 1.8% per annum in the AM peak hours and + 1.6% per annum in the PM peak hours. For simplicity EMM has assumed an equivalent average rate of +1.7% annual growth to apply for both the AM peak and PM peak traffic peak hours. Over a 16 year future period to the year 2036, this will correspond to an overall future traffic growth rate of 27% for through traffic using the route.

The Project may potentially reduce the overall route through traffic volumes as it increases the travel distance by one kilometre approximately. The future speed limit will still be posted at 60 km/hr so there will not be any time saving mechanism to compensate for the longer route. Therefore, it is conservative to assume that there will just be continuing traffic growth at approximately 1.7% annually, as a linear growth projection from the current year 2020 traffic levels.

There will not generally be any additional traffic impacts to the broader road network as a result of the development of the Project. Any impacts will be localised to the current section of Moorebank Avenue between Anzac Road and Cambridge Avenue.

The Project incorporates four intersections that will be built/upgraded in this section of Moorebank Avenue (refer Figure 5.11).

a Traffic generation and distribution

The existing 2020 peak hour traffic volumes at Moorebank Avenue and the projected level of traffic for the years of 2024 (opening year), 2026 and 2036 are presented in Table 7.21.

Table 7.21 Moorebank Avenue traffic

Year	Peak hour	Northbound		Southbound	
		Light vehicles	Heavy vehicles	Light vehicles	Heavy vehicles
2020 (Existing)	7am to 8am	1,040	38	331	4
	4pm to 5pm	380	4	795	22
2024	7am to 8am	1,111	41	354	4
	4pm to 5pm	406	4	849	23
2026	7am to 8am	1,146	42	365	4
	4pm to 5pm	419	4	876	24
2036	7am to 8am	1323	48	421	5
	4pm to 5pm	483	5	1011	28

Existing and future operational daily traffic along Moorebank avenue after application of an annual increment of 1.7% is presented in Table 7.22.

Table 7.22 Moorebank Avenue Realignment daily traffic

Year	Southbound	Northbound	Combined
2020	10,179	10,402	20,581
2024	10,871	11,109	21,980
2026	10,179	10,402	20,581
2036	12,948	13,231	26,179

b Built/upgraded intersections

The Project involves the construction of upgrade of four intersections:

- Moorebank Avenue/Terminal access/MAR (intersection A);
- MAR/Warehouse access 1 (intersection B);
- MAR/Warehouse access 2 (intersection C); and
- MAR/Warehouse access 3 (intersection D).

The operational traffic movements at each of the new/upgraded intersections are presented in Figure 6.2, Figure 6.3, Figure 6.4 and Figure 6.5 of the TIA (Appendix D).

c Signal warrant assessment

A traffic signal warrant assessment was undertaken to determine the need for signalised intersections in accordance with the requirements set out in the TfNSW Traffic Signal Design Guidelines. In accordance with the Roads & Traffic Authority's (RTA) *Traffic Signal Design – Section 2 Warrants* (RTA 2008), a signalised intersection may be considered if one or more warrants are met. Based on the traffic volumes presented in Figures 6.2 – 6.5 of the TIA (Appendix D), the intersections do not meet the requirement for a traffic signal. Accordingly, other options for were considered including priority-controlled intersection (eg give way), roundabout and signalisation. It is noted that roundabouts were not considered due to the sit constraint and possible land acquisition.

While the four intersections did not meet the signal warrant, the priority-controlled alternative will provide unacceptable performance (LOS F) for the forecast traffic.

Signalisation of the intersections B, C and D will also ensure traffic safety at these intersections and minimise traffic delay for the through movements. As all the heavy vehicles are expected to arrive from the north, an unsignalised intersection would require a reasonable gap (filter turn) to execute the right turn movements. Any waiting vehicle wishing to turn right effectively reducing the eastbound or southbound capacity by half and potentially creating a bottle neck in the area.

Similarly, exiting trucks wishing to travel west or north would require a reasonable gap before executing the left turn movements from the side roads. As trucks generally take longer for the left turn, it will affect the through traffic and also create traffic congestion within the new road section. Further, left turning vehicles from the side roads will not have a clear line of sight to their right if there any simultaneous right turning vehicle to their right- hand side. This will create safety and sight distance issues.

Despite failing to meet the warrants specified under the RTA's *Traffic Signal Design – Section 2 Warrants* (RTA 2008) signalisation of the tree new intersections B, C and D is essential based on the traffic safety and efficiency grounds. It is further noted that, upon completion of the MLP, three existing three signalised intersections (one permanent at DJLU access and two temporary) along the existing Moorebank Avenue route will be removed. Therefore, there is no net increase in traffic signals is proposed on the road this network.

d Travel time

The four built/upgraded intersections have also been modelled with SIDRA to produce average travel time and speed of the route. The travel time and speed of the realigned section of Moorebank Avenue are presented in Table 7.23.

Table 7.23 Travel time and speed of the realigned section of Moorebank Avenue

Model year	Peak hour	Average travel speed (km/h)		Average travel time (s)	
		Northbound	Southbound	Northbound	Southbound
2024	AM	47.2	55.4	224.8	191.4
	PM	50.8	55.3	208.8	191.9
2026	AM	46.8	55.5	226.7	191.0
	PM	50.8	55.2	208.9	192.1
2036	AM	47.7	55.7	222.4	190.5
	PM	50.5	55.2	209.9	192.3

Table 7.24 summarises and compares the survey travel times for the realigned section of Moorebank Avenue previously presented in Table 7.13 and Table 7.14.

Table 7.24 Surveyed travel time(s) of the existing section of Moorebank Avenue vs realigned Moorebank Avenue

Peak hour	Northbound				Southbound			
	2020	2024 (realigned)	2026 (realigned)	2036 (realigned)	2020	2024 (realigned)	2026 (realigned)	2036 (realigned)
AM	155	+45%	+46%	+43%	136	+41%	+40%	+40%
PM	131	+59%	+59%	+60%	146	+31%	+32%	+32%

The modelling suggests that traffic on the realigned Moorebank Avenue could experience an increase of travel time by up to 60% (78.9 seconds). This increase in travel time has the potential to discourage road users from using the Project and seek to use alternative routes such as the Hume Highway or the M5 Motorway.

e Mid block capacity

North of the south-eastern corner of MPE site, the new road section will be two lanes in each direction and south of that point the new road section will be reduced to one lane in each direction.

To determine the mid-block capacity of the northern road section, the Ausroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads 2020) has been used to provide typical mid-block capacities for various types of urban roads. For a divided road with two lanes each way, the one-way midblock capacity is 1900 vehicles, which is more than the forecast traffic volumes for the realignment.

To determine the mid-block capacity of the southern road section (ie one lane in each direction), the *Guide to Traffic Generating Developments* (RTA 2002) has been used to provide the two-way hourly traffic capacities (ie number of vehicles per hour) for two-lane roads (one lane each way) for different Levels of Service with a design speed of 100 km/h based on different terrain types. For a design speed limit of 70 km/h it has been assumed that the mid-block capacity is 80% of that of a 100 km/h road. The level of service of this section of the road is presented in Table 7.25.

Table 7.25 Level of service of southern road section

Year	Peak hour	Combined traffic volumes (vehicles/hour)	Level of service
2024	AM	1,530	E
	PM	1,292	E
2026	AM	1,577	E
	PM	1,333	E
2036	AM	2,257	F
	PM	1,539	E

The data in the above table shows that the configuration will cater for the predicted level of traffic at LOS E or F during the peak hours.

Given the strategic intent of the Project is to replicate the existing conditions, this outcome is considered acceptable. Furthermore, the existing bridge over the East Hills Railway presents a constraint to providing additional lanes that would otherwise improve the existing LOS. The existing bridge design necessitates a short two-lane section where the four lanes taper into two.

f Traffic redistribution following Cambridge Avenue upgrade

The Cambridge Avenue Upgrade (CAU) was initially identified in the Draft Glenfield Precinct Plan (DPE 2015) and is currently at the 'planning phase' by the NSW Government. This upgrade would improve access to the Moorebank Intermodal Terminal from the south west and will provide an important future transport corridor connecting MLP with, the Western Sydney Employment Area, Badgerys Creek Airport, and the South West Growth Centre. For freight destinations to the south and south-west, the more direct route via Cambridge Avenue (assuming no load limit restriction following the upgrade) will become more feasible. The CAU is expected to ease the pressure on traffic distribution to the north and result a more balanced traffic distribution to the north and south in the area. A sensitivity test was undertaken for three scenarios in 2036, including:

- 10% MPE operational traffic travelling to/from the south via the CAU route;
- 20% MPE operational traffic travelling to/from the south via the CAU route, and
- 30% MPE operational traffic travelling to/from the south via the CAU route.

The SIDRA network intersection analysis results for the test scenarios are presented in Table 7.26 and in Appendix F of the TIA.

Table 7.26 SIDRA results for redistributed MPE and MPW operations traffic

Intersection	Peak hour	DOS			LOS			DEL			Q95		
		10% case	20% case	30% case	10% case	20% case	30% case	10% case	20% case	30% case	10% case	20% case	30% case
A	AM	0.871	0.861	0.862	B	B	B	23.2	22.3	22.2	208.2	199.7	200.0
	PM	0.633	0.616	0.613	A	A	A	12.2	12.1	12.1	53.3	52.8	52.5
B	AM	0.576	0.551	0.553	A	A	A	6.1	6.0	6.0	117.8	116.0	116.8
	PM	0.525	0.532	0.541	A	A	A	2.8	2.9	3.0	20.0	22.7	25.5
C	AM	0.522	0.522	0.529	A	A	A	5.9	5.9	5.9	110.5	110.6	112.6
	PM	0.525	0.535	0.545	A	A	A	3.7	3.7	3.5	28.3	29.7	27.8
D	AM	0.516	0.521	0.527	A	A	A	4.3	4.3	4.3	74.6	75.8	77.4
	PM	0.527	0.538	0.550	A	A	A	4.0	4.0	4.1	28.4	29.0	30.4

The SIDRA results show that with the redistributed traffic there will not be a change in performance for any of the intersections.

g Impact to public transport, pedestrians and cyclists

Additional bus stops will be provided along the realigned section of Moorebank Avenue. The additional truck movements from the MPE and MPW developments will not significantly impact the road amenity and therefore, buses running along the realigned Moorebank Avenue should not experience significant traffic delays.

Along the realigned Moorebank Avenue, shared user path will be provided on the western side of the road providing access to the MPE developments. The shared user path will cross to the eastern side of the Project where it runs along the Boot Land to the bridge over the East Hills Railway. Appropriate pram ramps would be provided at the warehouse accesses to ensure connectivity.

h Property and business access

The Sydney Trains/TAHE gate will be repositioned as part of the proposal, near the southern tie in, north of the East Hills Railway overbridge.

There are currently five roads off Moorebank Avenue used to access businesses and MPW. These accesses will not be impacted by the Project.

i Safety

There is a new terminal rail line to the MPE, which is parallel to the MAR for a short section near the southern tie-in. The tie in is on a bend and therefore there is a potential safety issue. Strongly reinforced safety barriers are proposed to mitigate this issue.

7.4.5 Management and mitigation measures

Mitigation measures to be implemented for potential traffic and transport impacts are summarised in Table 7.27.

Table 7.27 Management and mitigation measures for transport and traffic

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of bushfire protection measures	TRA01	A transport and traffic management plan (TTMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The TTMP will provide details for the ongoing management and maintenance of traffic management and mitigation measures during the construction phase of the Project.
Traffic control	TRA02	Prior to the commencement of construction, traffic control plans (TCPs) will be developed and will be encompassed within the traffic management plan. TCPs shall be developed in accordance with the AS and the RMS *Traffic Control at Work Sites Manual - Version 5* (RMS 2018).
Traffic control	TRA03	All traffic controllers engaged on-site will be accredited by TfNSW, and act in accordance with TfNSW Standard Conditions, including: • no stopping of traffic on public streets; and • no stopping of pedestrians in anticipation of truck movements. Pedestrians may only be held for short periods, for their safety, whilst a truck is entering or leaving the site.
Traffic control	TRA04	No marshalling or queuing of trucks will be permitted on the public road.
Licencing	TRA05	A Road Occupancy Licence application will be submitted to the Transport Management Centre for approval prior to any road closures.
Road safety	TRA06	Safety barriers will be installed for the sections of the new route which is closest to the new terminal rail line to prevent any chance of a vehicle on the new road losing control and crashing onto the rail track below.

7.5 Noise and vibration

7.5.1 Overview

A Noise and Vibration Impact Assessment (NVIA) (Appendix E) was undertaken in accordance with the following guidelines:

- NSW Department of Environment Climate Change and Water (DECCW) 2011, *Road Noise Policy* (RNP);
- NSW Roads and Maritime Services (RMS) April 2015 *Noise Criteria Guideline* (NCG);
- NSW Roads and Maritime Services (RMS) April 2015 *Noise Mitigation Guideline* (NMG);
- NSW Roads and Maritime Services (RMS) May 2018 *Noise Model Validation Guideline* (NMVG);
- NSW Department of Environment Climate Change (DECC) 2009, *Interim Construction Noise Guideline* (ICNG); and
- Department of Environment and Conservation (DEC) NSW 2006*, Assessing Vibration: a technical guideline*.

Table 7.28 sets out the SEARs that relate to noise and vibration and identifies where they are addressed in this EIS.

Table 7.28 SEARs for the Project – Noise and vibration

Requirement	Where addressed in this EIS
3. Noise and Vibration	
1. Assess construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines, including activities with the proposed alignment and activities at ancillary facilities, and vehicle movements associated with the proposal, including haulage vehicles. The assessment must identify sensitive receivers and assess construction noise/vibration generated by representative construction scenarios focusing on high noise generating works. Where work hours outside of standard construction hours are proposed, clear justification and detailed assessment of these work hours must be provided, including alternatives considered and mitigation measures proposed.	Construction and operational noise and vibration impacts have been assessed in accordance with the specified guidelines within Chapter 5 and Chapter 6 of the NVIA (Appendix E) and summarised within Section 7.5.3 of this EIS. Sensitive receivers are identified in Chapter 4 of the NVIA (Appendix E) and Section 7.5.2 of this EIS.
2. Demonstrate that blast impacts are capable of complying with the current guidelines, if blasting is required.	No blasting is proposed as part of the construction works (refer to s.7.5.3.ii).
3. Impacts to the structural integrity and heritage significance of items (including Aboriginal places and items of environmental heritage).	Potential noise and vibration impacts are addressed in Section 7.5.3 of this EIS and Section 6.2 of the NVIA. No buildings, or sensitive structures or heritage items have been identified within the safe working distances for cosmetic damage or human response.
4. An assessment of cumulative impacts associated with any existing development and any developments having been granted development consent, but which have not commenced.	Future traffic projections for opening year (2024) and design year (2034) for 'build' scenario have been adopted from Traffic Impact Assessment Report (EMM, 2020) incorporating cumulative traffic generation from the MLP and 1.7% annual traffic growth. Noise modelling, incorporating cumulative traffic generation from the MLP and the 1.7% annual traffic growth rate are addressed in Section 7.5.3 of this EIS and Section 4.4 and 6.5 of the NVIA.

7.5.2 Existing environment

i Ambient noise

Land uses in the vicinity of the Project are primarily industrial, infrastructure and urban bushland as described in Section 5.2 and shown in Figure 5.2. Residential land uses (Low Density Residential and Medium Density Residential) and public recreation uses are located further east in the suburb of Wattle Grove. The MLP has been approved and is currently under construction.

ii Assessment locations

The nearest representative noise sensitive locations to the Project have been identified for the purpose of assessing potential noise and vibration impacts from construction activities and operation of the new roadway. These locations were selected to represent the range and extent of noise impacts from the Project and are referred to hereafter as assessment locations.

Assessment locations are summarised in Table 7.29 and are shown in Figure 7.7.

Table 7.29 Noise assessment locations

ID	Address	Classification	Easting	Northing
COM1	Defence Building 1	Commercial	308640	6241780
IN1	Defence Building 2	Industrial	308764	6241755
IN2	Defence Building 3	Industrial	308764	6241623
R1	26 Brickendon Court, Wattle Grove	Residential	309349	6241227
R2	25 Exford Court, Wattle Grove	Residential	309290	6240862
R3	25 Yallum Court, Wattle Grove	Residential	308920	6240179

iii Background noise study

To establish the existing ambient noise environment of the area, unattended noise surveys and operator-attended aural observations were conducted at monitoring locations.

Noise monitoring was conducted at three locations considered to be representative of the range of noise levels likely to be experienced by residential assessment locations in the vicinity of the Project site. The logger locations were selected after inspection of the Project site and its surrounds, giving due consideration to other noise sources which may influence the readings (eg domestic air-conditioners), the proximity of assessment locations to the Project site, security issues for the noise monitoring device and gaining permission for access from the residents or landowners.

The monitoring locations selected are presented in Table 7.30 and shown in Figure 7.7.

Table 7.30 Noise monitoring locations

Dates	ID	Address	Instrumentation
28/2/20 to 11/3/20	NM1	Moorebank Avenue, Moorebank	SVAN 977 Serial No. 59682
	NM2	26 Brickendon Court, Wattle Grove	SVAN 977 Serial No. 59681
	NM3	23 Exford Court, Wattle Grove	ARL 316 Serial No. 16-2017-005
	NM4	25 Yallum Court, Wattle Grove	SVAN 979 Serial No. 21095

The noise loggers were programmed to record statistical noise level indices continuously in 15-minute intervals, including the L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and the L_{Aeq}.

A summary of existing background and ambient noise levels is given in Table 7.31.

Table 7.31 Summary of existing background and ambient noise

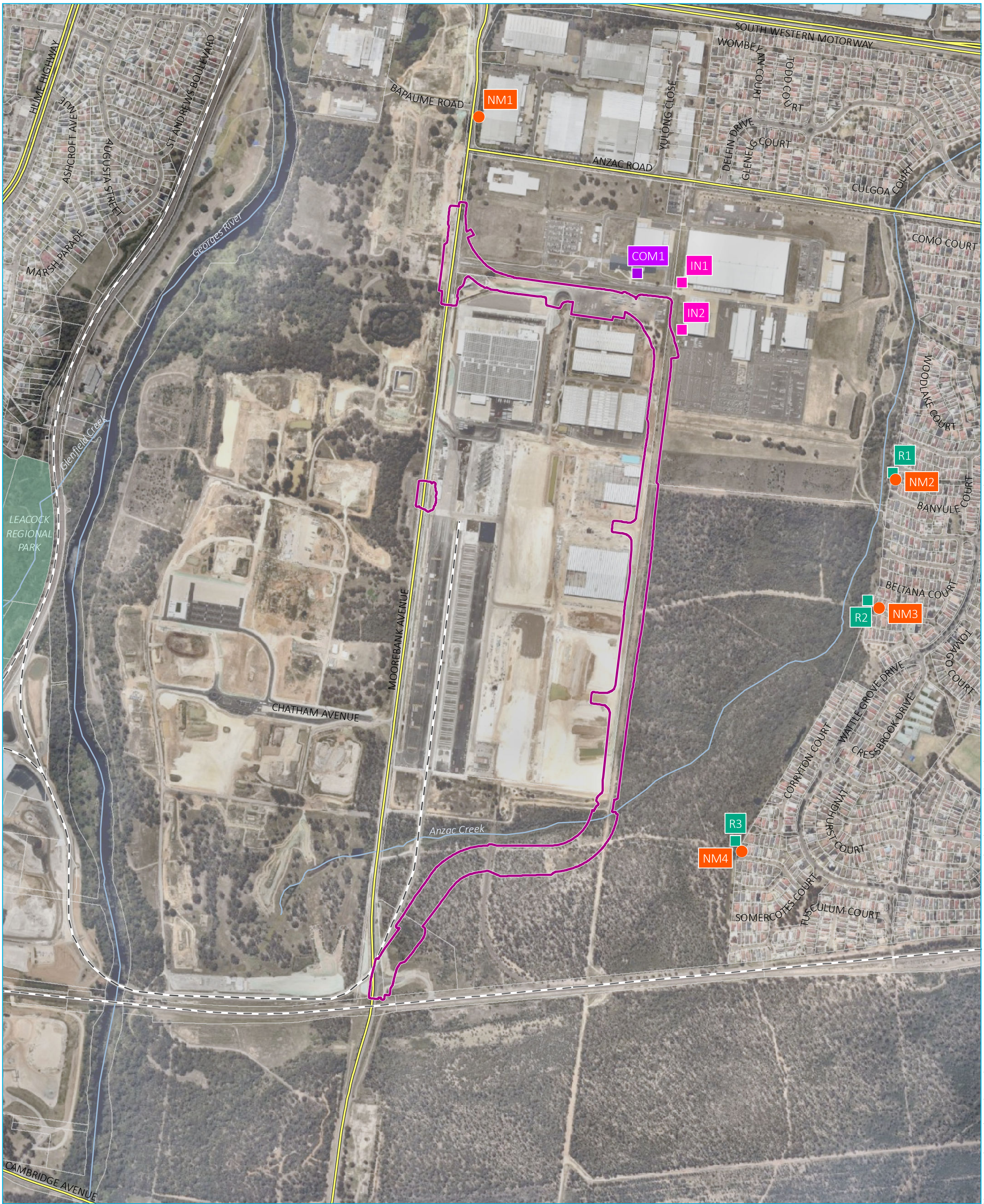
Monitoring location	Period[1]	Rating background level (RBL)[2], dBA	Measured $L_{Aeq, period}$ noise level[3], dBA
NM1 – Moorebank Avenue	Day	54	65
	Evening	51	69
	Night	43	60
NM2 – 26 Brickendon Court, Wattle Grove[4]	Day	36	52
	Evening	34 (42)	50
	Night	31 (38)	46
NM3 – 23 Exford Court, Wattle Grove	Day	35	54
	Evening	34	51
	Night	31	47
NM4 – 25 Yallum Court, Wattle Grove	Day	36	52
	Evening	36	49
	Night	31	44

Note: 1. Day: 7 am to 6 pm Monday to Saturday; 8 am to 6 pm Sundays and public holidays; Evening: 6 pm to 10 pm; Night: 10 pm to 7 am, Sunday to Friday and 10 pm to 8 am Saturday and public holidays.

2. The RBL is an Noise Policy for Industry (NPfI) term and is used to represent the background noise level. In accordance with the NPfI, minimum thresholds were adopted given measured values were lower. Measured noise levels are provided in brackets () where relevant.

3. The energy averaged noise level over the measurement period and representative of general ambient noise.

4. Evening noise level cannot be greater than day and night not greater than evening. Ambient levels appear affected by localised noise source accordingly levels for NM3 were adopted for assessment purposes. Measured levels in brackets ().



Source: EMM (2020); DPIE (2019); DFSI (2017); Nearmap (2020)

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KEY

- Construction footprint
- Cadastral lot
- Rail line
- Major road
- Named watercourse
- Noise monitoring location

Assessment location

- Commercial
- Industrial
- Residential

Noise monitoring and assessment locations

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.7

EMM
creating opportunities

iv Existing road traffic noise levels

Existing traffic noise levels are based on the unattended noise monitoring conducted as part of the determination of the existing noise environment for this assessment. Noise data from the monitoring period is detailed in Table 7.31 with day and night traffic noise extracted as shown in Table 7.32.

Table 7.32 Existing traffic noise levels

Location	Measured traffic noise levels, dB	
	$L_{Aeq\ 15hr}$ Day	$L_{Aeq\ 9hr}$ Night
NM1 – Moorebank Avenue	66	60

v Traffic volume data

Volumes relevant to the study area have been adopted from the traffic survey counts conducted along Moorebank Avenue between Cambridge Avenue and Newbridge Road, Moorebank from 28 February to 5 March 2020. Existing traffic volumes are presented in Table 7.33.

Table 7.33 Existing traffic volumes (2020)

Location	Direction of travel	Day – 7am to 10pm			Night – 10pm to 7am		
		Light vehicles	Heavy vehicles	HV%	Light vehicles	Heavy vehicles	HV%
Moorebank Avenue	Bidirectional	12,395	3,088	20%	2,310	548	19%

Future traffic projections for opening year (2024) and design year (2034) for 'build scenario' have been adopted from the TIA (Appendix E). Volumes relevant to the study area are provided in Table 7.34 for light vehicles (LV), heavy vehicles (HV), total and HV% at representative chainages of the Project.

Table 7.34 Project Traffic Volumes – two way (Moorebank Avenue)

Section (chainage)	Day – 7am to 10pm				Night – 10pm to 7am			
	LV	HV	Total	HV%	LV	HV	Total	HV%
2024								
North (Ch 0-400)	15,384	713	16,097	4%	2,970	140	3,110	5%
Central (Ch 400-1300)	14,900	586	15,486	4%	2,851	114	2,965	4%
South (Ch 1300-1770)	14,415	458	14,874	3%	2,731	88	2,819	3%
South Tie In (Ch 1770-3000)	13,932	331	14,263	2%	2,611	62	2,673	2%
2034								
North (Ch 0-400)	17,601	766	18,367	4%	3,386	150	3,536	4%
Central (Ch 400-1300)	17,118	639	17,756	4%	3,266	124	3,390	4%
South (Ch 1300-1770)	16,633	511	17,144	3%	3,146	98	3,244	3%
South Tie In (Ch 1770-3000)	16,150	384	16,534	2%	3,027	72	3,098	2%

7.5.3 Assessment of impacts

i Noise criteria

a Road traffic noise criteria

The NCG documents the RMS interpretation of the RNP and provides a consistent approach to identify road noise criteria for RMS projects. Noise criteria are assigned to sensitive receivers using the NCG. The NCG provides guidance on how to implement the RNP.

The Project constitutes a ‘new’ road under the RMS project classification as it meets the following description:

- A project proposes road construction in an undeveloped corridor.
- A road project changes the functional class of the road.
- A widening, curve straightening or adjustment of the corridor where the upgrade road pavement has been substantially realigned.
- A duplication where the new lanes have been substantially realigned from the existing corridor in which case the existing lanes are also assessed as a new road development type.
- A bypass where the upgraded road extends beyond the existing road corridor.

The NMG provides guidance in managing and controlling road traffic generated noise and describes the principles to be applied when reviewing noise mitigation. The NMG recognises that the criteria recommended by the NCG are not always practicable and that it is not always feasible or reasonable to expect that they should be achieved. The NMG provides three triggers where a receiver may qualify for consideration of noise mitigation (beyond the adoption of road design and traffic management measures). These are:

- **Trigger 1 -** The predicted Build noise level exceeds the NCG controlling criterion and the noise level increase due to the project (ie the noise predictions for the Build minus the No Build) is greater than 2 dB(A).
- **Trigger 2** - The predicted Build noise level is 5 dB(A) or more above the NCG controlling criterion (exceeds the cumulative limit) and the receiver is significantly influenced by project road noise, regardless of the incremental impact of the project.
- **Trigger 3** - The noise level contribution from the road project is acute (daytime $L_{Aeq(15hour)}$ 65 dB(A) or higher, or night-time $L_{Aeq(9hour)}$ 60 dB(A) or higher) even if noise levels are dominated by a non-project road.

The eligibility of receivers for consideration of additional noise mitigation (over and above road design and traffic management measures) is determined before the benefit of additional noise mitigation (low noise pavement and noise barriers) is included. The requirement for the project is to provide feasible and reasonable additional mitigation for these eligible receivers to meet the NCG controlling criterion. As highlighted in the NMG, once noise has been minimised by feasible and reasonable methods during the corridor planning and road design stages, triggered receivers with residual exceedances of the NCG controlling criteria shall be assessed to determine if they qualify for additional noise mitigation.

b Construction noise criteria

The *Interim Construction Noise Guideline* (ICNG) (DECC 2009) sets out noise management levels (NMLs) for residential and other noise-sensitive receivers and how they are to be applied.

The project construction NMLs and highly noise affected levels for recommended standard daytime period are presented in Table 7.35 for all assessment locations acknowledging that construction would be generally during daytime hours.

Table 7.35 Construction noise management levels – all assessment locations

Assessment location	Period	Adopted RBL[1]	Highly noise affected	NML $L_{Aeq,15min}$, dB
COM	When in use	-	-	70
IN	When in use	-	-	75
R1	Day (standard ICNG hours)	36	75	46
R2	Day (standard ICNG hours)	35	75	45
R3	Day (standard ICNG hours)	36	75	46

c Construction vibration criteria

Environmental Noise Management – Assessing Vibration: a technical guideline (DEC 2006) is based on BS 6472 – 2008, Evaluation of human exposure to vibration in buildings (1-80Hz). It presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. Table 2.1 of the guideline provides examples of the three vibration types and has been reproduced in Table 7.36.

Table 7.36 Examples of types of vibration

Continuous vibration	Impulsive vibration	Intermittent vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, eg occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZEC (1990).	Trains, intermittent nearby construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer these would be assessed against impulsive vibration criteria.

The most relevant to the proposed construction activities are continuous and intermittent vibration. Criteria for exposure to continuous and intermittent vibration are outlined in section 5 of the NVIA (Appendix E).

Additionally, the most recent relevant vibration criteria, AS 2187.2 – 2006 *Explosives - Storage and Use - Use of Explosives* recommends that the frequency dependent guideline values and assessment methods given in British Standard BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2* be used as they are “applicable to Australian conditions”. The recommended limits (guide values) for transient vibration to manage minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in Table 5.9 of the NVIA (Appendix E).

ii Construction noise assessment

Construction noise modelling was conducted using DGMR Software proprietary modelling software, iNoise. In order to assess a potential worst-case construction scenario, the model has considered the identified plant and equipment in Table 6.5 of the NVIA for phase 2 road construction with 50% of all plant and equipment including vehicles operating continuously over a 15 minute period. Construction noise levels were predicted for those assessment locations identified in Table 7.29 and shown in Figure 7.7. The predicted daytime construction noise limits for Phase 2 road construction are presented in Table 7.37.

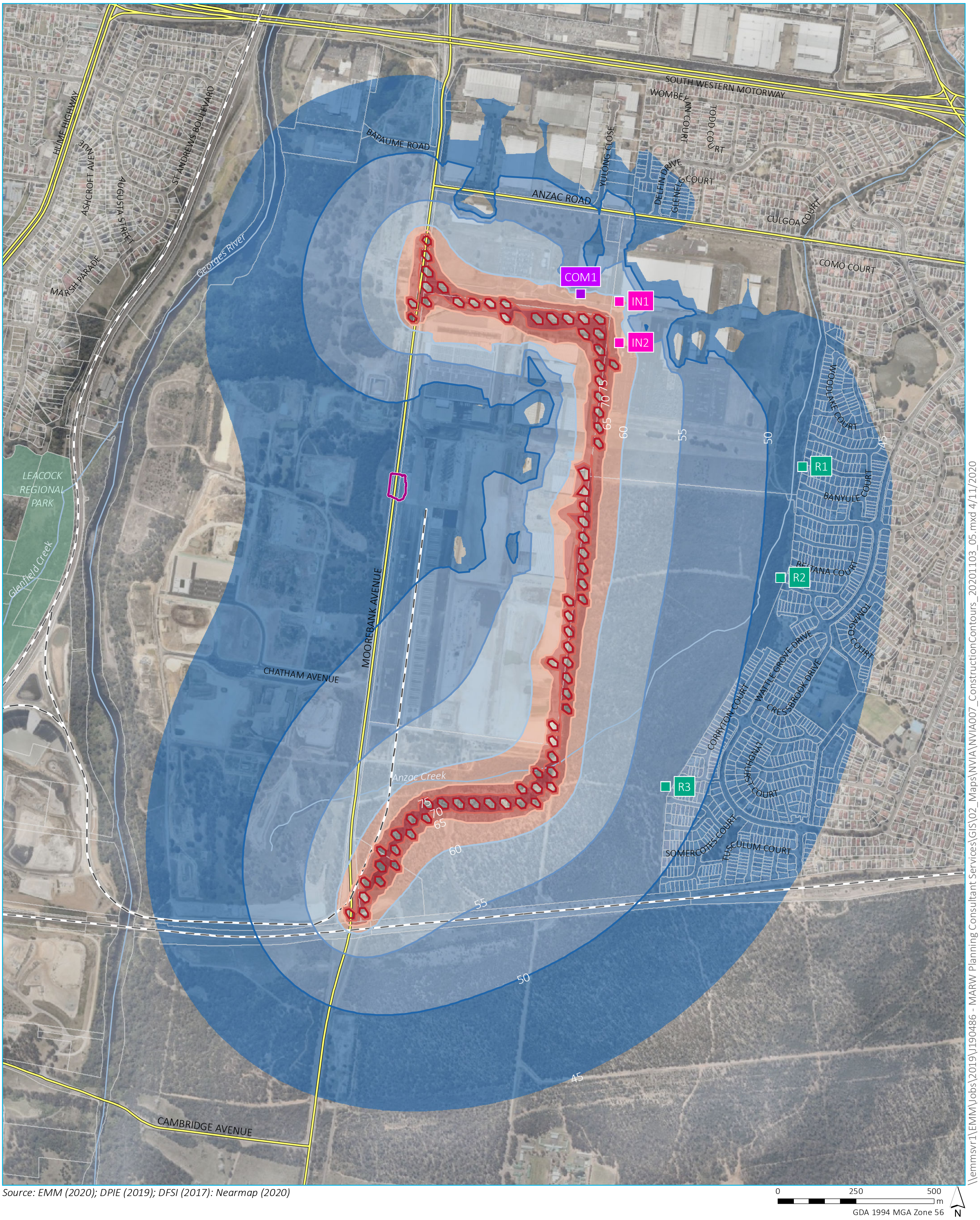
Table 7.37 Predicted daytime construction noise levels – Phase 2

Assessment location	NML $L_{Aeq,15min}$, dB	Highly noise affected level	Predicted level	Exceedance
COM	70	-	66	0
IN1	75	-	62	0
IN2	75	75	66	0
R1	46	75	51	+5
R2	45	75	52	+7
R3	46	75	55	+9

The result of the modelling for worst case phase 2 construction activities identify that construction noise levels satisfy the ICNG noise management levels at the reference commercial and industrial assessment locations. However, NMLs will be exceeded at the reference residential assessment locations to the east of the works. It should be noted that these exceedances are limited to the phase 2 construction period only. Notwithstanding this, in accordance with the ICNG, feasible and reasonable measures will be applied.

Further to the above approach and acknowledging industrial land uses and other residential areas to the north, east and south of the Project site, noise contours have been generated to evaluate noise exposure surrounding the project footprint including construction compound is provided in Figure 7.8.

A review of the construction noise contours identifies the residential area to the north-east may be exposed to construction noise levels in the order of $L_{Aeq,15min}$ 45−48 dB, and therefore up to 2 dB above NMLs.



Source: EMM (2020); DPIE (2019); DFSI (2017): Nearmap (2020)

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KEY

Construction footprint	**Assessment location**	**Construction noise contours**
Cadastral lot	Commercial	45 - 50 dB(A)
Rail line	Industrial	50 - 55 dB(A)
Major road	Residential	55 - 60 dB(A)
Named watercourse		60 - 65 dB(A)
		65 - 70 dB(A)
		70+ dB(A)

Construction noise contours, Phase 2, ISO9613

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.8

creating opportunities

iii Construction vibration assessment

Safe working distances for typical items of vibration intensive plant are listed in Table 7.38. The safe working distances are quoted for both "Cosmetic Damage" (refer British Standard BS 7385) and "Human Comfort" (refer British Standard International BSI 6472-1).

Table 7.38 Recommended safe working distances for vibration intensive plant

Plant Item	Rating/Description	Safe working distance	
		Cosmetic damage (BS 7385)	Human response (BS 6472)
Vibratory pile driver	Sheet piles	2–20 m	20 m
Pile boring	≤ 800 mm	2 m (nominal)	n/a
Vibratory Rollers	<50kN (Typically 1-2 tonnes)	5 m	15–20 m
	<100kN (Typically 2-4 tonnes)	6 m	20 m
	<200kN (Typically 4-6 tonnes)	12 m	40 m

No buildings, sensitive structures or heritage items have been identified within the safe working distances for cosmetic damage or human response. The nearest residences are located greater than 300 m from vibration generating construction activities. The assessment locations are outside of the safe working distances required to maintain acceptable human response and structural vibration levels. Vibration impacts from construction at residential assessment locations are therefore highly unlikely.

No construction blasting is proposed.

iv Road traffic noise assessment

Traffic noise associated with the Project were predicted using SoundPlan™ noise modelling software. Guidance was from the NMVG as to standard parameters required by RMS in establishing a robust noise model.

Traffic noise predictions for the 2024 and 2034 'build' scenarios are provided in Figure 6.1, Figure 6.2, Figure 6.3 and Figure 6.4 of the NVIA (Appendix E) incorporating cumulative traffic generation from the MLP and 1.7% annual traffic growth. The predicted traffic noise levels for those assessment locations identified in Table 7.29 are presented in Table 7.39.

Table 7.39 Predicted traffic noise levels

ID	Assessment location	2024		2034	
		Day $L_{Aeq,15hr}$ dB	Night $L_{Aeq,9hr}$ dB	Day $L_{Aeq,15hr}$ dB	Night $L_{Aeq,9hr}$ dB
COM	Defence Building 1 – D175	57	53	57	53
IN	Defence Building 2	53	49	54	50
IN	Defence Building 3	58	54	58	54
R1	26 Brickendon Court, Wattle Grove	40	36	41	37
R2	25 Exford Court, Wattle Grove	42	38	42	38
R3	25 Yallum Court, Wattle Grove	46	42	46	42

Regarding the model, the following was noted:

- The Project will increase road traffic noise levels for residential areas to the east as it is the development of a 'new' road.
- Traffic volumes adopted for noise modelling incorporate cumulative traffic generation from the MLP and 1.7% annual traffic growth.
- The predicted noise levels are less than the recommended RNP criteria for 2024 and 2034 build options.
- No additional mitigation measures are required according to the RNP for road traffic noise.

There are buildings on Defence land identified to the north on DJLU site as D174 and associated reception building that noise modelling has predicted levels of the order of $L_{Aeq,15hr}$ 57 dB at the building façade, only 2 dB above the recommended baseline level for residential dwellings under the NSW, RNP. The specific use of D174 and façade construction detail is unknown, however for the purposes of assessment of potential noise impacts a commercial use is assumed.

The recommended internal design noise level for commercial buildings including general office and reception areas under AS2107 is LAeq 40−45 dB internal. Considering a typical commercial façade construction comprising composite of sheet metal and glazed windows/doors with a minimum 5-mm safety glass with seals, a nominal reduction across the façade would be 22 dB, resulting in internal noise levels in the order of 35-37 dB and satisfy the recommended internal design noise level of AS2107.

The assessment has not identified the need for acoustic barriers along the north-east corner of the roadway or façade treatments for the Defence buildings identified. However, noise mitigation have been included in the design at the request of Defence.

v Cumulative noise impacts

The noise monitoring which underlies this assessment occurred during the construction phase of the MLP. The road traffic noise impact assessment includes traffic growth estimates for construction and operation of the MLP. Consequently, the noise impact assessment and proposed mitigation measures address relevant cumulative impacts.

7.5.4 Management and mitigation measures

Noise levels above NMLs have been predicted for residential assessment locations. It is not uncommon for construction projects to exceed NMLs. For this reason, they are not considered as noise criteria, but as a trigger for all feasible and reasonable noise mitigation and management to be considered, once exceeded. There is limited opportunity due to extent of works and fleet of plant and equipment for road construction, proximity of residential assessment locations and local topography to provide significant noise mitigation.

Mitigation measures to be implemented for potential noise and vibration impacts are summarised in Table 7.40.

Table 7.40 Management and mitigation measures for noise and vibration

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of noise and vibration measures	NVI01	A noise and vibration management plan (NVMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The NVMP will provide details for the ongoing management and maintenance of noise and vibration management and mitigation measures during the construction phase of the Project.
Work practices	NVI02	The Project will regularly reinforce (such as at toolbox talks) the need to minimise noise and vibration.
Work practices	NVI03	The Project will review and implement feasible and reasonable mitigation measures that reduce construction noise levels.
Work practices	NVI04	Avoidance of portable radio use, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents.
Work practices	NVI05	Routes for the delivery of materials and parking of vehicles to minimise noise will be used, where feasible.
Work practices	NVI06	Where possible, the Project will avoid the use of equipment that generates impulsive noise.
Work practices	NVI07	Residents will be notified prior to the commencement of intensive works.
Plant and equipment	NVI08	Where possible, quieter plant and equipment will be used based on the optimal power and size to most efficiently perform the required tasks.
Plant and equipment	NVI09	Plant and equipment will be operated in the quietest and most efficient manner.
Plant and equipment	NVI10	Regular inspection and maintenance of plant and equipment will be undertaken to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.

7.6 Contamination

7.6.1 Overview

A Preliminary Site Investigation (PSI) (Appendix F) was prepared in general accordance with Schedule B2 of the National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure* (NEPC 2013). The PSI included an inspection of the Project site, review of site history and other publicly available information (such as NSW EPA databases) and review of previous investigation reports and management plans for portions of MLP.

Table 7.41 sets out the SEARs that relate to soils and contamination and identifies where they are addressed in this EIS.

Table 7.41 SEARs for the Project – Soils and contamination

Requirement	Where addressed in this EIS
4. **Soils and Contamination**	
1. Verify the risk of acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Risk Map) within, and in the area likely to be impacted by, the project.	Acid sulfate soils risk is identified in Section 7.6.2 of this EIS and Section 2.5 of the PSI.
2. Assess the impact of the project on acid sulfate soils (including impacts of acidic runoff offsite) in accordance with the current guidelines.	Acid sulfate soils risk was identified as low to extremely low, accordingly no impacts are considered (refer to section 7.6.3).
3. Assess whether the land is likely to be contaminated and identify if remediation of the land is required, having regard to the ecological and human health risks posed by the contamination in the context of past, existing and future land uses. Where assessment and/or remediation is required, document how the assessment and/or remediation would be undertaken in accordance with current guidelines.	Contamination is described in Section 7.6.2 of this EIS and in Chapter 3 and Chapter 4 of the PSI.
4. Assess the impacts on soil and land resources (including erosion risk or hazard). Particular attention must be given to soil erosion and sediment transport consistent with the practices and principles in the current guidelines.	Soils are characterised in Section 7.6.2. Erosion and sediment controls are addressed in Section 7.10 (air quality) and Section 7.7 (water).

7.6.2 Existing environment

i Soils

The Project site is underlain by clayey sand and clay of tertiary age, which are likely to be floodplain deposits associated with the Georges River. This sand and clay deposits are likely to be underlain by Hawkesbury Sandstone and Ashfield Shale or Brinley Shale of the Triassic age Wianamatta Group.

Acidic, residual soils of variable thickness with sandstone shale fragments are also likely to be encountered at the Project site. Based on the Atlas of Australian Acid Sulfate Soils there is a low to extremely low chance of acid sulfate soils being present at the Project site.

ii Surface water

There is only one water body identified in the study area being Anzac Creek which was observed to be gently flowing and slightly turbid. A detention basin was also noted adjacent to the eastern site boundary within the northern section of the study area near the DJLU site.

iii Hydrogeology

Aquifers within the study area are likely to be of low to moderate productivity. It is expected that regional groundwater would generally be in a west and northerly direction towards the Georges River. No registered groundwater bores were identified within the study area of in the immediate surrounding area.

Previous investigations associated with MPW reported the presence of two aquifers at the Project site, generally encountered between 2 mbgl near the Georges River and 6 mbgl in the eastern portion of MPW.

iv Site history

a Land titles, photographs and maps

MLP and the surrounding area has been occupied by Defence since at least 1915. In the early 1990s, the Project site partially comprised the Defence National Storage Distribution Centre (DNSDC), which included warehousing, refuelling and chemical storage areas. It was subsequently developed into MPE, which includes Commonwealth land and land held by Qube and SIMTA on a 99-year lease.

Photographs of the Project site are included in Appendix A and summarised in Section 3.2 of the PSI (Appendix F).

A Lotsearch report, incorporating historical maps of the Project site is included in Appendix A and summarised in Section 3.3 of the PSI (Appendix F).

b Previous investigations

MPE, MPW and land to the south has been subject to extensive investigation in the form of contamination reports. The ensuing section summarises the key historical information relating to the study area and surrounding area.

In the 1940s, a storage area (utilised by the DoD) was established on the MPE site. Activities associated with this area included the storage of military equipment, including chemical storage and waste disposal. As such, several potential sources of contamination were identified. In particular, the presence of burial and burn pits was noted, which may have contained batteries, unexploded ordnance (UXO), and demolition rubble.

The Project site was partially redeveloped into the DNSDC in the early to mid-1990s and involved the demolition of several older buildings and construction of new facilities. Five underground storage tanks (USTs) were formerly located in the south-western portion of the DNSDC site. Further investigations have identified an area of light-non-aqueous phase liquids in the vicinity of the former USTS, however it is understood that it is confined to groundwater, with the tanks and impacted soils having been removed.

Some remediation works were undertaken as part of the DNSDC development and following the redevelopment of the site as an IMT. A Contamination Management Plan was prepared for the MPE which notes that the MPE site is largely subject to environmental audits that concluded it was either suitable, or could be made suitable, for commercial and industrial land uses. Residual contamination, if present, would be managed by the Contamination Management Plan, which includes a UXO Management Plan, an Asbestos Management Plan and an Unexpected Finds Protocol.

The southern portion of the Boot Land was identified as being used as a grenade range from the 1950s until the 1980s, although it was considered likely to have also been used during WWII. While a small area was reportedly remediated in 1994, the potential for residual contamination, including UXO and explosive ordnance waste (EOW) was noted.

Land owned by RailCorp (Lot 1 in DP825352) at the south-western extent of the study area as identified as having been used for storage around the time the East Hills Rail Line was constructed. Imported fill to approximately 2 m above the surrounding ground level and illegal dumping was recorded to the north of this area. Fragments of suspected asbestos containing fragments (ACM), ash and slag materials were also recorded to be adjacent to the former rail spur in the Boot Land.

Investigations undertaken at the Holsworthy Barracks to the south of the study area identified that the former DoD fire station (now the Liverpool Fire Station) located approximately 350 m to the north of the study area, was a source per- and poly-fluoroalkyl substances (PFAS) contamination. Additionally, migration of PFAS via a surface water from the fire station to Anzac Creek was identified.

Previous investigations also identified contaminants of concern, including lead, asbestos, petroleum, hydrocarbons, explosives, hexachlorobenzene, PFAS and polycyclic aromatic hydrocarbons (PAHs).

c Database searches

No areas within the Project site were identified as being on the list of NSW contaminated sites notified to the EPA.

ABB Australia's Medium Voltage Production Facility, approximately 300 m to the north-west of the northern portion of the Project site was identified as a listed contaminated site. The facility was formerly used for the production of electrical condensers and transformers and has been contaminated with polychlorinated biphenyls (PCBs). Contaminated soil is contained beneath a capping layer at the property. The facility also has an EPL for the non-thermal treatment of hazardous and other wastes. Based on the inferred hydraulic gradient at the Project site and in the surrounding area, contamination at this facility is considered unlikely to impact on the Project site.

EPLs have been issued for two activities, including:

- EPL 21054 for crushing, grinding or separating and extractive activities, applying to the MPE site and MPW site. Ancillary activities associated with this EPL include bulk earthworks "cut and fill", importing fill and road construction. There are seven licenced discharge points (LDP) for water discharges. Discharge limits apply to oil and grease, pH, total suspended solids and turbidity, as well as perfluorooctane sulphonate (PFOS), perflurooctanoic acid and perflurohexane sulphonate at LDP3, LDP4 and LDP5. LDP5 appears to discharge to Anzac Creek.

- EPL 12208 for railway system activities, applicable to the entire Sydney Trains (RailCorp) network and covers the East Hills Railway Line to the immediate south of the site and the railway spur that crosses the southern portion of the site and connects MPE to the East Hills Railway Line. The licence primarily relates to the management of noise. Other activities covered by the EPL include railway maintenance and construction.

Seven former licenced activities under the POEO Act 1997 (now revoked or surrendered) were identified within this site. Two former EPLs were issued to BAE Systems Australia Logistics Pty Ltd for DNSDC relating to Dangerous Goods Production and the generation or storage of Hazardous, Industrial or Group A waste. The remaining five former EPLs related to application of herbicides on waterways throughout NSW.

A small portion of the southern site area, consistent with the alignment of Anzac Creek, was identified as within the Holsworthy Barracks (including Liverpool Fire Station) NSW Government PFAS Investigation Site. The investigation indicated that PFAS concentrations in water samples collected from Anzac Creek were greater than human health drinking water guidelines but below recreational water use guidelines. Anzac Creek was also identified as a potential pathway for the migration of PFAS contamination.

The Liverpool Fire Station (a former DoD fire station) located approximately 320 m to the north of the Project was also identified as a source of PFAS contamination. Information published by the DoD indicates that a human health risk assessment and PFAS area management plan are currently being prepared for Holsworthy Barracks.

Portions of the Project site are identified as being within the Defence 3 Year Regional Contamination Investigation Program (RCIP) and include:

- The DNSDC (consistent with the current MPE) which was previously used for storage of military equipment and contained refuelling and chemical storage areas. Un-remediated burials potentially containing UXO may also be present. Hydrocarbon contamination has been reported at the property, in soil, groundwater and some sediments in the north-eastern area. Cyanide was also reported in groundwater in the southern area.

- Moorebank Defence Area (consistent with the current MPW). The Project is located marginally within this area and had formerly comprised Moorebank Barracks, Steele Barracks and the School of Military Engineering. Potential sources of contamination in this area include waste burials (containing chemicals, building debris including asbestos and other domestic waste), weapons ranges with the potential for UXO, firefighting training areas, vehicle maintenance and refuelling areas with underground fuel storage and wash bays and sewerage treatment plants. Contaminants including asbestos, metals, hydrocarbons and solvents have been reported in soil and/or groundwater.

Holsworthy Barracks was also identified as an RCIP site, located approximately 30 m to the south of the Project site, beyond the East Hills Railway Line. As noted in this section, PFAS contamination from Holsworthy Barracks may have impacted on Anzac Creek waster and sediments which transects the Project site.

The Project site is not identified as being part of the Airservices Australia National PFAS Management Program.

Several commercial and industrial business were identified to have an 'address match' to the Project site, ie 'Moorebank Avenue'. However, given that Moorebank Avenue extends approximately 2 km to the north of the Project site and 1 km to the south, through generally industrial areas, it is generally unclear how close these activities have been undertaken in relation to the Project site. No dry cleaners, service stations or motor garages were identified at the Project site or in the immediate surrounding area.

Remediation works appear to have been undertaken across much of MPE for developments undertaken to date and contamination management plans are in place for works proposed within MPE and the current Moorebank Avenue alignment. The potential of significant contamination at the Project site is considered to be low, with the exception of the following:

- the south-westernmost extent of the Project site, where significant filling has occurred as well as storage of materials and equipment associated with railway operations and infrastructure;
- the disused rail spur that crosses the southern portion of the Project site, in a north-south orientation and where ACM, ash and slag were previously observed. Elevated concentrations of lead were reported adjacent the rail spur within the MPE;
- ACM reported in soils across MPE including adjacent to the Project site. ACM was also observed on the ground surface in the southern portion of the Project site during the site inspection;
- Anzac Creek surface water and sediment, which may be impacted by PFAS and other contaminants of potential concern (CoPC); and
- the former grenade range in the south-eastern portion of the Project site, which may not have been fully remediated as part of other UXO, explosive ordinance (EO) and EOW remediation and management activities.

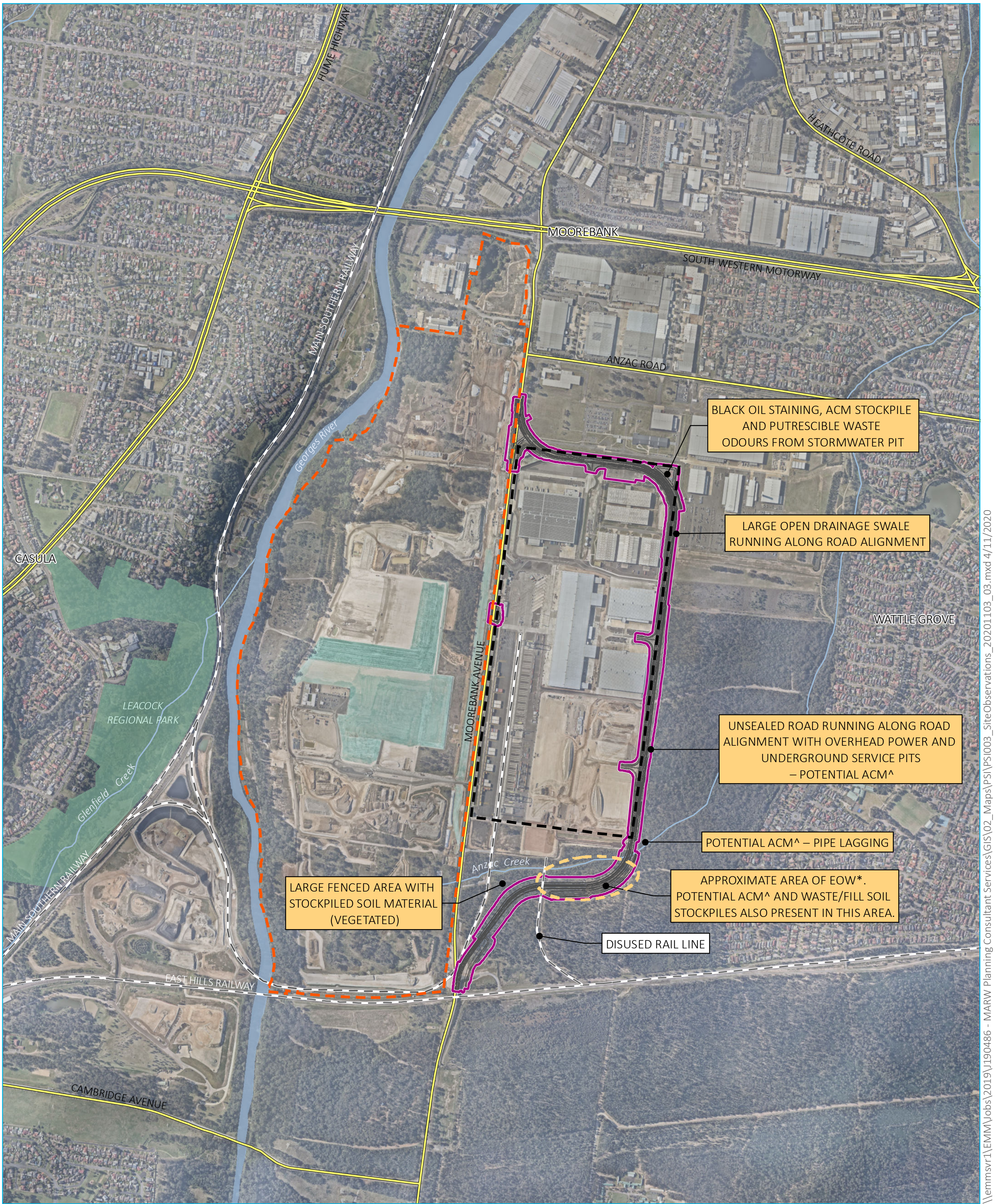
v Site inspection

A site inspection was undertaken on 3 March 2020. Key observations made during the site inspection are summarised below in Table 7.42 and Figure 7.9.

Photographs of the site are included in Appendix B to the PSI (Appendix F).

Table 7.42 Key observations made during the site inspection

Location	Summary
North	• The northern portion of the Project site comprised a hardstand area covered with concrete/bitumen and some gravel areas; • the hardstand area was partially fenced off and was disused. Some car parking was noted in this area; • stockpiles of fill material containing potential ACM were observed near to the eastern boundary between the Project site and the DJLU site; • localised areas of black staining were observed in the compound area adjacent to the DJLU site; • an unlabelled intermediate bulk container was present in the northern Site area, approximately 40% full of unknown liquid; and • a stormwater drain near the northern site boundary (adjacent to the DJLU site) was observed to have a putrescible waste odour.
East	• The eastern portion of the Project site comprised an unsealed track with a strip of vegetation between the track and the eastern boundary of the MPE site; • overhead power lines were present between the track and the eastern boundary of MPE and underground service easements were also observed; • metal pipes with potential asbestos lagging were observed to be dumped in this area of the Project site; • a drainage swale was present running along the project north-south alignment within the northern portion of the Project site, which connected with the DJLU site to the east; and • two stormwater detention basins were present within the MPE adjacent to the eastern Site area.
South	• The southern Site area was heavily vegetated, with some unsealed tracks; • a disused railway line was present in the southern Site area, extending into the southern part of the MPE; • stockpiles of woodchip and fill materials, including concrete and demolition rubble, were observed in this area adjacent Anzac Creek; • evidence of illegal dumping was also noted, with furniture, fabric, glass, paper waste and timber observed; • EOW was observed on the ground surface, including grenade plugs and other metal fragments from WW II era 36 M hand grenades; • fragments of ACM were observed on the ground surface, partially buried and in stockpiles of demolition rubble and waste to the west of the railway line; and • at the south-western extent of the Project site, a large mound of fill material (partially vegetated) was observed within a fenced compound.



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)
^ ACM = Asbestos Contaminated Material
* EOW = Explosive Ordnance Waste

0 250 500 m
GDA 1994 MGA Zone 56
N

KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- Road design
- Rail line
- Major road
- Watercourse
- NPWS reserve

Site inspection observation

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.9

EMM
creating opportunities

7.6.3 Assessment of impacts

Based on a review of site history and information for the Project site and surrounding areas, potential sources of contamination and associated contaminants of potential concern (CoPC) that may impact on the Project are summarised in Table 7.43.

Table 7.43 Potential sources of contamination and CoPC

Potential sources of contamination	CoPC	Likelihood and contaminant release
On-site/off-site. Stockpiles of fill material, including potential ACM, in the southern portion of the Project site and surrounding areas.	Asbestos, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), metals, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs).	Likely Fragments of ACM were identified during the site inspection. Stockpiles of fill materials were observed and previous investigations have reported elevated concentrations of lead in fill materials near the railway spur in the southern portion of the Project site.
On-site/off-site. Former grenade range in the southern portion of the Project site and surrounding areas.	UXO, EO, EOW, metals.	Likely Fragments of EOW were observed during the Project site inspection, which could result in leaching of metals into the surrounding soils and surface water. The potential of EO and UXO is less likely as the area has been subject to some survey and remediation work but cannot be precluded.
On-site/off-site. Anzac Creek and drainage swales.	PFAS, TPH, BTEX, PAH, metals, pesticides/herbicides.	Likely Anzac Creek was identified in the Defence Holsworthy DSI as an area of PFAS contamination and a contaminant migration pathway. Additionally, other CoPC may impact on the waters and sediments in and around Anzac Creek and the surface drainage swales near the central portions of the Project site.
On-site/off-site Former vehicle and equipment storage in northern Site area.	TPH, BTEX, PAH.	Possible Surface staining was identified during the Project site inspection, and this area is known to have been used for the storage of military vehicle and equipment and heavy vehicles. Possible fuel and other chemical storage may also have occurred resulting in the possibility of leaks and spills.
Off-site Former burial and burn pits on MPE.	Asbestos, TPH, BTEX, PAH, PCBs, UXO, metals	Unlikely Previous investigations identified a number of former waste burial and burn pits on the MPE property. The closest to the Project site were identified in the north-eastern corner and the southern portion of MPE. These areas have largely been subjected to remediation as part of the MPE development and/or are the subject of contamination management plans. Furthermore, the pits are generally up hydraulic gradient from the majority of the Project site, indicating impacts, if present, would be unlikely to migrate onto the Project site.

Table 7.43 Potential sources of contamination and CoPC

Potential sources of contamination	CoPC	Likelihood and contaminant release
Off-site	TPH, BTEX, PAH, PFAS	Unlikely
Former fuel and chemical storage and use on MPE.		Former fuel storage and other chemical storage (including AFFF) was identified at MPE. These areas are subject to ongoing remediation/management and are generally located up hydraulic gradient from the majority of the Project site.

Potential migration and exposure pathways associated with the Project include:

- leaching through the soil profile and into shallow groundwater and/or surface water;
- direct run-off into surface water (Anzac Creek and drainage swales);
- surface water discharge into Georges River and/or Lake Moore;
- migration of groundwater to north and north-west, potentially discharging into surface water at Georges River and/or Lake Moore;
- windblown migration of dust and/or fibres; and
- migration of vapours/volatile contaminants through soil profile and/or preferential pathway such as underground service conduits.

The following exposure pathways may require further consideration:

- direct contact with contaminated soils, surface water and shallow groundwater;
- incidental ingestion of contaminated soils, surface water and shallow groundwater; and
- inhalation of volatile contaminants, dust and/or fibres.

Sensitive receptors that could be exposed to contamination during construction and future use of the Project include:

- construction and maintenance workers; and
- future site users.

A preliminary conceptual site model (CSM) has been developed based on the available information to identify complete or potentially complete linkages between contaminant sources and sensitive receptors in the context of the Project. This CSM is presented in Table 7.44.

As noted above, there is a low to extremely low chance of acid sulfate soils being present at the Project site and therefore a low risk of encountering acidic soils during construction works. Notwithstanding this low risk, an acid sulfate soil monitoring program will be developed and encompassed within a Contamination Management Plan (CMP).

Table 7.44 Preliminary CSM

Source	Pathway(s)	Receptor(s)	SPR linkage complete, without mitigation/management measures?
Stockpiles of fill material, including potential ACM, in the southern portion of the Project site and surrounding areas	Direct contact with or ingestion of impacted soil, surface water and/or shallow groundwater	• Construction / maintenance workers	Yes
		• Future site users	No
	Inhalation of volatile contaminants, dust and/or fibres	• Construction / maintenance workers	Yes
		• Future site users	Yes
Former grenade range in the southern portion of the Project site and surrounding areas	Direct contact with or ingestion of impacted soil, surface water and/or shallow groundwater	• Construction / maintenance workers	Yes
		• Future site users	No
	Inhalation of volatile contaminants, dust and/or fibres	• Construction / maintenance workers	Yes
		• Future site users	Yes
Anzac Creek and drainage swales	Direct contact with or ingestion of impacts surface water and/or sediments	• Construction / maintenance workers	Yes
		• Future site users	No
	Inhalation of volatile contaminants, dust and/or fibres	• Construction / maintenance workers	Yes
		• Future site users	Yes
Former vehicle and equipment storage in northern site area	Direct contact with or ingestion of impacts surface water and/or sediments	• Construction / maintenance workers	Unlikely
		• Future site users	No
	Inhalation of volatile contaminants, dust and/or fibres	• Construction / maintenance workers	Unlikely
		• Future site users	Unlikely
Former burial and burn pits on MPE	Direct contact with or ingestion of impacts surface water and/or sediments	• Construction / maintenance workers	Unlikely
		• Future site users	No
	Inhalation of volatile contaminants, dust and/or fibres	• Construction / maintenance workers	Unlikely
		• Future site users	Unlikely
Former fuel and chemical storage and use on MPE	Direct contact with or ingestion of impacts surface water and/or sediments	• Construction / maintenance workers	Unlikely
		• Future site users	No
	Inhalation of volatile contaminants, dust and/or fibres	• Construction / maintenance workers	Unlikely
		• Future site users	Unlikely

7.6.4 Management and mitigation measures

Mitigation measures to be implemented for contamination impacts are summarised in Table 7.45.

Table 7.45 Management and mitigation measures for contamination

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of contamination measures	CON01	A Contamination Management Plan (CMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The CMP will provide details for the ongoing management and maintenance of contamination management and mitigation measures during the construction phase of the Project.
Stockpiled materials	CON02	Classification and appropriate removal/disposal of the stockpiled materials observed in and around the southern portion of the Project site.
Exploded ordnance	CON03	A clearance survey and removal of EOW observed in and around the southern portion of the Project site.
Soil and sediments	CON04	Targeted investigation of any areas of soil/sediment disturbance proposed as part of the development (ie assessment of soils/sediments required to be excavated to assess waste classification or re-use suitability).
Unexpected finds	CON05	Preparation of an Unexpected Finds Protocol to be encompassed within the CEMP.
Acid sulfate soils	CON06	An acid sulfate soil monitoring program will be developed for the Project and encompassed within the CMP and will be maintained during construction.

7.7 Water

7.7.1 Overview

A Water Assessment (WA) (Appendix G) was undertaken in accordance with the relevant government assessment requirements, guidelines, and policies. A Flood Investigation Report was also prepared for the Project (Costin Roe 2020) (Appendix B of the WA) which included a flood model parametrised to produce a similar rainfall/runoff response to flood modelling undertaken for the broader MLP.

The Costin Roe (2020) report was provided to LCC and the SES for comment on 2 November 2020. No comments were received in reply.

Table 7.46 sets out the SEARs that relate to water and identifies where they are addressed in this EIS.

Table 7.46 SEARs for the Project - Water

Requirement	Where addressed in this EIS
5. Water - Quality	
1. Identify the ambient NSW Water Quality Objectives (NSW WQO) and environmental values for the receiving waters relevant to the project, including the indicators and associated trigger values or criteria for the identified environmental values;	Water Quality Objectives and environmental values relevant to the Project are identified in Section 7.7.3 of this EIS and Section 3.6 of the WA (Appendix G).
2. Demonstrate how construction and operation of the project will, to the extent that the project can influence:	
(a) where the NSW WQOs for receiving waters are currently being met they will continue to be protected; and	Water quality impacts are assessed in Section 7.7.4 of this EIS and Section 4.6 of the WA (Appendix G).

Table 7.46 SEARs for the Project - Water

Requirement	Where addressed in this EIS
(b) where the NSW WQOs are not currently being met, activities will work toward their achievement over time.	Existing water quality controls are described in Section 7.7.2 of this EIS and Section 5.6 of the WA (Appendix G).
3. Justify, if required, why the WQOs cannot be maintained or achieved over time.	No material impacts to water quality are expected (refer Section 7.7.4 of this EIS and Sections 6.3 and 7.3 of the WA).
4. Identify and estimate the quality and quantity of pollutants that may be discharged and an analysis of the likely nature and degree of impact that any discharge(s) may have on the receiving environment.	Water quality impacts are described in Section 7.7.4 of this EIS and Sections 6.3 and 7.3 of the WA (Appendix G).
5. Identify the rainfall event that water quality protection measures will be designed to cope with.	Design criteria are presented in Chapter 5 of the WA (Appendix G).
6. Demonstrate that all practical measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented.	No material impacts to water quality are expected (refer Section 7.7.4 of this EIS and Sections 6.3 and 7.3 of the WA).
7. Identify sensitive receiving environments (which may include estuarine and marine waters downstream) and develop a strategy to avoid or minimise impacts on these environments.	The proposed water management strategy is provided in 7.7.3 of this EIS and Chapter 5 of the WA (Appendix G).
8. Identify proposed monitoring and indicators of surface and groundwater quality.	Monitoring is described in Section 5.7.5 of the WA (Appendix G).
6. Water - Hydrology	
1. Describe any surface and groundwater resource (including reliance by users and for ecological purposes) likely to be impacted by the project, including stream orders, as per the BAM.	Surface and groundwater resources are described in Section 7.7.2 of this EIS and Chapter 4 of the WA (Appendix G).
2. Identify an adequate and secure water supply for the life of the project.	Water supply is described in Section 6.2.1 of the WA (Appendix G).
3. Prepare a water balance for ground and surface water for construction.	The construction water balance is addressed in Section 6.2.1 of the WA (Appendix G).
4. Assess (and model if appropriate) the impact of the construction and operation of the project (both built elements and discharges) on surface and groundwater hydrology in accordance with the current guidelines.	Impacts to surface water and groundwater hydrology are assessed in Section 7.7.4 of this EIS and Chapters 6 and 7 of the WA (Appendix G).
5. Identify any requirements for baseline monitoring of hydrological attributes.	Monitoring is described in Section 5.7.5 of the WA (Appendix G).

Table 7.46 SEARs for the Project - Water

Requirement	Where addressed in this EIS
7. Flooding	
1. Assess the impacts of the proposed development on flood behaviour, including:	Impacts to flood behaviour are described in Section 7.7.4 and Sections 6.4 and 7.4 of the WA (Appendix G) and Appendix B of the WA (Appendix G).
(a) any detrimental increases in the potential flood affectation of other properties, assets and infrastructure;	
(b) consistency (or inconsistency) with applicable Council floodplain risk management plans;	
(c) compatibility with the flood hazard of the land;	
(d) compatibility with the hydraulic functions of flow conveyance in flood ways and storage areas of the land;	
(e) downstream velocity and scour potential;	
(f) impacts the development may have upon existing community emergency management arrangements for flooding. These matters must be discussed with the State Emergency Services and Council;	
(g) any adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the proposal;	
(h) any direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourse;	
(i) whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with SES and the local Council;	
(j) emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event; and	
(k) any impacts the development may have on social and economic costs to the community as a consequence of flooding.	
2. Describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of 5% Annual Exceedance Probability (AEP) flood level, 1% AEP flood level and the probable maximum flood, or an equivalent extreme event.	A flood investigation report which describes the assessment and modelling undertaken is provided in Appendix B of the WA (Appendix G).
3. Model the effect of the proposed development (including fill) on the flood behaviour under current flood behaviour for a range of design events as identified above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.	A flood investigation report which describes the assessment and modelling undertaken is provided in Appendix B of the WA (Appendix G).

Table 7.46 SEARs for the Project - Water

Requirement	Where addressed in this EIS
4. Modelling in the EIS must consider and document:	A flood investigation report which describes the assessment and modelling undertaken is provided in Appendix B of the WA (Appendix G). Flood impacts to and project consistency with relevant studies/plans/guidelines are described in Section 7.7.4 and Section 6.4 and Section 7.4 of the WA (Appendix G).
(a) existing local council flood studies in the area and examine consistency to the flood behaviour document in these studies;	
(b) the impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood;	
(c) impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories; and	
(d) relevant provision of the NSW Floodplain Development Manual 2005.	

7.7.2 Existing environment

i Regional surface water context

The Project is within the Liverpool LGA region of the Georges River catchment. The catchment covers a total catchment area of 960 km^2. Most of the Project site is within the Anzac Creek catchment. Anzac Creek is a minor tributary to the Georges River and has a total catchment area of 10.6 km^2.

Most of the upper catchment remains undeveloped while the lower catchment comprises the Wattle Grove residential area and industrial developments associated with the Moorebank Industrial Area. The lower catchment is also traversed by a number of important transport routes such as the M5 Motorway. Upstream of the Project site, the catchment is approximately 0.5 km^2 and comprises of vegetated bushland and industrial area associated with MPE and MPW.

ii Local watercourses

Georges River and Anzac Creek are the two primary watercourses in proximity of the Project.

The Georges River is located 600 m west of the Project site and flows in a south to north direction, approximately parallel to the proposed road alignment. The Georges River forms the western boundary of the MPW site where the channel is well defined with vegetated banks on both sides of the river. A terraced floodplain area with relatively low elevations exists on the eastern bank of the river at the northern end of the Project area. The terrain rises steadily from the terraced area to the higher elevations of the Project site to the east.

Anzac Creek rises west of the Project site and flows in an easterly direction traversing the existing Moorebank Avenue and SIMTA Rail Line to the north of the proposed road realignment. The creek crosses the proposed road realignment adjacent to the south-eastern corner of MPE before turning north-east through vegetated bushland. Downstream of the Project, the creek flows adjacent to the DJLU site and Wattle Grove before traversing the M5 Motorway and discharging to the Georges River approximately 3 km north-east of the Project site.

Anzac Creek is observed as being a 1st order watercourse and having an ephemeral flow regime in the vicinity of the Project site.

iii Stormwater drainage

There are four external stormwater catchments upstream of the Project site. Three of these are associated with discharge from the MPE site. The fourth includes runoff from the western extent of the DJLU site. The external catchments include:

- MPE Catchment A – Drains the north-east portion of the MPE site. Runoff from the 22.8 ha catchment is directed to a detention basin in the north-east corner of the MPE site via a series of pit and pipe networks and overland flow paths. Controlled discharge to 'Outlet A' occurs via four 1,200 x 600 mm reinforced concrete box culverts. Overflows from the basin drain in an easterly direction across an access road before entering an existing drainage channel that traverses DJLU land before discharging to Anzac Creek.

- MPE Catchment B - Drains the south-east portion of the MPE site. Runoff from the 24.9 ha catchment is directed to a detention basin at the southern end of the MPE site via a series of pit and pipe networks and overland flow paths. Controlled discharge to 'Outlet B' occurs via four 1,350 mm diameter reinforced concrete pipes. Overflows from the basin drain in an easterly direction across an access road before entering Anzac Creek and/or to the south where flows will directly enter Anzac Creek.

- MPE Catchment C - Drains the western portion of the MPE site. Runoff from the 57.3 ha catchment is directed to a detention basin in the north-east corner of the MPE site via a series of pit and pipe networks and overland flow paths. Controlled discharge to 'Outlet C' occurs via an existing culvert arrangement that traverses Moorebank Avenue to the west. Overflows from the basin drain in a westerly direction across Moorebank Avenue before discharging to Georges River via an existing concrete lined drainage channel.

- DJLU Catchment – Drains the south-west portion of the DJLU land. Runoff from the 5.1 ha catchment drains west of Moorebank Avenue via a pit and pipe network before discharging to the drainage channel at Outlet C. Runoff that exceeds the capacity of the pit and pipe network is expected to pond on the eastern side of Moorebank Avenue before overtopping the road in a westerly direction and entering the drainage channel at Outlet C before discharging to the Georges River.

Stormwater drainage catchments and associated flow paths are summarised in Table 7.47 and shown in Figure 7.10.

Table 7.47 Summary of upstream drainage catchments

Catchment ID	Catchment area	Outlet ID	Peak discharge at outlet [1]	Receiving watercourse
MPE Catchment A	22.8 ha	Outlet A	2.9 m^3/s (Costin Roe 2019)	Anzac Creek
MPE Catchment B	24.9 ha	Outlet B	2.1 m^3/s (Costin Roe 2018)	Anzac Creek
MPE Catchment C	57.3 ha	Outlet C	6.7 m^3/s (Arcadis 2019)[2]	Georges River
DJLU Catchment	5.1 ha	Outlet C	6.7 m^3/s (Arcadis 2019)[2]	Georges River

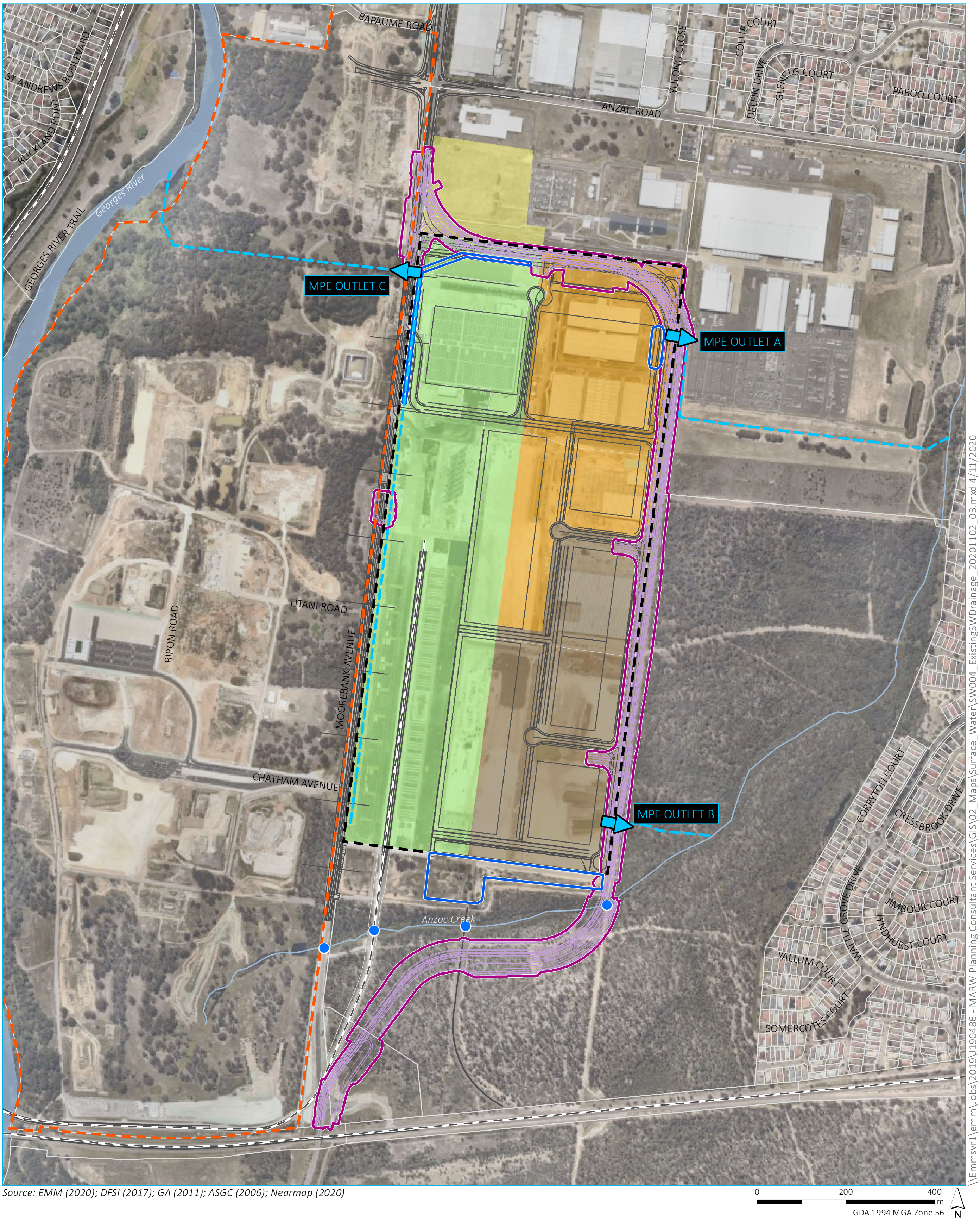
Note: 1. Peak discharge for the 100-year average recurrence interval (ARI) design storm event.
2. Peak discharge at Outlet C based on MPE post development scenario presented in Arcadis (2019) and includes runoff from MPE Catchment C and DJLU Catchment.

iv Flooding

A section of the Georges River floodplain lies to the west of the Project. The 100-year ARI flood extent is approximately 400 m west of the Project (Arcadis 2016). The probable maximum flood (PMF) event is shown to extend up to the north-western section of the Project but does not encroach on the Project site. Some backwater flooding effects during such an extreme flood event may be experienced in the channel that conveys water from MPE Catchment C and the DJLU Catchment to Georges River. The critical storm duration for the Georges River near the Project site is 36 hours for the 100-year ARI storm event (Parsons Brinckerhoff 2014). Flood levels resulting from the critical storm are expected to remain elevated for a relatively long period of time, in the order of a day or more.

Liverpool City Council flood risk mapping identifies the Anzac Creek floodplain as a combination of low and medium flood risk, based on flooding investigations undertaken as part of the *Anzac Creek Floodplain Risk Management Study and Plan* (BMT WBM 2008). However, the flood modelling undertaken to support this work is now dated and of relatively coarse resolution suitable to inform broad catchment-scale flood planning.

Existing flooding characteristic where the Project crosses Anzac Creek and its floodplain have been established via flood modelling undertaken by Costin Roe (2020). Flood mapping shows shallow overland flooding extends across much of the study area for all events. However, mainstream flooding along Anzac Creek is relatively well confined to the creek line for events up to the 100-year ARI. Flooding conditions along the creek line would typically be of relatively high hazard and unsafe for people and vehicles for all events assessed, whilst overland flows approaching the creek line would typically be of low hazard.



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

KEY

- Construction footprint
- Moorebank Precinct East
- Moorebank Precinct West
- Cadastral boundary
- Rail line
- Watercourse
- Waterbody
- Road design
- Precinct plan
- Existing/approved basin
- Waterway crossing
- External drainage line
- Local drainage outlet

External catchment

- DJLU catchment
- MPE catchment A
- MPE catchment B
- MPE catchment C

Existing stormwater drainage

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.10

EMM
creating opportunities

v Water quality

The quality of stormwater discharging from the existing site is currently influenced by discharges from adjacent developments (MPE and MPW), existing road infrastructure and upstream land uses.

Previous water quality sampling (Hyder 2013; Parsons Brinckerhoff 2014; Biosis 2018) of Georges River and Anzac Creek indicates the following water quality characteristics:

- Most physico-chemical water quality parameters are within ANZECC (2000) guidelines for low land aquatic ecosystems in south-eastern Australia. Except for:
  - pH and dissolved oxygen which were occasionally lower than the guideline range; and
  - turbidity which occasionally exceeded the guideline value.
- Total nitrogen and total phosphorus occasionally exceed ANZECC (2000) guideline values. Anzac Creek was observed to exceed guideline values more frequently, which was attributed to runoff from the Royal Australian Engineers golf course (Parsons Brinckerhoff 2014).
- No major exceedances of metals that indicate unusual or long-term trends of concern. However, aluminium concentrations were observed to exceed guideline values in one sample on Anzac Creek (Hyder 2013).

A detailed site investigation of the Holsworthy Barracks (CH2M HILL 2018) indicated that the concentration of PFAS in water samples collected from Anzac Creek were greater than the human health drinking water guidelines but below recreational water use guidelines.

vi Hydrogeology

Geological investigations (Golder 2016a; 2016b) were undertaken to confirm the existing geological and hydrogeological environment of the MLP. Geology of the Project site generally comprises a thin layer of fill material at the ground surface over a layer of alluvium soil. The alluvium soil generally overlays bedrock that is typically shale (Ashfield Shale) underlain by sandstone (Hawksbury Sandstone). Alluvium soils are present extensively across the northern, western, and southern extent of the Project site, but decrease in thickness towards the east. Sandstone was found to occur immediately below the alluvium at the southern end of the Project site.

Two main aquifer systems are present across the Project site, a perched system within the alluvium soils and a deeper aquifer within the bedrock. Groundwater within the shallow alluvial aquifer is expected to flow towards the Georges River.

Depth to groundwater varies across the Project site with a typical range of 4 m to 7 mbgl. However, depth to groundwater has been observed at 1.5 mblg at the south-eastern corner of the MPE site near Anzac Creek.

7.7.3 Proposed water management

i Water quality performance targets

The water quality criteria applicable to the Project site include the *NSW Water Quality and River Flow Objectives* (DECCW 2006) for the Georges River catchment and water quality performance targets defined by local planning instruments and for development specific activities. The stormwater quality performance targets for the Project have been derived in-line with the broader MLP objectives and with consideration with documents including the Liverpool DCP, the Georges River Estuary Coastal Zone Management Plan (CZMP) (BMT WBM 2013) and Roads and Maritime Services *Water Sensitive Urban Design Guideline* (2017)/Transport for NSW (TfNSW) *Sustainable Design Guidelines* (2017).

The water quality performance targets for the Project are provided in Table 7.48.

Table 7.48 Water quality performance targets

Water quality parameter	Liverpool DCP 2008	Georges River Estuary CZMP 2013	RMS/TfNSW guidelines 2017
Total suspended solids	85%	85%	85%
Total phosphorus	65%	60%	65%
Total nitrogen	45%	45%	45%
Gross pollutants	90%	90%	90%

ii Water management approach

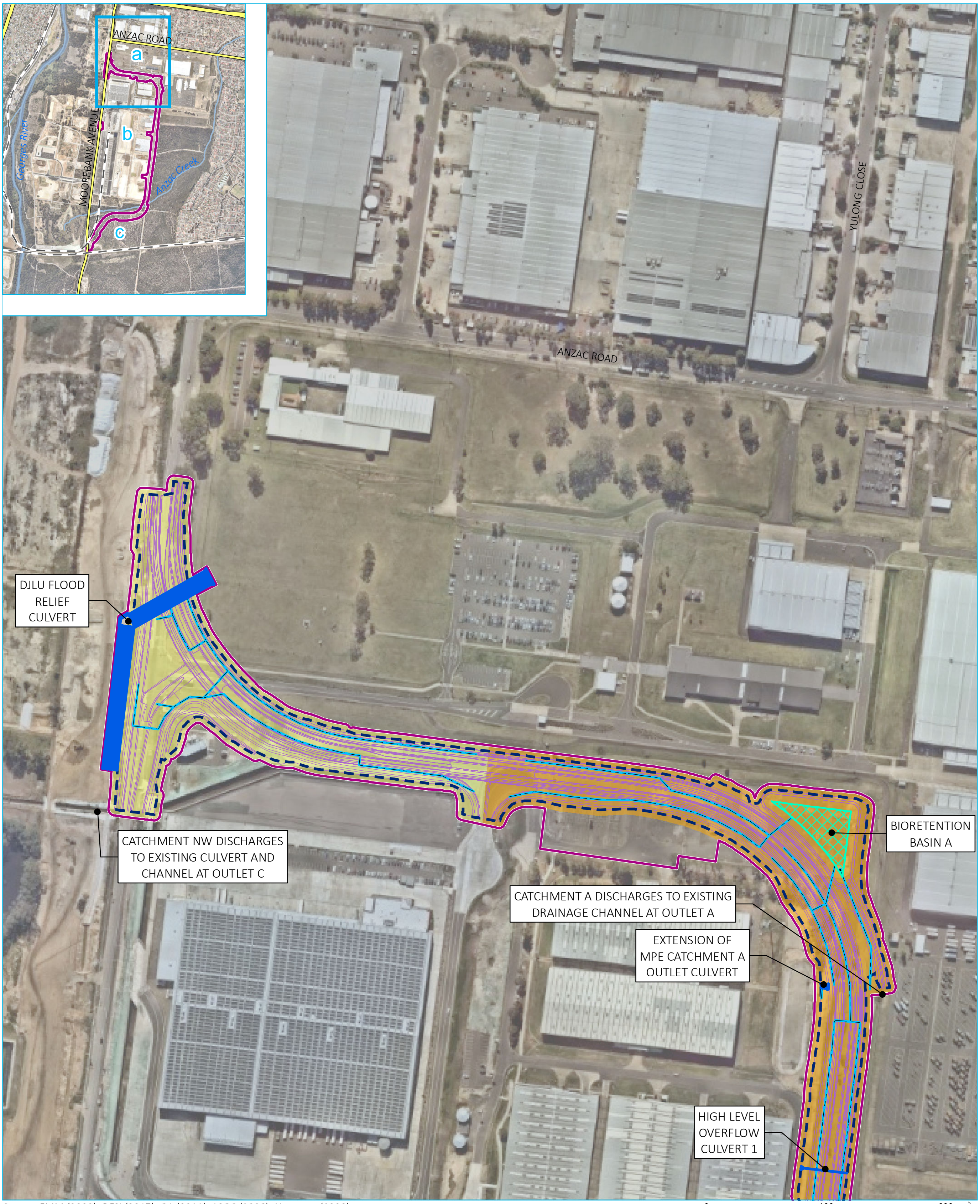
The proposed water management approach and drainage design are detailed in Section 5.1. It is noted that the design, including drainage and water quantity and quality controls is subject to further refinement during detailed design.

Once built, the Project site will comprise four stormwater catchments. Runoff from these catchments will be collected and conveyed to nominated outfall locations via a road drainage network comprised of piped longitudinal drainage and overland flow paths. Stormwater conveyed by the road drainage network will discharge into an existing drainage network or one of three bioretention basins located along the road alignment. Stormwater that will discharge from the Project site will flow into the receiving waters of Georges River or Anzac Creek via existing drainage channels.

The stormwater catchments are described in Table 7.49 and shown in Figure 7.11.

Table 7.49 Summary of stormwater catchments

ID	Area	Description	Receiving water
Catchment NW	2.4 ha	Road alignment between the northern extent of the Project and Intersection B and the Moorebank Avenue termination works. Drains stormwater from the DJLU site via an existing pit and pipe network to be incorporated into the Project design. Stormwater from the Project and DJLU site discharge to an existing culvert prior to entering an existing drainage channel that discharges to Georges River.	Georges River
Catchment A	4.5 ha	Road alignment between Intersection B and land immediately south of Intersection C. Drains stormwater to Bioretention Basin A in the north-eastern corner of the Project site.	Anzac Creek
Catchment B	2.3 ha	Road alignment between land immediately south of Intersection C and the south-eastern corner of the MPE site. Drains stormwater to Bioretention Basin B in the vicinity of the southern MPE site intersection.	Anzac Creek
Catchment C	6.0 ha	Road alignment between the south-eastern corner of the MPE site and the southern extent of the alignment where it re-joins with the existing Moorebank Avenue. Drains stormwater to Bioretention Basin C in the south-eastern corner of the Project site.	Anzac Creek



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

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KEY

- Construction footprint
- Road design
- Design footprint
- Proposed bioretention area
- Proposed culvert
- Proposed stormwater drainage pipe

Proposed catchment

- Catchment A
- Catchment NW

Proposed water management infrastructure

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.11a

creating opportunities

Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

KEY

Construction footprint

Road design

Design footprint

Proposed bioretention area

Proposed culvert

Proposed stormwater drainage pipe

Proposed catchment

Catchment A

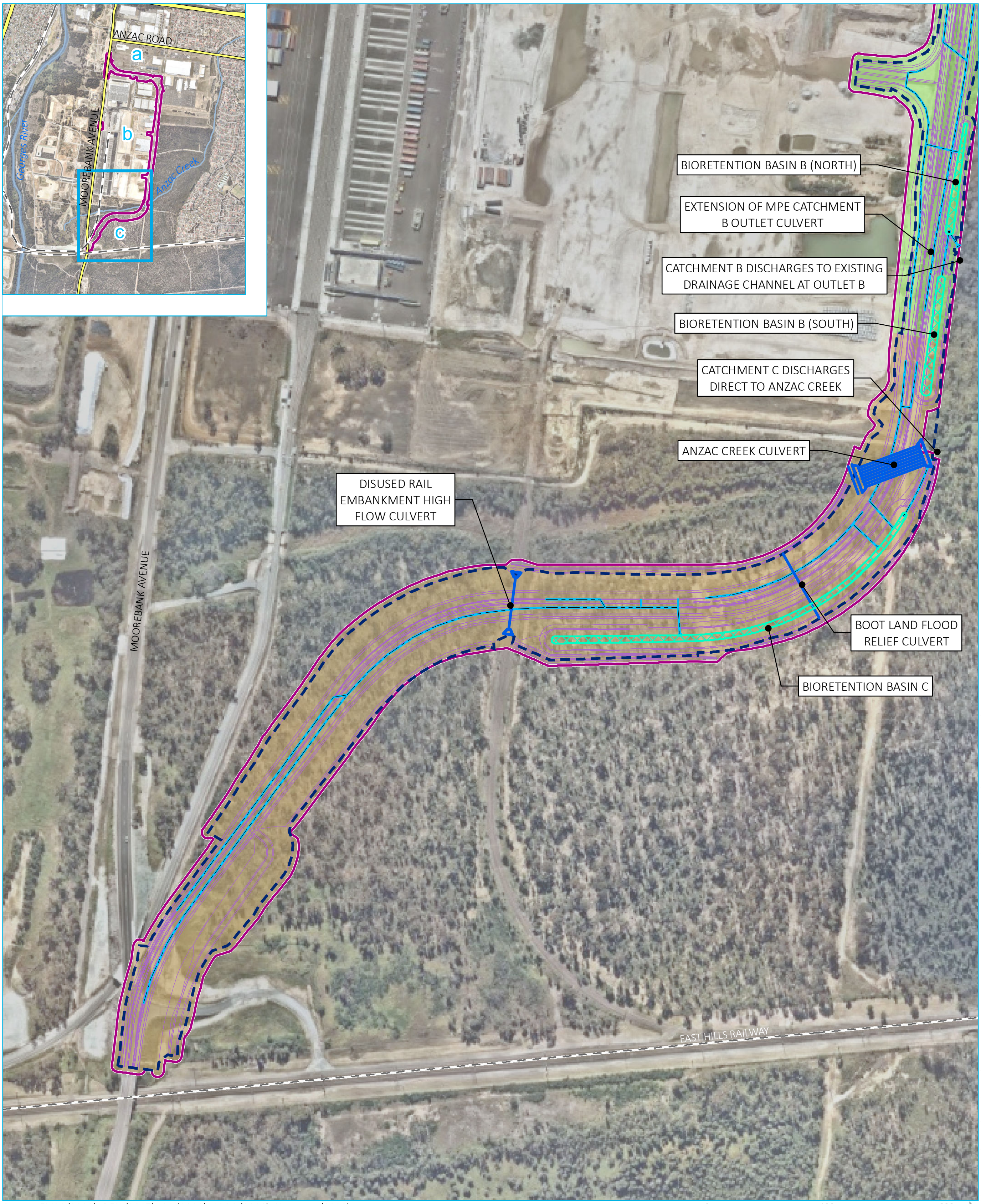
Catchment B

Catchment NW

Proposed water management infrastructure

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.11b

EMM creating opportunities



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Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

0 100 200 m

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KEY

- Construction footprint
- Road design
- Design footprint
- Proposed bioretention area
- Rail line
- Proposed culvert
- Proposed stormwater drainage pipe

Proposed catchment

- Catchment B
- Catchment C

Proposed water management infrastructure

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.11c

EMM
creating opportunities

a Surface drainage

Catch drains will be constructed around the extent of the Project site where the surface falls towards cut and fill embankments. Where practical, catch drains will direct stormwater toward vegetated swales and then to bioretention basins to improve water quality prior to discharge.

Clean water diversions will be established to divert flow from external catchments towards proposed transverse drainage structures and/or existing watercourses.

Surface drainage channels will convey stormwater runoff during minor and major storm events. Channels will be lined with grass, rock rip-rap, concrete or some other suitable material depending on design velocities and industry best practice.

b Longitudinal drainage

The Project will incorporate a longitudinal drainage system, consisting of drainage pits, pipes, gutters and open channels. The longitudinal drainage system will function to collect and convey stormwater runoff from the road pavement and will generally discharge via stabilised outfalls to proposed bioretention basins or to an existing drainage line. The system will be designed to convey the 10-year ARI design storm event. Where possible, the drainage design will seek to retain elements of the existing drainage network.

Future detailed design stages of the Project will confirm that existing drainage channels within the DJLU and MPW sites have sufficient capacity to convey combined stormwater flows from the Project and the broader MLP.

c Transverse drainage and flooding

Several transverse drainage structures will be installed to convey flows from external stormwater catchments beneath the Project alignment. Transverse drainage is also required where the alignment crosses Anzac Creek. The transverse drainage network will be designed to convey the 100-year ARI design storm event peak discharge and achieve the following objectives:

- minimal change to peak discharge compared to existing conditions;
- minimal afflux effects both upstream and downstream of structure; and
- maintain or improve safe passage for road users during storm or flood events.

Proposed transverse drainage structures are described in Table 7.50.

Table 7.50 Proposed transverse drainage structures

Culvert	Chainage (m)	Proposed works	Purpose
DJLU flood relief culvert	100	New culvert	Provides flood relief to DJLU site.
MPE Catchment A outlet culvert	820	Extension of existing outlet culvert	Bioretention basin outlet that receives runoff from the northern portion of MPE site. Discharges to Outlet A.
High level overflow culvert 1	960	Potential new culvert	High flow culvert to drain runoff from MPE Warehouse 2.
High level overflow culvert 2	1,020	Potential new culvert	High flow culvert to drain runoff from MPE Warehouse 2.
MPE Catchment B outlet culvert	1,920	Extension of existing outlet culvert	Bioretention basin outlet that receives runoff from the southern portion of MPE site. Discharges to Outlet B.

Table 7.50 Proposed transverse drainage structures

Culvert	Chainage (m)	Proposed works	Purpose
Anzac Creek culvert	2,080	Upgrade of existing culvert	Convey flows in Anzac Creek from upstream to downstream of the Project.
Boot Land flood relief culvert	2,240	New culvert	Flood relief/high flow culvert to allow overland flows from the south to drain to Anzac Creek.
Disused rail embankment high flow culvert	2,480	New culvert	Flood relief/high flow culvert to allow overland flows from the south to drain to Anzac Creek.

d Scour protection

Where existing velocities from drainage culverts are sufficiently high and the receiving channel is expected to be erodible, protective measures will be included as part of the drainage design to protect against scouring and erosion. Planned scour protection measures include but are not limited to:

- concrete headwalls with concrete or rock aprons (provided at all culverts);
- extended transition aprons; and
- energy dissipators.

Scour protection for the longitudinal and transverse drainage network will be designed for the 50-year ARI design storm event.

iii Onsite water detention

Bioretention basins will function to attenuate stormwater flows from the Project site (as well as providing water quality treatment). The basins will be designed so that peak discharge rates from the Project site will not exceed runoff generated by existing conditions up to the 100-year ARI design storm event.

Bioretention basin outlets will comprise a low flow outlet pipe to convey smaller runoff events and an overflow/high flow weir for larger runoff events. Basin outlets will include suitable scour protection and energy dissipation controls to reduce erosion potential associated with concentrated discharges and increased runoff rates.

The feasibility of constructing onsite bioretnetion basins is dependent on road geometry, the Project boundary and existing terrain levels. Detention basins are proposed for stormwater catchments where there is sufficient space and favourable terrain. No onsite detention is proposed where catchments are constrained.

A summary of the proposed detention basins including contributing operational catchment area is provided in Table 7.51.

Table 7.51 Summary of onsite detention basins

ID	Catchment area[1]	Description
Bioretention Basin A	3.8 ha	Receives runoff from Catchment A. Discharge from the basin drains to an existing stormwater channel on the DJLU site before flowing to Anzac Creek.
Bioretention Basin B	1.7 ha	Receives runoff from Catchment B. Comprised of two separate storage areas (north and south) that join at the proposed overflow spillway weir. Discharge from the basin drains to Anzac Creek via an existing drainage channel.
Bioretention Basin C	2.9 ha	Receives runoff from Catchment C. Discharge from the basin drains directly to Anzac Creek.

Note: 1. Catchment area represents the total operational area draining to each bioretention basin as per the concept design.

iv Water quality controls

Vegetated swales will be established where practical along the Project to promote uniform flow and reduced velocity to encourage the settlement of course sediments and capture litter and organic matter.

Bioretention systems will be established in Bioretention Basins A, B and C to provide water quality benefits and achieve pollutant load reduction targets. Bioretention basins facilitate the removal of pollutants and sediment from stormwater runoff through extended detention and filtration processes. Stormwater captured in a bioretention basin flows through a vertical filter media before being collected by slotted under drainage and discharged downstream (ie to Anzac Creek).

The biofiltration area to be constructed in each bioretention basin will be sized to meet the pollutant load reduction targets. The minimum biofiltration area required for each project catchment is provided in Table 7.52.

Table 7.52 Minimum biofiltration area requirements

Catchment ID	Basin ID	Catchment area	Total base area	Minimum biofiltration area	Remaining base area
Catchment A	Bioretention Basin A	3.8 ha	1,600 m^2	800 m^2	800 m^2
Catchment B	Bioretention Basin B	1.7 ha	1,120 m^2	400 m^2	720 m^2
Catchment C	Bioretention Basin C	2.9 ha	1,670 m^2	600 m^2	1,070 m^2

Spill containment will be provided for catchments that drain to the Boot Land and Anzac Creek. Spill containment will be provided by the bioretention basins.

7.7.4 Assessment of impacts

i Construction impacts

a Hydrology

The Project portable water demand during construction is expected to be sourced from Sydney Water Corporation's mains network. Stormwater collected in temporary sedimentation basins and/or permanent bioretention basins may be recycled for construction purposes such as dust suppression. Hence, water used during construction can be managed without impacting (via extraction) local surface water and groundwater resources.

During construction, runoff regimes from disturbed areas may be materially different from undisturbed areas due to the removal of vegetation and establishment of engineered surfaces such as roads and hardstand areas.

Increases to streamflow volume and discharge rates from the Project site during construction are expected to be insignificant compared to streamflow in the Georges River and Anzac Creek resulting from the broader catchment. Accordingly, impacts to flow regimes during construction are anticipated to be minor and manageable with proposed management measures in place (refer Section 7.7.5). Residual impacts will only occur over a short-duration (16 months).

Potential changes to watercourse geomorphology may occur during construction. Changes will take the form of altered bed and bank conditions due to changes in streamflow characteristics and via erosion and sediment build up which can impact instream profiles and habitat features.

Soil disturbance during construction also has the potential to increase sediment loads and distributions within receiving watercourses. This increase to sediment loads during construction is unlikely to substantially alter existing sediment loads and distributions occurring from the wider Georges River and Anzac Creek catchments.

Changes in runoff regimes from the disturbed construction areas have the potential to alter stormwater flow volumes and velocities. Increased velocities can increase the risk of scour at stormwater outlets and in the main channel of receiving watercourses. The risk of scour immediately downstream of the Project site is low in areas where the Project discharges to engineered channels such as from Catchment NW and Catchment A. Due to the relatively small disturbance area, additional runoff from the Project site is unlikely to alter the hydrologic characteristics of the wider Georges River and Anzac Creek catchments. Controls will be implemented to mitigate scour risk at locations where the Project will discharge to natural drainage lines.

b Water quality

The Project has been designed to minimise impacts to water resource within and near to the Project boundary. The primary risk to water quality during construction is a reduction as a result of ground disturbance during earthworks (eg vegetation clearing, stripping of topsoils, and stockpiling). Other impacts may occur due to other site activities such as movement of construction vehicles and plant and road construction. There is potential that these works will lead to exposure of soils and potential erosion and mobilisation of sediment into receiving watercourses. If unmitigated, run-off from disturbed areas may increase concentrations and loads of suspended solids, nutrients, and metals in receiving watercourses.

There is also a risk to water quality from accidental leaks and spills occurring from chemical storage areas, construction equipment, and vehicle incidents. Inadequate containment of leaks and spills increases the risk of runoff conveying hydrocarbons and chemicals used in construction to receiving waters.

The Project also involves the installation of a culvert within Anzac Creek and the extension of existing culverts which will require works within existing watercourses/drainage lines. Instream works pose a higher risk of erosion and sediment transport due to the potential disturbance of bed sediments and concentrated flows occurring from the upstream catchment.

Impacts to water quality during construction and operations are considered minor and manageable with proposed management.

c Flooding

During construction there is a hazard to construction personnel, construction plant/equipment and downstream watercourses. There is also potential for adverse flooding impacts on surrounding and downstream land.

d Groundwater

Excavations during construction are expected to be relatively shallow and are not anticipated to intercept groundwater which typically occurs at 4 to 7 m below ground level. Fill earthworks are proposed in the vicinity of Anzac Creek where groundwater levels were observed to be nearer to the surface.

Groundwater interception during the installation of culverts within Anzac Creek is not anticipated. However, if groundwater were intercepted, the temporary nature of these works and the limited extent of potential disturbance to groundwater means that residual impacts will be negligible.

e Monitoring

A surface water monitoring program for the construction phase of the project will be developed as part of the SWMP. The monitoring program will aim to identify water quality issues occurring as a result of construction activities. The monitoring program will include:

- visual inspection of local water quality to identify potential spills or deficient controls;
- determination of monitoring locations;
- determination of monitoring frequency (typically in wet weather or site overflow);
- development of a targeted analytical suite (typically pH, total suspended solids, turbidity, oil and grease); and
- formalisation of a reporting strategy for water quality results.

Monitoring locations will target project discharge locations such as temporary sediment basins and receiving waters.

f Cumulative impacts

The construction of the Project will coincide with the construction and operation of the broader MLP. Cumulative impacts to water quantity and quality are generally related to the movement of soil and water across project boundaries and the combination of discharge streams in receiving waters.

The environmental impact assessments prepared for MPE and MPW indicate that no significant impacts to water quantity or quality are predicted in Georges River or Anzac Creek. Therefore, with the implementation of the construction management and mitigation measures, cumulative impacts associated with the construction phase of the Project are considered negligible.

ii Operational impacts

a Hydrology

In terms of operational water balance, larger runoff volumes associated with increased impervious areas could result in an increase in pollutant loads, greater risk of erosion and sediment mobilisation, and/or changes to the geomorphological condition of watercourses. The Project will introduce additional impervious areas that will drain to Georges River and Anzac Creek (estimated to be 1.4 ha and 7.6 ha, respectively). When considered in the context of the greater Georges River (960 km2) and Anzac Creek (10.6 km^2) catchment areas, the predicted changes to annual flow volumes during operation are considered negligible. The Project is not expected to require portable water or generate wastewater during operation. There will be no water take or discharges other than stormwater runoff.

Peak discharges from the Project site for existing and operational conditions (operation of bioretention basins described in Section 5.3.8), are presented in Table 7.53. A critical storm duration of 2 hours was considered for all discharge outlets and storm events.

Table 7.53 Impacts to flow regime

Outlet	10-year ARI peak discharge (m^3/s)			100-year ARI peak discharge (m^3/s)		
	Existing	Design	Difference	Existing	Design	Difference
Bioretention Basin A	1.46	0.17	-1.29	1.98	0.30	-1.68
Bioretention Basin A	0.59	0.39	-0.2	0.82	0.50	-0.32
Bioretention Basin A	1.02	0.16	-0.86	1.41	0.018	-1.392

No water quantity controls are proposed for Catchment NW due to road alignment, boundary and existing terrain constraints. Any increase to peak discharge from Catchment NW due to the 1.4 ha impervious area is expected to be negligible compared to the flows in the Georges River.

The Costin Roe (2020) flood investigation identified minimal changes to flow depths and velocities in Anzac Creek as a result of proposed stormwater infrastructure within Anzac Creek. Flow depths and velocities were observed as generally being of low magnitude for both existing and proposed conditions. Hence, no impacts to watercourse geomorphology are anticipated as a result of the Project.

b Water quality

Impacts to water quality from stormwater discharge have been considered in the design of the Project.

Stormwater discharge to Anzac Creek will occur via a bioretention filter through a low flow outlet. During larger runoff events, where detention basin inflows exceed low flow outlet capacity, discharge will occur via a high flow overflow weir.

Stormwater discharge to Georges River will drain freely through the pit and pipe network, and longitudinal drainage network.

MUSIC modelling was completed as a part of the design phase of the Project. The modelling was used to determine pollutant loads and assess the performance of the proposed stormwater quality treatment systems during operational conditions. Table 7.54 presents the MUSIC modelling results for discharges to Anzac Creek via Detention Basins A, B and C for a suite of pollutants including total suspended solids (TSS), total phosphorus (TP), total nitrogen (TN) and gross pollutants.

Table 7.54 MUSIC model results – discharge to Anzac Creek

	Source load	Load reduction	Residual load	Design pollutant reduction[1]	Adopted target	Target achieved
Flow (ML/year)	55.9	-3.1	52.8	5.6%	n/a	n/a
Total suspended solids (kg/year)	19,900	-18,730	1,170	94.1%	85%	Yes
Total phosphorus (kg/year)	33	-22	11	66.7%	65%	Yes
Total nitrogen (kg/year)	134	-82.5	51.5	61.6%	45%	Yes
Gross pollutants (kg/year)	1,500	-1,500	0	100%	90%	Yes

Source: Arcadis Concept Design Report.
Notes: 1. Design pollutant reductions are relative to post development pollutant loads with no controls.

Model results indicate that pollutant load reductions for all pollutants meet the adopted pollutant reduction targets. This indicates the proposed water management system is appropriately configured for operational conditions. Furthermore, the annual reduction (up to 18,730 kg/year for total suspended solids) in pollutant loads achieved by the proposed design will result in a substantial reduction in total pollutant loads discharging to Anzac Creek over time compared to an unmitigated design.

Vegetated swales will provide water quality benefits for Catchment NW. No water quality controls are proposed where vegetated swales are not practical. Any increase to total suspended solids, nutrients and gross pollutant loads as a result of the Project is expected to be negligible compared to the existing loads from the broader Georges River catchment. Hence, residual water quality impacts in the Georges River are expected to be negligible.

Water quality impacts due to erosion and sediment mobilisation has potential to occur at stormwater discharge outlets and instream structures. The Project will be managed via appropriately designed scour protection measures, designed for the 50-year ARI design storm event. In storm events larger than the 50-year ARI, the potential for erosion and sediment mobilisation at discharge outlets and instream structures is greater. Notwithstanding, water quality impacts are still expected to be minimal as increased sediment loads would be expected under existing conditions and from the broader catchment in these larger storm events.

Additionally, impacts to water quality may occur through accidental leaks and spills. Unmitigated, leaks and spills can lead to elevated levels of chemicals, heavy metals, oil, grease and petroleum hydrocarbons in receiving watercourses. Accordingly, spill containment has been provided for bioretention basins for Catchments A, B and C. No spill containment is proposed for Catchment NW as incidents that lead to leaks and spills are anticipated to occur infrequently and contribute minimal volume to the overall flow in the Georges River.

c Flooding

Flood impact mapping is presented in Costin Roe (2020) to show predicted afflux (ie change in peak flood level) as a result of the Project for the 20, 100, 200 and 500-year ARI flood events and the PMF. For the 100-year ARI flood event, changes in peak flood level are shown to be minor and located within or immediately adjacent to the proposed road corridor and do not affect existing development. Localised increases in peak flood level reach a maximum of about 230 mm outside the road corridor. This affects bushland area with no development potential nor environmental value that would be materially affected.

Impacts for other flood events assessed generally scale with flood magnitude. Impacts for the 20-year ARI flood event are shown to be generally smaller than for the 100-year ARI, with localised increases in peak flood levels reaching a maximum of about 140 mm. For the 200-year ARI event, localised increases in peak flood levels reach a maximum of about 250 mm. For floods larger than 200-year ARI, impacts are shown to affect the broader Anzac Creek floodplain extending upstream and to the south of the Project site. Inundation depths within the Anzac Creek channel downstream of the Project are expected to increase by up to 35 mm for the 20-year ARI, experience no change for the 100-year ARI event, and decrease for flood events of greater magnitude than the 100-year ARI.

No impacts to beneficial inundation of the floodplain environment are expected downstream of the Project for flood events up to and including the 500-year ARI. Flooding during the PMF is expected to maintain a similar inundation extent across the Anzac Creek floodplain. However, the depth of floodplain inundation during the PMF is expected to decrease downstream of the Project for the proposed design.

Floodplain inundation upstream of the Project is constrained by the existing Moorebank Avenue and MLP rail link. No material changes to flood extent are predicted to occur upstream of the Project. However, inundation depths are generally expected to decrease for the 20-year and 100-year ARI flood events and increase for the 500-year ARI and PMF events.

Flow velocities are shown to be subject to minor increases in the order of 0.25 metres per second (m/s) for the 100-year ARI event, with impacts similarly located within or immediately adjacent to the proposed road corridor.

Flood impacts resulting from the Project are not anticipated to influence the geomorphology and stability or geomorphic form of the Anzac Creek channel and overbank area as:

- the Anzac Creek culverts have been sized to minimise or eliminate changes to the existing peak discharges that are conveyed by the Anzac Creek channel;
- increases to flow velocities are generally isolated to areas immediately adjacent to the MAR alignment and do not extend downstream along the Anzac Creek channel or overbank area; and
- scour protection measures are proposed in high-risk areas where larger velocities are predicted and where culverts and stormwater pipes discharge to reduce the potential for erosion that may lead to sediment being deposited in the downstream reaches of Anzac Creek.

It is noted the Project is located well upstream of the tidal limit and not subject to influence from potential sea level rise that may also occur due to future climate change.

The Costin Roe (2020) notes the following key findings in relation to flood safety and emergency management:

- The entirety of the Project (and MPE) will lie above the level of the PMF and therefore provide safe road egress for the full range of potential flood events.
- There is no significant change to existing flood hazard in areas surrounding the Project corridor for the 100-year ARI and PMF events.

The Project is generally consistent with flood planning provisions contained in the LEP and DCP, as well as the NSW Floodplain Development Manual 2005. The project is located outside of the PMF flood extent and above flood planning levels for the Georges River as described in the *Georges River Floodplain Risk Management Study and Plan* (Bewsher 2004) and *Georges River Flood Study: Final Draft Report* (BMT 2020).

The Project is also consistent with the Anzac Creek Floodplain Risk Management Study and Plan (BMT WBM 2008), which does not identify any specific strategies or measures that would be impacted by the Project. As noted above, the Project will generally improve local flood evacuation by providing flood-free egress from the MLP for events up to and including the PMF.

d Groundwater

There is potential for increased aquifer recharge due to increased impervious surface area associated with the Project. The total impervious area (approximately 8.9 ha) is relatively small in comparison to the total groundwater source recharge area. Accordingly, impacts to groundwater recharge are considered negligible.

Additionally, infiltration of poor-quality water or fuel/oils from vehicle accidents or malfunction may also lead to a deterioration to groundwater quality. However, impervious road surfaces would prevent poor-quality water infiltrating to the groundwater system. Runoff, including spills will be treated by bioretention basins. Therefore, no impacts to groundwater quality as a result of infiltration are anticipated.

e Monitoring

As the completed road asset and corridor is to be dedicated to TfNSW for operation as a public road, no ongoing (operational) water quality monitoring by the Proponent is proposed.

f Cumulative impacts

The environmental impact assessments prepared for MPE and MPW indicate that no significant impacts to water quantity or quality are predicted in Georges River or Anzac Creek. The design of thew Project will ensure that there is adequate downstream drainage capacity where stormwater infrastructure is planned to convey flows from both the Project and broader MLP.

With the implementation of the proposed water management measures and if mitigation measures are applied effectively to existing and future major projects, negligible cumulative impacts are anticipated.

7.7.5 Management and mitigation measures

A summary of the proposed water mitigation and management measures is provided in Table 7.55.

Table 7.55 Management and mitigation measures for water

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of water measures	WAR01	A Water Management Plan (WMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The WMP will provide details for the ongoing management and maintenance of water management and mitigation measures during the construction phase of the Project.
Construction water impacts	WAR02	A Soil and Water Management Plan (SWMP) will be prepared in accordance with Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004) for the construction phase of the Project and will be encompassed within the CEMP.
Construction water impacts	WAR03	A surface water monitoring program for the construction phase of the Project will be developed as part of the SWMP. Monitoring locations will target discharge locations such as temporary sediment basins and receiving waters.
Construction water impacts	WAR04	An Erosion and Sediment Control Plan (ESCP) will be prepared in accordance with Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004) for the construction phase of the Project.
Operational water impacts	WAR05	Implementation of diversion channels and drains will be constructed to divert water around the Project site for up to the 10-year ARI design storm event.
Operational water impacts	WAR06	Bioretention basins are proposed to attenuate stormwater runoff from the Project site for up to the 100-year ARI design storm event.
Operational water impacts	WAR07	Bioretention basins will include bioretention systems to achieve pollutant reduction targets and provide spill containment.
Operational water impacts	WAR08	Longitudinal and transverse drainage will be in accordance with design criteria set out in best practice guidelines and have minimal impact on peak discharge and afflux effects.
Operational water impacts	WAR09	Scour protection will be provided to reduce erosion and sedimentation at stormwater discharge outlets for up to the 50-year ARI design storm event.
Operational water impacts	WAR10	Where areas of the Project site is constrained at tie-ins to existing roads (eg areas where the terrain is flat, and levels limit the use of some water management measures). At these areas, where practical, alternative water management measures will be implemented.
Flooding	WAR11	A Flood Emergency Response and Evacuation Plan or equivalent will be prepared and implemented for the construction phase of the Project to minimise hazard to construction personnel, construction plant/equipment and downstream watercourses.

7.8 Historic heritage

7.8.1 Overview

A statement of heritage impact (SoHI) (Appendix H) was prepared in accordance with NSW guidelines and policies, including the NSW *Heritage Manual* (Heritage Office 1996), as well as the principles of the Australia ICOMOS (2013) Burra Charter.

Table 7.56 sets out the SEARs that relate to historic heritage and identifies where they are addressed in this EIS.

Table 7.56 SEARs for the Project – Historic heritage

Requirement	Where addressed in this EIS
8. Heritage	
1. Direct and/or indirect impacts (including cumulative impacts) to the significance of:	
(c) environmental heritage, as defined under the NSW Heritage Act 1977 (Heritage Act);	Heritage items are identified in Section 7.8.2 of this EIS and Section 2.2 of the SoHI.
(d) items listed on the State, National and World Heritage lists;	Heritage items are identified in Section 7.8.2 of this EIS and Section 2.2 of the SoHI.
(e) heritage items and conservation areas identified in environmental planning instruments applicable to the project area.	Heritage items are identified in Section 7.8.2 of this EIS and Section 2.2 of the SoHI. No conservation areas apply.
2. Where impacts to State or locally significant heritage items are identified, the assessment must:	
(a) include a significance assessment, a state of heritage impact for all heritage items and historical archaeological assessment;	A significance assessment is provided in Chapter 7 of the SoHI and summarised within Section 7.8.3 of this EIS.
(b) consider the conservation policies of any relevant conservation management plan;	No relevant conservation management applies.
(c) consider impacts to the item caused by, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment, drainage infrastructure, contamination remediation and ancillary facilities;	Impacts to the heritage significance of the Project site and surroundings is provided in Section 7.8.3 of this EIS and Chapter 7 of the SoHI.
(d) outline measures to avoid and minimise those impacts during construction and operation in accordance with the current guidelines; and	Mitigation measures are provided in Section 7.8.4 of this EIS and Chapter 8 of the SoHI (Appendix H).
(e) be undertaken by a suitably qualified heritage consultant(s) and/or historical archaeologist (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria)	The SoHI has been undertaken by Greg Ho Sing and Pamela Kottaras who are suitably qualified in the field of historical heritage.

The SoHI was undertaken to meet the following objectives:

- to investigate the potential of items of historic value, including relics and built heritage, to exist within the Project;
- to assess the significance of historic heritage items within the Project site and its surrounds;
- to assess the potential impacts of the Project on items of historic heritage; and
- to formulate management and mitigation measures for the protection of historic heritage items in the construction footprint.

7.8.2 Existing environment

Section 7.9.3 of this EIS provides relevant information on landscape, geology, land use and Aboriginal heritage. The following section provides greater context to the existing environment as it relates to historic heritage.

i Historic context

The Georges River was first mapped by European colonists in the late-eighteenth century. Land grants in the Liverpool region were released from 1798 and by 1808 two large landholdings had been claimed along the Georges River. One of the largest holdings of the district was granted to Thomas Moore in 1809. Following his death, Moore's property was subdivided.

In the mid-nineteenth century, the Parish of Holsworthy, including Moorebank, consisted largely of small agricultural plots. The eastern side of the Georges River, however, was prone to flooding and the highly acidic soil was less suited to agriculture. Due to this, the land was largely unsuitable for intensive agriculture and by the late 1890s the area supported only a few dozen settlers.

In the late-nineteenth century, the land comprising the Project was obtained by the Commonwealth for the establishment of a military training and encampment area. A military barracks was subsequently established and land at Moorebank was granted to the military for use as a training ground. By 1907, a permanent military camp and rifle range had been developed on the eastern and northern side of the Georges River.

The military camp was expanded during the onset of World War I (WWI). Prior to 1915, the camp comprised the areas now encompassed by the northern end of MPW; this land consisted of cleared and levelled land with wooden structure for barracks and storage depots. The land was extensively cleared to the south and to the east to accommodate further infrastructure.

During World War II (WWII), the camp was further expanded (into the land now comprising MPE) to accommodate more permanent warehouse structures. This large flat area would become the DNSDC. Large warehouses were constructed and would remain in use until the site was decommissioned.

The area to the east of the study area between MPE and Wattle Grove (Boot Land) continue to be used as a "Danger area" for the Anzac rifle range. It was also used as an internment camp for prisoners between 1939 and 1946. It returned to its former use as a firing range until it was closed for the development of the Wattle Grove suburb in the 1980s. It retains relatively intact native bushland.

Following WWII, the DNSDC was decommissioned and the site was developed as an intermodal freight terminal. Built heritage was cleared to accommodate the MPE Project and associated infrastructure (including flood management and drainage infrastructure, access tracks and power transmission lines).

A raised earth embankment and culvert was constructed to support this railway link through the study area in the This has had a significant impact on Anzac Creek. Little to no evidence of the natural watercourse is now present in the study area.

ii Heritage listings

No heritage items listed on the National Heritage List (NHL), or Section 170 Register are located adjacent to or within the boundary of the Project.

Several items identified on the Commonwealth Heritage List (CHL) occur (or have occurred) to the west and south of the boundary of the Project. One item on the State Heritage Register (SHR) (Glenfield Park) is near to the Project site. No Commonwealth listed heritage items currently occur within the boundary of the Project.

Liverpool LGA lists a number of items on Schedule 5 (environmental heritage) of the Liverpool LEP. The Project passes through the curtilage of the Australian Army Engineers Group property (I57).

Table 7.57 shows the identified heritage items in the vicinity of the Project. Figure 7.12 shows the location of the Project in relation to listed heritage items.

Table 7.57 Identified heritage items in the vicinity of the Project site

Item name	Register listing number								
	NHL[1]	CHL[2]	SHR[3]	S170[4]	LEP[5]	NT[6]	RNE[7]	Other[8]	Location
Australian Army Engineers Group/School of Military Engineering (SME)	-	-	-	-	I57	-	-	-	The Project site passes through curtilage
DNSDC	-	105641	-	-	I57A	-	103862	-	Adjacent to Project site
Kitchener House (formerly "Arpafeelie")	-	105520	-	-	I58	-	102578	-	Adjacent to Project site
Holsworthy Group, including powder magazine and former officers' mess, corporals' club, internment camp, Holsworthy railway station lock-up/gaol, German concentration camp	-	105406	-	-	I32	-	14223	-	Adjacent to Project site
Cubbitch Barta National Estate	-	105405	-	-	I34	-	-	100633	Adjacent to Project site
Casula Powerhouse	-	-	-	-	I10	-	-	-	Adjacent to Project site
Railway Viaduct	-	-	-	-	I11	-	-	-	Adjacent to Project site
Glenfield Farm	-	-	00025	-	I14	-	-	-	Project within the viewshed of the item

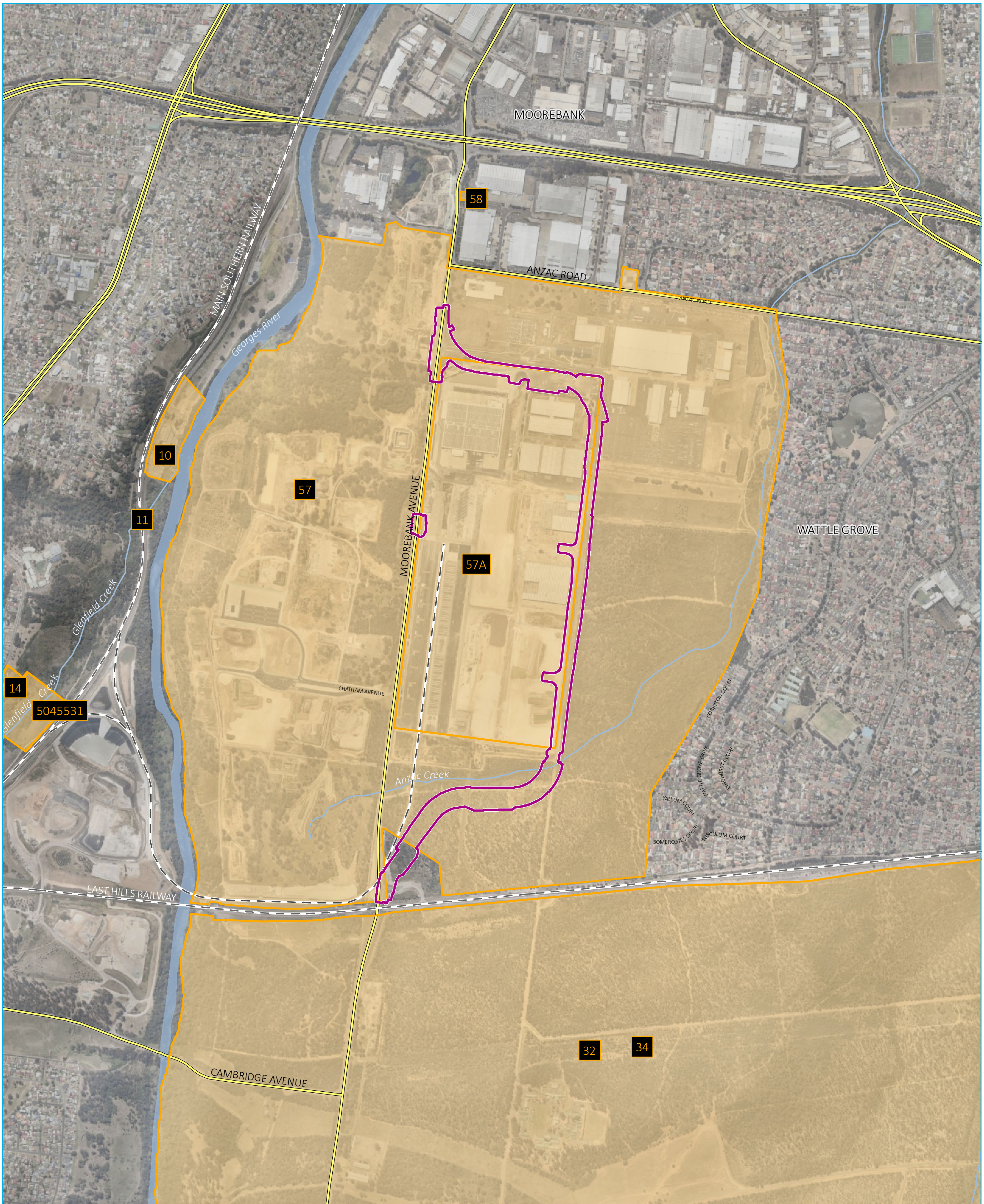
Note: 1. NHL = National Heritage List (statutory)
2. CHL Commonwealth Heritage List (statutory)
3. SHR State Heritage Register (statutory)
4. S170 Section 170 of the Heritage Act (Government agency list of heritage assets) (statutory)
5. LEP Local Environmental Plan (statutory)
6. NT National Trust of Australia (NSW Branch) (non-statutory)
7. RNE - Register of the National Estate (static and non-statutory)
8. Landscape Identified significant cultural landscapes.

a Defence National Storage and Distribution Centre

The DNSDC was formerly listed on the CHL and is currently listed in Schedule 5 (environmental heritage) of the Liverpool LEP. This site was de-registered from the CHL following divestment of the property to SIMTA.

The DNSDC was a significant military storage site with associations to the military from WWI until the "present time". This site was listed for its association with national heritage themes relating to sites associated with "the establishment of the defence of Australia and ongoing ties to the defence force" and "going to war".

The buildings were considered typological examples of the timber beam and post design of the mid-20th century and a rare intact example of this structure type. The buildings were constructed mainly of Oregon timber and prefabricated in the United States. The re-cladding of many of the structures was carried out in the 1990s to further facilitate the site's use as a defence storage centre.



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Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020); Liverpool City Council (2020)

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GDA 1994 MGA Zone 56
N

KEY

- Construction footprint
- NSW LEP listed Heritage item
- Rail line
- Major road
- Watercourse

Heritage items in the Project boundary and surrounds

Moorebank Avenue realignment
Environmental impact assesment
Figure 7.12

creating opportunities

iii Archaeological potential

A field survey of the study area was undertaken by EMM on 6 March 2020. It involved a pedestrian investigation of the study area to ground truth the findings of the desktop assessment.

The field survey had identified that site of the Project has been significantly altered through the development of the MPE Project and associated infrastructure. Imported fill was observed in the southern portion of the study area, associated with water management and/or the construction of transmission lines.

Previous archaeological studies, associated with the development of the intermodal precinct, have occurred within, or near to, the study area. A summary of the findings of these archaeological studies is provided in Table 7.58.

Table 7.58 Summary of archaeological studies

Study	Findings summary
Aboriginal Heritage Impact (Archaeological and Heritage Management Solutions Pty Ltd 2015)	An Aboriginal Heritage Impact Assessment was undertaken by Archaeological and Heritage Management Solutions Pty Ltd (AHMS) to support the environmental impact assessment of MPE Stage 1. It involved archaeological excavations on the banks of Anzac Creek and of the Georges River. In areas subject to excavation, deposits were found to be generally shallow duplex soil profiles with evidence of land clearing and demolition fill relating to the construction of the rail link and for water management. A very high-water table is noted across the area with localised flooding present in some areas and test pits, consistent with the historical accounts of this area as being unsuitable for construction. The generally clean soil profile indicates low historical land use throughout this area as this area with construction fill occurring in the A1 soil horizon.
Moorebank, Proposed Intermodal Terminal - Heritage Assessment (Artefact Heritage Services Pty Ltd 2013)	An assessment of non-Aboriginal heritage was undertaken by Artefact Heritage Services Pty Ltd (Artefact Heritage) to support the Concept Plan approval for the MPE Project. The assessment encompassed the MPE site (then referred to as the SIMTA site) and focused on three heritage listed items – the DNSDC site (then listed under the CHL), the SME (listed under schedule 5 of the Liverpool LEP and Glenfield Farm (listed under schedule 5 of the Liverpool LEP and the SHR). The study found that the MPE Project would significantly impact on the DNSDC through demolition/removal of all or some of the heritage buildings. Direct impacts to the SME site would also occur, resulting in the removal of a small portion of this site. Impacts to heritage values associated with the Glenfield Park was also noted in the form of impacts to the viewsheds of the farm to the east. However, this viewshed was determined to have been previously impacted by the Glenfield waste disposal facility and the East Hills railway line.
Summary of excavation results and future management of potential archaeological resources within Moorebank Precinct East (MPE) PADs V and W (Artefact Heritage Services Pty Ltd 2018)	Artefact Heritage undertook an assessment of non-Indigenous heritage for works associated with MPE Stage 2. It identified potential archaeological deposits (PADs) within the MPE Stage 2 construction footprint. PADs V and W (near to the north-western corner of the Project site) were identified as having potential to contain the archaeological remains of a small cluster of structures associated with the DNSDC. Artefact Heritage prepared a document summarising the results of archaeological test excavations and monitoring within PADs V and W, occurring between 19 and 21 March 2018. Testing in PAD V identified the presence of post holes and differentiating fill indicating the presence of footings of several buildings. No finds that could be considered artefacts were discovered during the excavation and monitoring works for PADs V and W.
Heritage Interpretation Strategy (Artefact Heritage Services Pty Ltd 2017)	Artefact Heritage prepared a Heritage Interpretation Strategy (HIS) for the MPE site to provide a strategy for ways of transmitting messages about the cultural heritage values of a site to visitors and other audiences through interpretation. The HIS recommended to retain the timber post and beam structures either as standing structures used in the intermodal site or to integrate the fabric of the timber and post structures as part of adaptive re-use into the construction and grounds of the intermodal terminal as decorative features.

Based on the outcomes of the field survey and documentary research, it is considered that the potential for archaeological material to be present within the Project site is nil to low.

7.8.3 Assessment of impacts

The heritage significance of the study area has been previously impacted by the MPE Project. These impacts include the complete demolition of heritage buildings (associated with the DNSDC site), the construction of new intermodal terminal facilities and warehousing, and landscape modification associated with the installation of infrastructure.

The Project will further modify landscapes within the study area. As the Project would fall outside the grounds of the DNSDC site, it is anticipated that impacts on the residual historic heritage significance of this site, including any remaining buried heritage material would be nil to negligible.

7.8.4 Management and mitigation measures

Mitigation measures to be implemented for potential historic heritage impacts are summarised in Table 7.59.

Table 7.59 Management and mitigation measures for historic heritage

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of historic heritage measures	HIH01	A Historic Heritage Management Plan (HHMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The HHMP will provide details for the ongoing management and maintenance of historic heritage management and mitigation measures during the construction phase of the Project.
Unexpected finds	HIH02	If unanticipated finds, including potential relics, is found during Project activities, work in the vicinity (ie within 10 m) will cease until an assessment of the find is made by an archaeologist. An Unexpected Finds Protocol will be developed for the Project and encompassed within the CEMP.
Human remains	HIH03	Where human remains (including skeletal material) are found work will halt, and the remains will not be tampered with. The police and coroner will be contacted for investigation, which may include the involvement of Heritage NSW and advice from a physical anthropologist.
Viewshed from Glenfield Farm	HIH04	Where possible, trees that provide visual shielding to Glenfield Farm will be retained to minimise visual impacts to viewsheds from the farm, particularly in the southern sector where the Project would traverse vegetated land.

7.9 Aboriginal heritage

7.9.1 Overview

A preliminary Aboriginal heritage assessment (PAHA) (Appendix I) was prepared in accordance with NSW guidelines, including the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011), the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a), and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010b).

An Aboriginal Cultural Heritage Assessment (ACHA) is currently under preparation for the Project. The outcomes of this assessment will be submitted in SIMTA's response to submissions.

The PAHA was undertaken to meet the following objectives:

- identify Aboriginal cultural heritage places and landscapes within the study area;

- identify prospective conservation areas based on their heritage values;
- consult with Aboriginal stakeholder communities; and
- provide foundational information for future studies in the event that approvals are required.

The study area for the PAHA represents an area slightly larger than the 'construction footprint' as presented as part of this EIS (refer Figure 5.1).

Table 7.60 sets out the SEARs that relate to Aboriginal heritage and identifies where they are addressed in this EIS.

Table 7.60 SEARs for the Project – Aboriginal heritage

Requirement	Where addressed in this EIS
8. Heritage	
1. Direct and/or indirect impacts (including cumulative impacts) to the significance of:	
(a) Aboriginal places, objects and cultural heritage values, as defined under the National Parks and Wildlife Act 1974 and in accordance with the principles and methods of assessment identified in the current guidelines;	Section 7.9.4
(b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan;	Section 7.9.4
2. Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, in accordance with section 1.6 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW 2010).	The investigation was conducted by a suitably qualified archaeologist
3. Impacts to Aboriginal objects and/or places must be assessed and documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR). Consultation must be undertaken with Aboriginal people in accordance with the Aboriginal Cultural Heritage Consultation requirements for proponents (DECCW, 2010). The ACHAR must:	
(a) document the outcomes of consultation with Aboriginal people and outlines measures proposed to mitigate impacts, and document the significance of cultural heritage values for Aboriginal people who have a cultural association with the land;	Section 7.9.2
(b) identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the project;	Section 7.9.4

7.9.2 Consultation

EMM undertook informal consultation with the Tharawal LALC and Cubbitch Barta Native Title Claimants Aboriginal organisation (CBNTAC). Consultation included discussing the Project with representatives of these organisations, and their participation in a field inspection of the proposed road alignment to identify cultural materials and/or places.

A single set of comments was received from CBNTAC in late October 2020. These comments largely support the findings of this report, affirming the identification of a single isolated Aboriginal object, identifying numerous other sites in the general area (but not within the study area), and indicating that expansion east of the Project footprint should not be undertaken due to potential damage to the established vegetation.

7.9.3 Existing environment

The environmental characteristics of an area influenced the way Aboriginal people used the landscape. The availability of natural resources such as water, flora, fauna, stone material and topography played a substantial role in the choice of camping, transitory movement and ceremonial areas used by Aboriginal people. Understanding these environmental characteristics assists in predicting where Aboriginal sites are likely to occur in the landscape, its spatial distribution and its preservation. Similarly, natural and cultural (human-made) site formation process that occur after the deposition of archaeological material influence the level of preservation and the integrity of Aboriginal sites.

i Topography

The landscape in the study area is characterised by the undulating hills and flats of the Cumberland Plains, and river terraces and floodplains along the Georges River. It has a low topographic relief (between 10–30 m) with slopes (around >5%) adjacent Georges River. Near Anzac Creek it is low-lying and subject to regular flooding.

ii Geology and geomorphology

The study area is part of a transitional zone between two geological features of the Sydney Basin: the Hawkesbury Sandstone and Wianamatta Shale zones. The features are delineated by Georges River with Hawkesbury Sandstone terrain to the east and Wianamatta Shale terrain to the west. The geology is conducive to the presence of rock shelters, grinding grooves and other site types that require exposed rock outcropping, however rock outcropping was not observed during the survey.

iii Hydrology

The study area is part of the catchment of the Georges River, a major watercourse which bisects the region. The Georges River would have formed a significant resource for Aboriginal people in the past. Previous archaeological investigations (associated with MPW) have confirmed extensive habitation before and after colonial settlement. The eastern bank of the Georges River is lower than the western side of the River and therefore more prone to flooding and soil deposition.

Anzac Creek is a first order stream in accordance with the Strahler system. It intersects the study area in the vicinity of the south-east corner of the MPE site and runs to the northeast of the study area before re-joining the river system in the north. Anzac Creek is highly modified and very little of the natural creek line remains.

The construction of the Liverpool Weir in 1836 may have influenced tidal reach into the Georges River resulting in higher salinity prior to colonial settlement. As a result, Aboriginal peoples may have been attracted to the Georges River due to the unique and abundant biodiversity of the area. Additionally, it may have also increased Aboriginal peoples' reliance on Anzac Creek and other water bodies for fresh drinking water.

iv Soil landscape

The study area contains one soil landscape which is defined in the *Soil and Land Resources of the Hawkesbury-Nepean Catchment* (DECCW 2008). Soil landscape information builds on the underlying geology of the study area and describes what soils overlie the geology and where soils are likely to have been eroded or missing, exposing bedrock or where they have built up. Table 7.61 presents the soil landscapes relevant to the study area in combination with other observations, including landform elements, slope and relief and geology.

Table 7.61 Soil landscape in the study area

Soil landscape and type	Landform pattern and hydrology	Landform elements	Location in study area	Slope and relief	Geology	Soil summary	Implications for archaeology
Berkshire Park	Flat terrace tops and drainage lines on Rickabys Creek gravel and Londonderry Clays.	Flat terrace Tops dissected by small drainage channels. Small remnant surfaces occurring to the east and south at slightly higher elevation (20 m above sea level).	Entire study area.	Local relief of 10-30 m. Slopes usually >5%	Wianamatta shales and Hawkesbury sandstone. St Marys formation base.	BP1 dark sandy loam topsoil (A1 horizon). BP2 red brown sandy clay loam. BP3 brown sandy clay with ironstone nodules. BP4 Heavy high chroma clay with stones. Bedrock.	Low relief and low slope areas are favourable for habitation. Impacted by flood and erosion/deposition from Georges river. Land use disturbance is extensive due to Urban locale.

v Land use and disturbance

The majority of the study area been modified by historical land use practices and past disturbances associated with land clearing, forestry work, hunting, and livestock grazing. Unlike surrounding land in the Holsworthy and Moorebank area, the land on the eastern side of the Georges River was prone to flooding and less suited to agriculture. Accordingly, the study area was acquired by the Commonwealth for the establishment of a military training and encampment area. In 1913, the Commonwealth later formalised the area as a permanent training and military use zone.

This military use zone expanded (through progressive clearing) to the south and east to accommodate permanent warehouse structures through the duration of the first and second world wars.

Land to the east of the study area (the Boot Land) was used primarily as rifle range and associated “Danger area” prior to development of the Wattle Grove suburb in the 1980s. It currently retains intact native bushland.

The properties that make up the study area are currently used as an intermodal terminal facility. Land disturbance to the south and east has intensified associated with the construction phase of the MPE. The magnitude and extent of previous disturbance affects the likelihood of discovering intact heritage deposits, with significant deposits more likely to be found in undisturbed areas.

vi Ethno-history

Regional studies indicate that Aboriginal people first visited and occupied the Sydney Basin between ~45,000-35,000 years ago. Populations were focused along the banks of major river system, such as the Hawkesbury-Nepean River. Over the last 10,000 years, a significant population established across most environments of the basin, and during this time socio-economic and religious systems observed at contact likely developed.

The study area sits on the borders of the Tharawal country (which extended from Botany Bay in the north to Shoalhaven River to the south and east from Campbelltown to the coast), and Darug country (which encompassed Parramatta through to the Blue Mountains and from the Hawkesbury River in the north and Appin in the south). The study area was frequented by traveling groups and favoured as a place of meeting due in part to its central location and topography.

Ethno-historical accounts indicate that over 30 separate Aboriginal groups (now known as 'clans') populated the wider Sydney Basin in 1788CE (common era), each with their own country, practices, diets, dress and dialects. The many rivers acted as a natural demarcation of the areas and the flat terrain of the Cumberland Plain was favourable to the livelihood of these groups. Evidence suggests that population densities of Aboriginal peoples pre contact was high.

vii Post-contact period

In this region, a significant percentage of Aboriginal people declined significantly (by more than 50%) from smallpox and other European diseases. This decline in population led to a breaking down of traditional burial practices and merger of clans.

The Cumberland Plain was a point of first contact between Aboriginal peoples and European colonisers as the same environmental factors that supported Aboriginal people also made for favourable lands for settlement and agriculture. Governor Philip explored the region in 1788 and the township of Rose Hill (renamed Parramatta) was established. Settler colonialism rapidly expanded the European footprint in the area and competition for resources facilitated tensions between Aboriginal people and settlers.

Conflict between Aboriginal people and settlers mounted throughout the early nineteenth century. On 1 May 1801, Governor King issued a public order requiring that Aboriginal people around Parramatta, Prospect Hill and Georges River be 'driven back from the settlers' habitations by firing at them. These conflicts and subsequent reprisals by both sides spread across the region and eventuate in the Appin Massacre (1816); These events would eventually come to be known as the Cumberland Plain War. The area was not only a site of conflict but also served as an important reconciliation place even as early as 1805.

In 1816, Macquarie issued a call to Aboriginals of the Georges River to lay down arms in return for food, education and secure title to land in the Liverpool Area. Ethno-historical records of land grants to Aboriginals peoples arising from the 1816 agreement is sparse, however there is anecdotal evidence of Aboriginal freehold land along the Georges River until the late twentieth century.

viii Previous archaeological studies

Previous archaeological studies, associated with the development of an intermodal precinct, have occurred within, or near to, the study area. A summary of the findings of these archaeological studies is provided in Table 7.62.

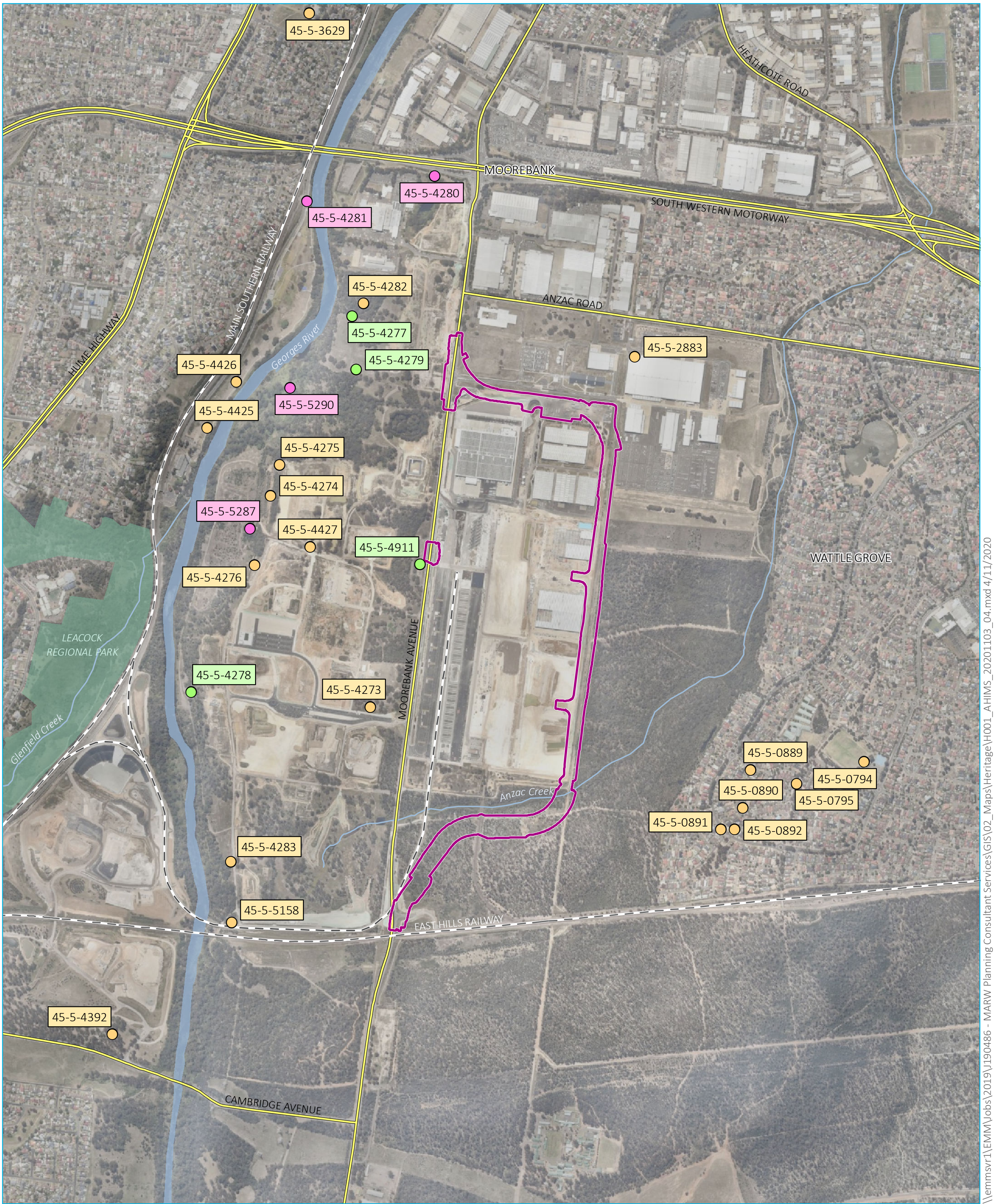
Table 7.62 Summary of archaeological studies

Archaeological study	Findings summary
Aboriginal Archaeological Survey of Department of Defence Lands at Moorebank (Steele and Dallas, 2001)	An assessment of the (former) Moorebank Defence area, which excluded the MPE Site but included the (former) School of Military Engineering. In the course of the study, no evidence for Aboriginal occupation or visitation was found. It was concluded that this outcome is principally because the study site had been substantially developed through a combination of cutting, levelling, landscaping and construction. Further, given the extent of the previous land use, the likelihood of intact archaeological deposits surviving within this portion of the Moorebank Defence area was assessed to be minimal.
Aboriginal Cultural Heritage Assessment (Archaeological and Heritage Management Solutions Pty Ltd, 2012)	An Aboriginal Cultural Heritage Assessment was undertaken by AHMS to support the environmental impact assessment for the MPE Concept Approval. It included consultation with Aboriginal groups and a field survey across the MPE site and the south sector. The survey (undertaken in a series of transects) encompassed the MPE site and proposed rail link between the MPE site and the East Hills Railway line. Transects 7 and 8 traversed the creek flats of the Anzac Creek and encompass significant parts of the study area. Transect 7 covered the rail corridor, and indicated extensive disturbance, with cultural material (stone artefacts) identified likely in secondary association with fill. Other disturbances include the alteration and diversion of the natural watercourses through canals and drainage channels. Clearing is extensive in this area. This transect is a good representative of the archaeological potential in the course of the Project. Transect 8 covered relatively undisturbed areas in the Anzac Creek flats are adjacent to the study area. This transect identified that Anzac Creek retains its natural course, the soil profile remained largely intact and that native vegetation of the area is intact. The implications for archaeological potential were considered high and the area was identified as a potential archaeological deposit (PAD). In the vicinity of the study area, a small number of isolated stone artefacts were found within the boundary of the MPE site. Given the presence of these isolated stone artefacts, and the low levels of disturbance recorded in the areas of investigation, it was recommended that the sites be subject to further investigation and/or recovery prior to development.
Aboriginal Heritage Assessment (Navin Officer Heritage Consultants Pty Ltd, 2014)	An Aboriginal Heritage Assessment was undertaken by Navin Officer Heritage Consultants Pty Ltd to support the environmental impact assessment for the MPW Concept Approval. It involved extensive survey and test excavations within the MPW site. A desktop assessment identified areas of archaeological sensitivity in the MPW site by mapping the boundaries of tertiary alluvial terrace across the site and identifying other key landforms such as surface water and undisturbed vegetation. The desktop assessment examined PADs identified in the Aboriginal Cultural Heritage Assessment undertaken by AHMS within the MPW sites and along the Georges River terrace as well as identifying several culturally modified trees in the MPW site. Artefact densities throughout the MPW were varied. In the vicinity of the Anzac Creek tributary (PAD2) artefact densities were low, indicative of rapid decline of archaeological sensitivity east of the Georges River.
Aboriginal Heritage Impact Assessment (Archaeological and Heritage Management Solutions Pty Ltd, 2015)	An Aboriginal Heritage Impact Assessment was undertaken by AHMS to support the environmental impact assessment of MPE Stage 1. It involved archaeological excavations across both sides of Anzac Creek. No Aboriginal objects were recovered from test pits around Anzac Creek.
Moorebank Intermodal Terminal: Archaeological Salvage Report (Biosis Pty Ltd, 2018)	An Aboriginal cultural heritage salvage report was undertaken by Biosis Pty Ltd in accordance with the approved salvage strategy for the MPW Project. It involved surface and subsurface salvage at six sites (MA1-5, and MA9) generally along the eastern bank of the Georges River. The results of the salvage excavations generally support previous predictive modelling carried out for other local areas and the broader Cumberland Plain. MA5 and MA9, contained moderate to high concentrations of artefacts in alluvial terraces. Artefact densities decreased further towards the east.

ix Previously recorded sites

A search of the Aboriginal Heritage Information Management System (AHIMS) register identified 36 Aboriginal sites and one Aboriginal place within a 6 km^2 area centred on the study area.

These sites (predominantly surface and/or sub-surface stone artefact sites) were primarily situated on the banks of the Georges River as a result of archaeological investigations associated with the MPW Project and the Wattle Grove residential development. The results of this search are presented in Table 7.63 and Figure 7.13.



Source: EMM (2020); OEH (2020); DFSI (2017); Nearmap (2020)

0 250 500 m
GDA 1994 MGA Zone 56
N

KEY

Construction footprint
Rail line
Major road
Watercourse
NPWS reserve

AHIMS site
Artefact
Modified tree (carved or scarred)
Potential archaeological deposit (PAD)

Aboriginal sites identified on the AHIMS register

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.13

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Table 7.63 Previously documented sites by type

Site feature	Number	Percentage
Artefact site	24	67
Artefact	*18*	*50*
Undefine artifactual site with PAD	*6*	*16.7*
Culturally modified tree	8	22
PAD	4	11
Total	**36**	**100**

No sites were registered as being located within the boundary of the Project; however, a number of isolated Aboriginal objects were documented in previous studies on the fringe of the MPE site. Previous assessments suggest that these sites were likely destroyed in the course of nearby development (ie development associated with the MPE Project and rail link.

7.9.4 Assessment of impacts

i Site predictions

Predictions can be made as to the presence of cultural material within the study area. The generic due diligence process (DECCW 2010:10) can be used to exercise the appropriate level of caution when carrying out activities that could cause harm to Aboriginal sites and/or objects. The generic due diligence process asks whether there are any landscape features (present within a study area) that are likely to indicate the presence of Aboriginal site and/or objects. Landscape features include:

- within 200 m of waters; or
- located within a sand dune system; or
- located on a ridge top, ridgeline or headland; or
- located within 200 m below or above a cliff face; or
- within 20 m of or in a cave rock shelter or cave mouth; or
- is on land that is not disturbed land.

While the study area is within 200 m of waters (Anzac Creek), cultural material is more commonly located on larger (3rd order and above) creeks, and less so on smaller tributaries. Therefore, cultural material in the locality would be more likely concentrated on the edges of the Georges River rather than the lesser waterbodies within the study area (including Anzac Creek). Further, significant cultural material along these tributaries is typically within elevated areas (ie terraces, levee banks, low hills) rather than flats, swampy areas (such as that land around Anzac Creek) or floodplains associated with those creeks. The AHIMS data generally support these findings with the majority of significant sites occurring the Georges River, and few occurring elsewhere.

Within or near the study area, eight isolated Aboriginal objects and a PAD have been identified by previous studies. However, these isolated finds appear to have been destroyed through the works associated with the MPE Project, while the PAD was demonstrated through excavations to be culturally sterile. The potential for archaeological deposits has been further impacted by land clearance and development associated with the DNSDC, MLP, and rail link.

Cultural material within the study area is likely to be dominated by various densities of surface and/or sub-surface stone artefacts. These will generally be found in numbers of <10 and often as isolated objects.

The potential for culturally modified trees in the vicinity of the study area is unlikely. The study area has been subject to vegetation clearance for pastoral use and the frequency of cultural modified trees in the vicinity of the study area is low.

ii Aboriginal cultural heritage field survey

A field survey of the study area was undertaken by EMM with the assistance of a representative of the Cubbitch Barta Native Title Claimants Aboriginal Corporation on 6 May 2020. It involved a pedestrian investigation of the study area, and documentation of any cultural materials observed.

The field survey had identified that the study area has been heavily impacted by a range of activities, including land clearing, power lines, historical realignment of Anzac Creek, and earthworks.

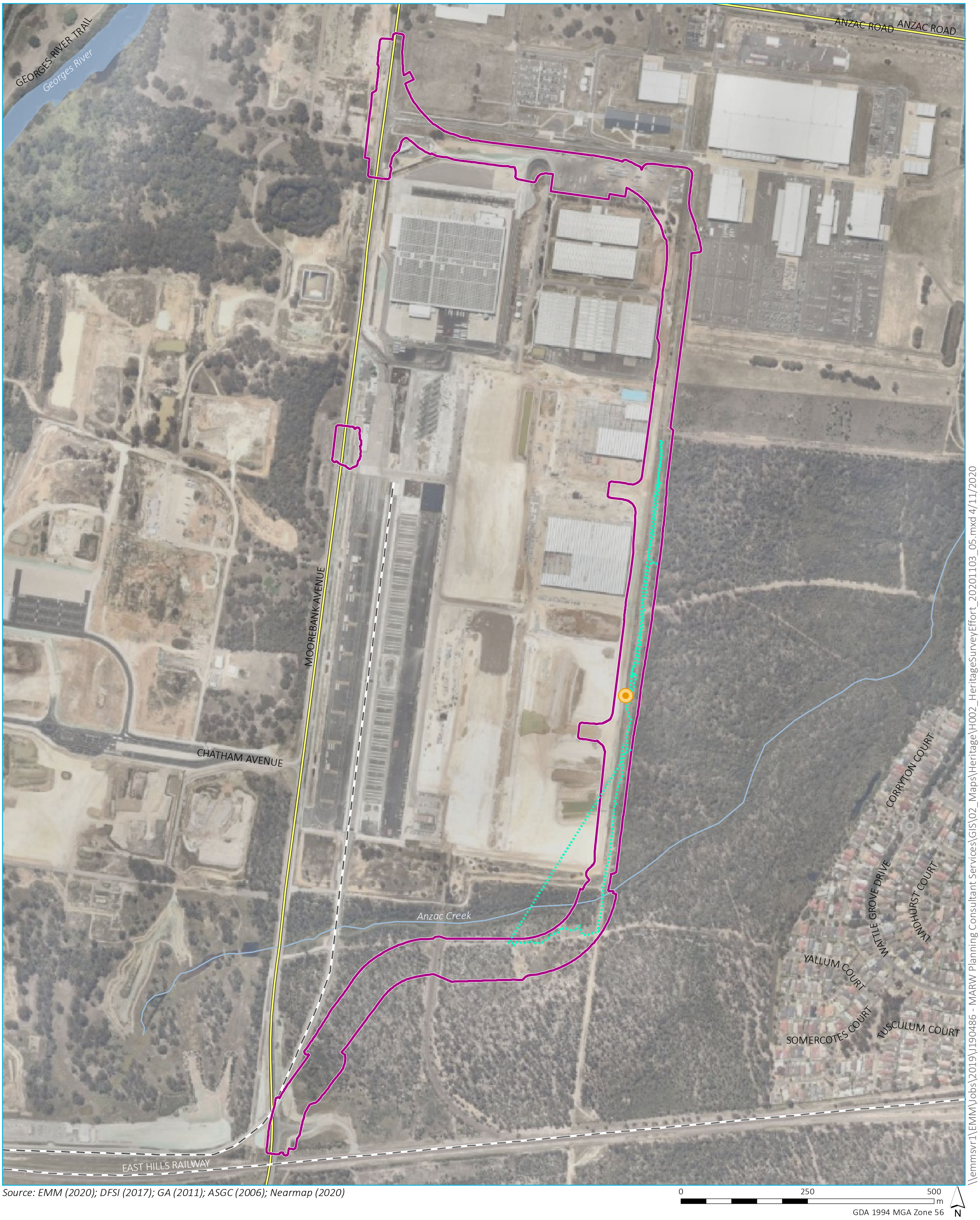
One Aboriginal site was identified as part of the field inspection. It was an isolated silcrete cote – a piece of stone used for recovering flakes used in later tool manufacture – situated on graded surface beneath an established powerline. The details of the site are presented in Table 7.64 and shown in Figure 7.14.

Table 7.64 Summary of previously unrecorded Aboriginal sites identified during the survey

AHIMS #	Site name	Easting/Northing	Survey Unit	Site Feature	Artefact count	Site Area (m^2)	Landform
TBC	MARW 1	308605E 6240671N	East Sector	Isolated object	1	>1	Access track (heavily modified)

Given the disturbed and isolated nature of the site, along with the broader archaeological record, it is considered that this artefact forms part of the wider background scatter known to occur in the region. It is therefore considered to be of low archaeological significance.

Two previous isolated Aboriginal objects and a PAD were investigated as part of the assessment. These objects have been subject to previous assessment and development activities and are considered either declassified or destroyed.



Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006); Nearmap (2020)

KEY

- Construction footprint
- Rail line
- Major road
- Watercourse
- Isolated find - silcrete core
- Survey tracks

Location of identified sites in the study area

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.14

EMM creating opportunities

iii Findings

The assessment finds that the study area would be characterised by very low densities of stone artefacts, reflective of ephemeral or transient use of the region by Aboriginal peoples. Artefacts would be present in disturbed contexts. Accordingly, it is considered that the Project would likely impact very low densities of cultural material, which would generally be considered of low significance.

The study area is heavily disturbed from previous activities, and no areas of buried cultural material are considered likely to be present.

Previous archaeological excavations in the vicinity of the key archaeological landform – Anzac Creek – have already been undertaken and have not identified any significant cultural material.

Based on these findings, no further archaeological investigation is required.

7.9.5 Management and mitigation measures

Mitigation measures to be implemented for potential Aboriginal heritage impacts are summarised in Table 7.65.

Table 7.65 Management and mitigation measures for Aboriginal heritage

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of Aboriginal heritage measures	ABH01	An Aboriginal Heritage Management Plan (AHMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The AHMP will provide details for the ongoing management and maintenance of Aboriginal heritage management and mitigation measures during the construction phase of the Project. The AHMP is to include details of: • the process, timing, and communication methods for maintaining Aboriginal community consultation and participation through the Project; • the procedure for identifying and managing any culturally modified trees and/or vegetation with cultural values; • the methods of any additional investigative and/or mitigative archaeological actions that may be required prior to works commencing or during the Project (eg inductions for personnel and subcontractors); • the methods for undertaking further Aboriginal heritage assessment, investigation and mitigation of any areas of the Project site that have changed following completion of the preliminary Aboriginal heritage assessment and/or during the final design and construction phases of the Project; • the methods of post-excavation analysis and reporting of any archaeological investigations and activities implemented as part of the AHMP; • the procedure for managing the unexpected discovery of Aboriginal objects, site and/or human remains; • the procedure for curation and long-term management of cultural materials recovered as part of the works outlined in the AHMP; and • the process for reviewing, monitoring, and updating the AHMP as the Project progresses.
Cultural landscape	ABH02	The CEMP (or equivalent) will include the consideration of the cultural landscape throughout the Project and as part of the rehabilitation of the study area.
Consultation with Aboriginal stakeholders	ABH03	Consultation with Aboriginal stakeholder will be maintained during the finalisation of the assessment process and throughout the Project.

Table 7.65 Management and mitigation measures for Aboriginal heritage

Aspect/impact	Reference	Mitigation measure
Consultation with Aboriginal stakeholders	ABH04	A copy of the PAHA will be lodged with AHIMS and be provided to each of the Aboriginal stakeholders.
AHIMS site recording	ABH05	Site Recording Forms for the newly identified Aboriginal objects and/or sites within the study area will be submitted to the AHIMS database.
Staff and contractor briefing	ABH06	So as to avoid inadvertent impact prior to the establishment of an Aboriginal heritage management plan, personnel and contractors involved in the Project will be advised of the heritage considerations, legislative requirements, and recommendations of the PAHA.

7.10 Air quality

7.10.1 Overview

An Air Quality Impact Assessment (AQIA) (Appendix J) was prepared with reference to the following regulations and guidance documents:

- POEO Act;
- NSW Protection of the Environment Operations (Clean Air) Regulation 2010;
- National Environment Protection Measure for Ambient Air Quality (AAQ NEPM) (DoE 2016);
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA 2016); and
- Guidance on the assessment of dust from demolition and construction (IAQM 2014).

Table 7.66 sets out the SEARs that relate air quality and identifies where they are addressed in this EIS.

Table 7.66 SEARs for the Project – Air quality

Requirement	Where addressed in this EIS
4. **Air Quality**	
5. An air quality impact assessment (AQIA) for construction and operation of the project in accordance with the current guidelines.	Impacts to air quality from construction and operational activities are described in Section 7.10.3 of this EIS. Construction impacts are addressed in Chapter 3 of the AQIA (Appendix J). Operational impacts in Section 4 of the AQIA (Appendix J). Management and mitigation measures concerning air quality impacts are outlined in Section 7.10.4 of this EIS and Chapter5 of the AQIA (Appendix J).
6. Ensure the AQIA also includes the following:	
(a) demonstrated ability to comply with the relevant regulatory framework, specifically the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (Clean Air) Regulation (2010); and	Although the Act and Regulation address motor vehicle emissions, they are not directly relevant to the assessment of air quality impacts for public roads.

Table 7.66 SEARs for the Project – Air quality

Requirement	Where addressed in this EIS
(b) a cumulative local and regional air quality impact assessment.	Cumulative local impacts have been considered in Section 4 of the AQIA (Appendix J). Because the Project will result in little or no net change in emissions, and only a small change in the location of traffic emissions, an assessment of regional air quality impacts has not been included.

Atmospheric dispersion modelling (using AERMOD) was used to determine the likely air quality impacts of the operation of the Project, to enable the cumulative impacts of the Project with MLP to be assessed, and to provide quantitative inputs for a screening level review of health risks.

Two scenarios were assessed being the road realignment only in 2024 (project opening year) and the road realignment only in 2034 (project opening year + 10 years).

The domain for dispersion modelling, and its relationship to the Project, is shown in Figure 7.15. The figure also shows the discrete assessment locations (receptors) that were included in the modelling.

7.10.2 Existing environment

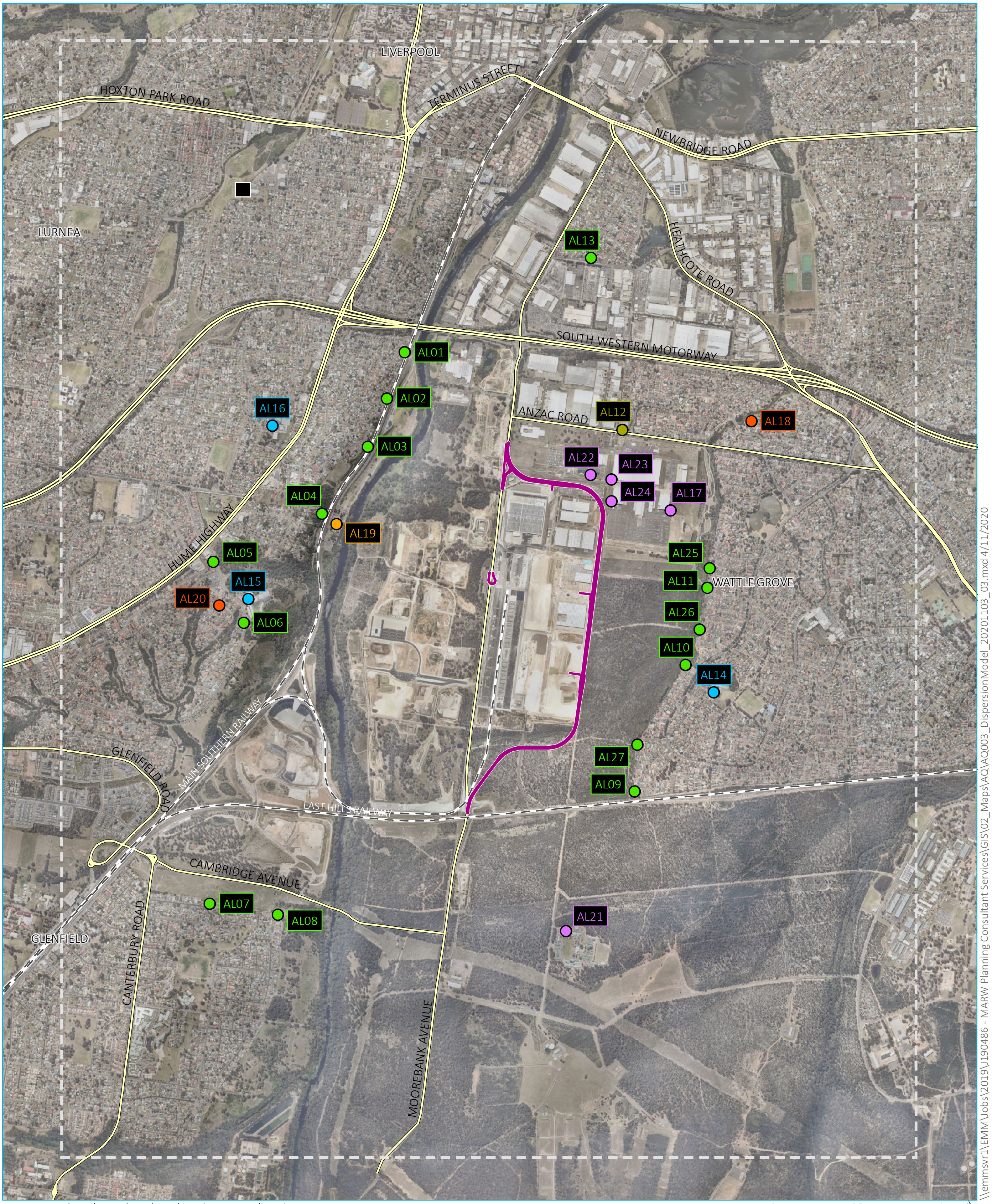
Existing and potential future emission sources of air pollution close to the Project include:

- emissions from road traffic and other activities associated with the MLP;
- traffic emissions from the wider road network, including the M5 Motorway;
- emissions from diesel locomotives using the SSFL and rail link;
- existing commercial and industrial facilities, including the Greenhills Industrial Estate and Moorebank Business Park to the north;
- the Glenfield Waste Facility to the south-west of the Project site; and
- emissions from aircraft at Bankstown Airport to the north-east.

Emissions data for the MLP were taken from previous air quality assessments for the MLP which covered the operation of warehouse and distribution facilities and associated infrastructure, including several operational scenarios. Some of the scenarios examined included combined operation of the MPE and MPW sites, up to a combined precinct total of 750,000 TEU and 515,000 m^2 of warehousing. It is assumed that in 2024 only the MPE Project would be operational, but in 2034 both the MPE Project and MPW Project would be operation.

Existing air quality was assessed using the data from the Liverpool monitoring station. An analysis of the air quality data from the DPIE Liverpool station for the period between 2015 and 2019 is included in Appendix C of the AQIA (Appendix J).

NO_2 concentration showed similar patterns in each year between 2014 and 2019. Annual mean PM_{10} and $PM_{2.5}$ concentrations were systematically higher in 2018 and 2019 that in previous years. Maximum 24-hour concentrations were especially high in 2018 and 2019, and with more exceedances than in previous years. Given these conditions, 2017 was selected as a representative year for the background.



Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

0 0.5 1 km
GDA 1994 MGA Zone 56
N

KEY

— Project alignment
- - Rail line
— Major road
AERMET/AERMOD model domain
■ DPIE Liverpool AQMS location

Assessment location
● Child care
● Cultural
● Emergency service
● Residence
● School
● Unknown

Dispersion model domain and assessment locations

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.15

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The following was noted with regards to background concentrations for the year of 2017:

- both the annual mean and maximum 1-hour NO_2 concentrations were well below the perspective impact assessment criteria (62 µg/m^3 and 246 µg/m^3);
- the annual mean concentrations for PM_{10} (20.6 µg/m^3) was around 80% of the corresponding criterion;
- the annual mean concentration of $PM_{2.5}$ (8.9 µg/m^3) exceeded the criterion of 8 µg/m^3;
- the maximum 24-hour concentrations of both PM_{10} and $PM2_{.5}$ were well above the corresponding criteria, however there were only a small number of exceedance days (two days for PM_{10} and three days for $PM_{2.5}$) and these could generally be attributed to exceptional events;
- the highest 24-hour PM_{10} concentration below the criterion of 50 µg/m^3 was 43.1 µg/m^3; and
- the highest 24-hour $PM_{2.5}$ concentration below the criterion of 25 µg/m^3 was 24.8 µg/m^3.

There are human receptors within 350 m of the Project site, and ecological receptors within 50 m of the Project site.

7.10.3 Assessment of impacts

i Construction

The total construction footprint for the Project is approximately 18.96 ha. The Project would be constructed using the conventional methods for most brownfield road infrastructure projects over a construction period of approximately 16 months. The construction footprint and construction period are subject to refinement during detailed design and construction. A description of how the Project would be constructed is provided in Section 5.4.

Dust impacts arising from the Project include:

- annoyance due to dust soiling;
- the risk of health effects due to an increase in exposure to PM_{10}; and
- harm to ecological receptors.

Under the Institute of Air Quality Management (IAQM) assessment procedure, activities at construction sites are divided into four types:

- Demolition, which is any activity that involves the removal of existing structures.
- Earthworks, which covers the processes of soil stripping, ground levelling, excavation and landscaping. Earthworks will primarily involve excavating material, haulage, tipping and stockpiling.
- Construction, which is any activity that involves the provision of new structures, modification or refurbishment.
- Track-out, which involves the transport of dust and dirt by vehicles from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

a Step 1 - Screening

The Project is within 350 m of human receptors and within 50 m of an ecological receptor. Accordingly, the proposed construction activities triggered the requirement for a detailed assessment of construction impacts.

b Step 2A – Scale and nature of works

The scale and nature of demolition, earthworks, construction and track-out were allocated a potential dust emission magnitude in accordance with the IAQM guidance criteria (refer Appendix A of the AQIA (Appendix J).

Earthworks activities was allocated a 'large' rating on the basis that significant earthworks would be required, involving the use of heavy machinery, across a construction footprint of approximately 81,000 m^2, with a volume of material of around 105,000 m^3.

Track-out was also allocated a 'large' rating given the volume of heavy movements during the construction period (an average, 144 heavy vehicle movements per day, with a maximum of 410 heavy vehicle movements per day).

Construction was allocated a 'medium' rating, utilising an estimated 50,000 m^3 of construction material.

Demolition was allocated a 'small' rating as the Project would only involve the removal of approximately 2,000 m^3 of pavement materials and concrete.

c Step 2B – Sensitivity of area

The sensitivity of the local area to dust impacts arising from demolition, earthworks, construction and track-out were allocated a sensitivity rating as specified under the IAQM guidance criteria (refer Appendix A of the AQIA). For dust soiling impacts, the sensitivity of the local area is defined based on the sensitivity of receptors and their number. For the purposes of assessment, human health and ecological receptors were considered separately.

Dust soiling effects on people and property

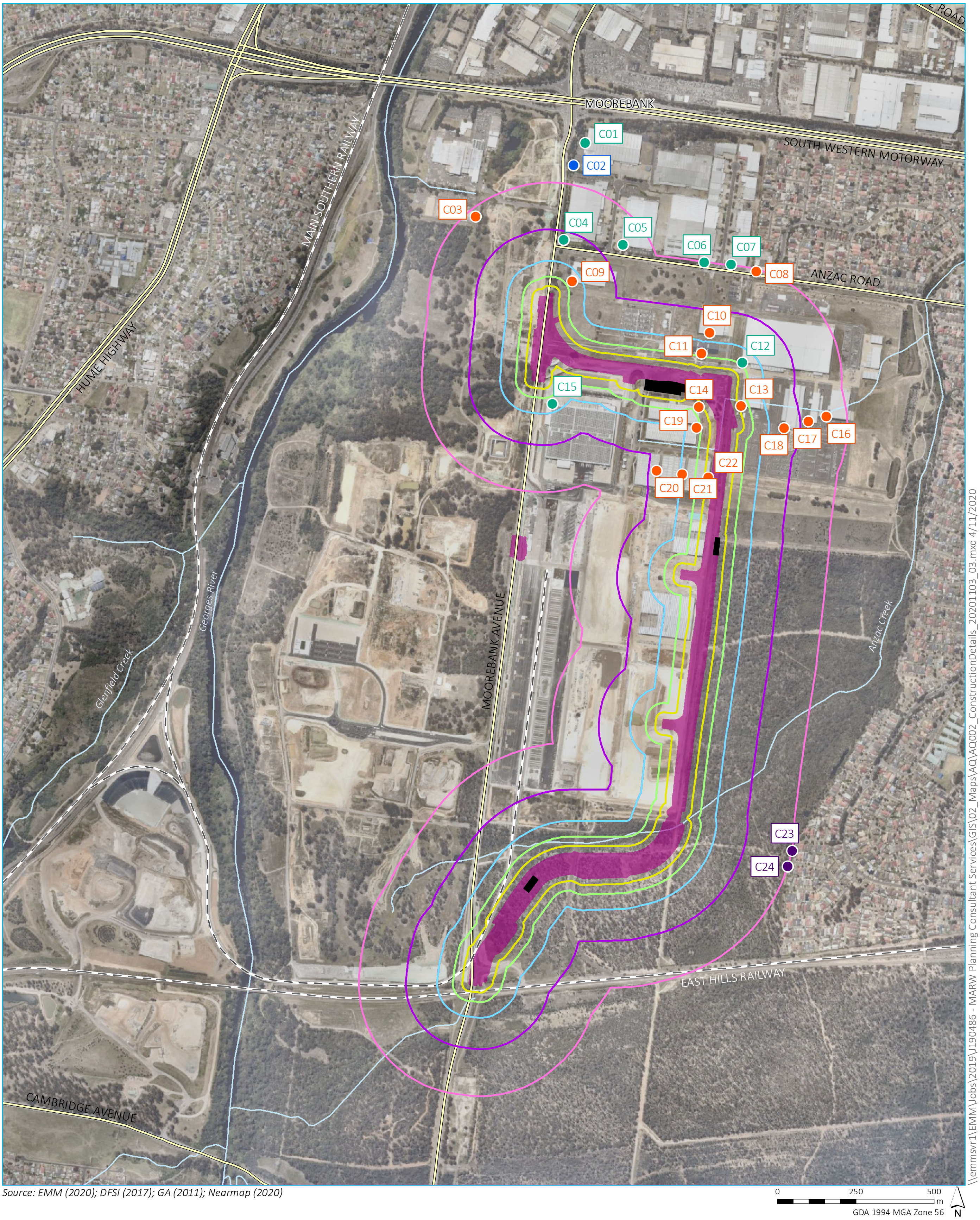
Human receptors were allocated a sensitivity rating, which combined with their number, can be used to determine the sensitivity of an area to dust spoiling impacts.

Human receptors within 350 m of the construction footprint were allocated a 'medium' receptor sensitivity rating for demolition, earthworks and construction activities. This rating was determined on the basis that:

- any residential receptors (which would normally be given a high rating), where located close to (or greater than) the maximum distance required by the assessment (350 m); and
- other receptors within 350 m of the Project construction footprint were places of work.

Human receptors were allocated a 'high' receptor sensitivity rating for track-out. While heavy vehicles transporting spoil and demolition materials would travel north via Moorebank Avenue to the M5 Motorway, those heavy vehicles will go by unoccupied but heritage-listed property at 208 Moorebank Avenue, approximately 400 m from the Project site.

Figure 7.16 shows the IAQM distance bands for construction and the receptors for dust soiling impacts.



Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2020)

KEY

Construction footprint

Construction compound

Rail line

Major road

Watercourse

Construction assessment location

- Heritage
- Large commercial
- Residential
- Small-medium commercial/services

Buffer distance

- 20 m
- 50 m
- 100 m
- 200 m
- 350 m

Construction footprint for the Project, buffer zones and receptors for construction impacts

Moorebank Avenue realignment
Environmental impact assessment
Figure 7.16

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The number of buildings in each distance band were estimated using GIS and the number of human receptors per building were assumed as follows:

- residential property = 1 (by convention in the IAQM guidance)
- heritage building = 1
- small/medium commercial or services = 15
- Large commercial = 30

The resulting numbers of human receptors and IAQM distance band are shown in Table 7.67.

Table 7.67 Numbers of human receptors for dust soiling impacts

	Number of human receptors by distance from construction footprint boundary or haul routes			
Activity	**<20 m**	**20-50 m**	**50-100 m**	**100-350 m**
Demolition, earthworks and construction	15	30	120	227
Track-out	0	61	-	-

Based on the receptor sensitivity and the numbers of receptors within certain distances from construction activities, the sensitivity to dust soiling effects for all areas and all activities was determined to be 'medium'.

Human health impacts

In accordance with the IAQM guidance, the sensitivity of the local area to human health impacts was determined by taking into account the sensitivity of receptors in the area, the proximity and number of receptors, and annual mean concentrations of particulate matter less than 10 µm in aerodynamic diameter (PM_{10}).

The sensitivity of receptors in the area were allocated a 'medium' sensitivity rating for human health. This rating was determined on a similar basis to dust soiling, on the basis that:

- any residential receptors (which would normally be given a high rating), where located close to (or greater than) the maximum distance required by the assessment (350 m); and
- other receptors within 350 m of the Project construction footprint were places of work.

Construction activities (demolition, earthworks, construction and track-out) were assigned a 'medium' rating. The numbers of human receptors and IAQM distance band are shown in Table 7.68. For human health impacts the 200 m distance is included and the unoccupied heritage-listed property at 208 Moorebank Avenue was excluded.

Table 7.68 Numbers of human receptors for human health impacts

	Number of human receptors by distance from construction footprint boundary or haul routes				
Activity	**<20 m**	**20-50 m**	**50-100 m**	**100-200 m**	**200-350 m**
Demolition, earthworks, construction	15	30	120	75	152
Track-out	0	60	-	-	-

PM_{10} concentrations between 2014 and 2019 were obtained from the air quality monitoring station (AQMS) at Liverpool operated by DPIE. An analysis of the air quality data from the DPIE Liverpool station to support the operational air quality assessment is presented in Appendix C of the AQIA (Appendix J). PM_{10} concentrations in 2017 was selected as more representative of the longer-term historical level in the area of the Project as 2018 and 2019 were systematically higher than in previous years. The annual mean PM10 concentration in 2017 was 20.6 µg/m3, meaning that the prevailing air quality environment still corresponded to the highest concentration band (>20 µg/m3) in the IAQM guidance.

Based on these assumptions, the sensitivity of the local area to human health impacts was determined to be 'high' for demolition, earthworks and construction, and 'medium' for track-out.

Ecological impacts

For ecological impacts, the sensitivity of the local area is defined based on the sensitivity of locations and their distance from the construction activity (see Appendix A of the AQIA (Appendix J). Due to its nature as a biobanking site, vegetation within the Boot Land was considered potentially sensitivity to dust impacts.

A number of threatened flora and fauna species were either recorded during a targeted survey or were assumed present. While none of the species mentioned had dust soiling as a known threat and/or sensitivity to it, there was some uncertainty in the classification of sensitivity. It was therefore assumed that, for all construction activities, there would be ecological receptors within 20 m of the Project site, and that their sensitivity was 'medium' (ie locations with an important species or national designation, and where sensitivity to dust us uncertain or unknown). As a result, for all construction activities the sensitivity of the local area to ecological impacts was determined to be 'medium'.

d Step 2C – Definition of risk of impacts

To determine the risk of impacts with no mitigation applied, the dust magnitude rating is combined with the sensitivity of the local area for each of the four activity categories (ie demolition, earthworks, construction and track-out). Using the lookup tables in the IQAM guidance (see Appendix A to the AQIA (Appendix J), risk ratings for each type of activity were allocated. The risk ratings for each activity are presented in Table 7.69.

Table 7.69 Summary of risk assessment

Activity	Step 2A: Potential for dust emissions	Step 2B: Sensitivity of area			Step 2C: Risk of dust impacts		
		Dust soiling	Human health	Ecological	Dust soiling	Human health	Ecological
Demolition	Small	Medium	High	Medium	Low risk	Medium risk	Low risk
Earthworks	Large	Medium	High	Medium	Medium risk	High risk	Medium risk
Construction	Medium	Medium	High	Medium	Medium risk	Medium risk	Medium risk
Track-out	Large	Medium	Medium	Medium	Medium risk	Medium risk	Medium risk

Dust spoiling impacts and ecological impacts were determined to be 'low' for demolition, and 'medium' for earthworks, construction and track-out. For human health impacts the risk was determined to be 'high' for earthworks, and 'medium' for demolition, construction and track-out.

As noted above, there is a high risk of human health impacts at surrounding sensitive receptors from uncontrolled earthworks. One reason for this is the prevailing PM_{10} concentrations in the area are already relatively high, which is beyond the control of the Project. After successful implementation of the recommended dust mitigation measures listed in Table 7.74, this risk should be reduced.

Given the distance between the construction boundary and most receptors (in particular, residential receptors), construction dust is unlikely to represent a serious ongoing problem. Any effects would be temporary and relatively short-lived and would only arise during dry weather with wind blowing towards a receptor at a time when dust is being generated and the mitigation measures are not being fully effective.

ii Operation

a Assessment locations

Locations were selected to be representative of the closest sensitivity locations to the Project and included residential areas and other sensitivity receptors such as schools and day care centres. For consistency, assessment locations were mainly taken from previous studies, with some additions for consistency with the noise impact assessment. One more assessment location (AL22) was included to the south of the Project to assess potential impacts in the corresponding area, as this was excluded from the previous assessment. Given that the AQIA for the Project related to the impacts of the realignment route only, it was considered that any receptors more than a few hundred metres from the assessment would have negligible impacts. In fact, any of the assessment locations from the previous assessment that were more than one kilometre from the Project were excluded from the AQIA.

The assessment locations are shown in Figure 7.15 and also summarised in Table 7.70.

Table 7.70 AQIA assessment locations

Location ID	Assessment location type	Name	Address	Suburb	Source	Easting	Northing
AL01	Residence	-	10 Lakewood Crescent	Casula	Ramboll Environ (2016a, 2016b)	307535	6242509
AL02	Residence	-	68 St Andrews Boulevard	Casula	Ramboll Environ (2016a, 2016b)	307430	6242235
AL03	Residence	-	17 Buckland Road	Casula	Ramboll Environ (2016a, 2016b)	307317	6241949
AL04	Residence	-	16 Dunmore Crescent	Casula	Ramboll Environ (2016a, 2016b)	307044	6241551
AL05	Residence	-	9 Leacocks Lane	Casula	Ramboll Environ (2016a, 2016b)	306397	6241264
AL06	Residence	-	45 Leacocks Lane	Casula	Ramboll Environ (2016a, 2016b)	306579	6240902
AL07	Residence	-	38 Ferguson Street	Glenfield	Ramboll Environ (2016a, 2016b)	306378	6239233
AL08	Residence	-	26-28 Goodenough Street	Glenfield	Ramboll Environ (2016a, 2016b)	306783	6239167
AL09	Residence	-	30 Wallcliff Court	Wattle Grove	Ramboll Environ (2016a, 2016b)	308903	6239900
AL10	Residence	-	82 Corryton Court	Wattle Grove	Ramboll Environ (2016a, 2016b)	309206	6240651
AL11	Residence	-	23 Gracemere Court	Wattle Grove	Ramboll Environ (2016a, 2016b)	309335	6241111
AL12	Emergency service	Liverpool Fire Station	Anzac Road	Moorebank	Ramboll Environ (2016a, 2016b)	308829	6242049
AL13	Residence	-	17 Church Road	Moorebank	Ramboll Environ (2016a, 2016b)	308643	6243069
AL14	School	Wattle Grove Public School	Cressbrook Drive	Wattle Grove	Ramboll Environ (2016a, 2016b)	309373	6240489
AL15	School	All Saints Catholic College	Leacocks Lane	Casula	Ramboll Environ (2016a, 2016b)	306606	6241042
AL16	School	Casula Primary School	De Meyrick Avenue	Casula	Ramboll Environ (2016a, 2016b)	306749	6242073
AL17	Unknown	DJLU Facility	-	Moorebank	Ramboll Environ (2016a, 2016b)	309117	6241571
AL18	Childcare	Wattle Grove Long Day Care Centre	8-10 Burdekin Court	Wattle Grove	Ramboll Environ (2016a, 2016b)	309596	6242100
AL19	Cultural	Casula Powerhouse Arts Centre	1 Powerhouse Road	Casula	Ramboll Environ (2016a, 2016b)	307130	6241489
AL20	Childcare	Little Peter's Child Care	7 Roberts Road	Casula	Ramboll Environ (2016a, 2016b)	306434	6241005
AL21	Unknown	-	Greenhills corridor	Holsworthy	AQIA	308496	6239070
AL22	Unknown	COM1 Defence Building 1	-	Moorebank	NVIA	308640	6241780

Table 7.70 AQIA assessment locations

Location ID	Assessment location type	Name	Address	Suburb	Source	Easting	Northing
AL23	Unknown	IN1 Defence Building 2	-	Moorebank	NVIA	308764	6241755
AL24	Unknown	IN2 Defence Building 3	-	Moorebank	NVIA	308764	6241623
AL25	Residence	-	26 Brickendon Court	Wattle Grove	NVIA (R1)	309349	6241227
AL26	Residence	-	25 Exford Court	Wattle Grove	NVIA (R2)	309290	6240862
AL27	Residence	-	25 Yallum Court	Wattle Grove	NVIA (R3)	308920	6240179

b Emission modelling

Emissions of NO_X, PM_{10} and $PM_{2.5}$ from traffic on the realignment route in 2024 and 2034 were calculated using the model developed by the EPA for the emissions inventory covering the Greater Metropolitan Region.

The MLP contribution was remodelled using the emission data from the previous assessments by Ramboll Environ (2016a, 2016b). The 2024 and 2034 scenarios were treated differently to allow for the different levels of development of the MPE Project and MPW Project. It was assumed that in 2024 only the MPE Project would be operational, but in 2034 both the MPE Project and MPW Project would be operational.

The atmospheric dispersion modelling for the assessment was conducted using AERMOD. For each scenario, AERMOD was used to determine ground-level concentrations of NO_X, PM_{10} and $PM_{2.5}$ associated with the Project (the traffic on the road realignment), as well as MLP.

The results for NO_2, PM_{10} and $PM_{2.5}$ are presented in this section. Both the long-term and short-term averaging periods are presented, and the predicted concentrations are compared against the relevant impact assessment criteria. The emissions rates for each scenario (2024 and 2034) and are provided in Table 7.71.

Table 7.71 Traffic emission rates in 2024 and 2034

	Emission rate in 2024 (g/km/h)			Emission rate in 2034 (g/km/h)		
Hour	NO_X	PM_{10}	$PM_{2.5}$	NO_X	PM_{10}	$PM_{2.5}$
1	36.1	3.7	2.3	29.4	4.0	2.4
2	20.4	2.1	1.3	16.7	2.2	1.4
3	19.5	2.0	1.3	15.9	2.1	1.3
4	26.5	2.7	1.7	21.6	2.9	1.8
5	91.7	9.4	5.9	74.8	10.0	6.1
6	239.0	24.5	15.4	194.9	26.2	15.8
7	467.7	47.7	30.0	379.4	50.6	30.6
8	576.9	58.1	36.5	476.9	62.3	37.7
9	540.5	54.7	34.4	446.3	58.8	35.6
10	378.6	38.9	24.4	308.8	41.4	25.1
11	302.9	31.1	19.5	247.0	33.2	20.1

Table 7.71 Traffic emission rates in 2024 and 2034

	Emission rate in 2024 (g/km/h)			Emission rate in 2034 (g/km/h)		
Hour	**NO_X**	**PM_{10}**	**$PM_{2.5}$**	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
12	295.2	30.3	19.0	240.8	32.3	19.5
13	317.9	32.6	20.5	259.3	34.8	21.0
14	319.8	32.8	20.6	260.9	35.0	21.2
15	422.4	43.3	27.2	344.5	46.2	28.0
16	512.4	52.6	33.0	418.0	56.1	33.9
17	508.9	52.6	33.0	412.7	56.0	33.8
18	486.8	51.6	32.3	390.9	55.0	33.2
19	332.9	34.2	21.4	271.5	36.4	22.0
20	208.0	21.3	13.4	169.6	22.8	13.8
21	159.7	16.4	10.3	130.3	17.5	10.6
22	139.3	14.3	9.0	113.6	15.3	9.2
23	102.2	10.5	6.6	83.4	11.2	6.8
24	65.5	6.7	4.2	53.4	7.2	4.3

NO_2

At most assessment locations, the Project's contribution to the annual mean NO_2 concentration was either 'imperceptible' or 'small', being less than or equal to 0.1 µg/m^3. The largest project contribution in both scenarios was 1.0 µg/m^3 at assessment location AL24. This contribution was also small and equated to less than 2% of the corresponding impact assessment criterion of 62 µg/m^3. In both scenarios, and at all assessment locations, the total annual NO_2 concentration was below the criterion by around 33 to 37 µg/m^3. The background concentration (25.2 µg/m3) was by far the largest component, at between 75% and 99% of the total.

There were not exceedances of the impact assessment criterion for 1-hour NO_2 in the background data (see Appendix C of the AQIA (Appendix J). At some assessment locations (AL22, AL23 and AL24) the project contribution to NO_X appears to be substantial. However, at high background concentrations of NO_X the project contribution would translate into a relatively small NO_2 increment. It is unlikely that the contribution from the Project to NO_X could, in itself, lead to an exceedance of the 1-hour criterion for NO_2, unless it is extremely high.

PM_{10}

At most assessment locations, the Project's contribution to annual mean PM_{10} concentrations was small, being less than or equal to 0.1 µg/m^3. The largest project contribution in both scenarios was 0.5 µg/m^3 at AS24. This contribution equated to 2% of the corresponding impact assessment criterion of 25 µg/m^3. In both scenarios, and at all assessment locations, the total annual PM_{10} concentration was below the criterion, by between around 3 µg/m^3 and 4 µg/m^3.

At most assessment locations, the maximum predicted project contribution to 24-hour PM_{10} was small. In the 2024 scenario, the largest contribution was 1.5 µg/m^3 at assessment location AL24 on 21 June, which equated to 3% of the corresponding impact assessment criterion of 50 µg/m^3. In 2034 the largest project contribution was slightly higher, at 1.6 µg/m^3, again at assessment location AL24.

The contributions to 24-hour PM_{10} from all sources on the days with the maximum project contributions were also considered. In both scenarios and at all assessment locations, the total 24-hour PM_{10} concentrations on these days were well below the impact assessment criterion.

$PM_{2.5}$

At most assessment locations the Project's contribution to annual PM2.5 concentrations was imperceptible, being less than or equal to 0.1 µg/m^3. The largest project contribution in both scenarios was 0.3 µg/m^3 at assessment locations AL22 and AL24 in 2034. This contribution could still be viewed as small, equating to 3% of the corresponding impact assessment criterion of 8 µg/m^3. Given that the background concentration for annual mean $PM_{2.5}$ was already above the criterion, the criterion was also exceeded at all assessment locations. It was therefore not possible to assess the risk of exceedance due to the Project itself.

At most assessment locations, the maximum predicted project contribution to 24-hour $PM_{2.5}$ concentrations was either imperceptible or small. In the 2024 scenario the largest contribution was 0.9 µg/m^3 at assessment location AL24 on 21 June, which equated to 5% of the corresponding impact assessment criterion of 25 µg/m^3. In 2034 the largest project contribution was slightly higher, at 1.0 µg/m^3, again at assessment location AL24. In both scenarios and at all assessment locations, the total 24-hour $PM_{2.5}$ concentrations on these days were below the impact assessment criterion.

The contributions to the 24-hour $PM_{2.5}$ concentration on the day with the highest background below the criterion (ie 24.8 µg/m^3 on 17 July) are given in Table 7.72 (2024 scenario) and Table 7.73 (2034 scenario). No other days with the background below the criterion had higher total concentrations than those given in the tables. When considering the contributions from both MLP and the Project, in both scenarios, there were some additional exceedances of the 24-hour $PM_{2.5}$ criterion (highlighted with grey shading in the tables). In the 2024 scenario there were additional exceedances at 13 of the 27 assessment locations, whereas in 2034 there were additional exceedances at 21 of the assessment locations. However, where most additional exceedances occurred, these were due to the combined contributions of the MLP and the Project. In the absence of the MLP, the Project would only be responsible for additional exceedances at assessment locations AL22 and AL24. Where there was an additional exceedance at any assessment location, this only occurred on one day of the year (ie 17 July).

Table 7.72 Contributions to 24-hour $PM_{2.5}$ concentration on day with highest background below criterion (2024)

Assessment location	Assessment location type	Background contribution (µg/m³)	MLP contribution (MPE only) (µg/m³)	Project contribution (µg/m³)	Total (µg/m³) [Criterion = 25 µg/m³]
AL01	Residence	24.8	0.1	<0.1	25.0
AL02	Residence	24.8	0.2	<0.1	25.0
AL03	Residence	24.8	0.2	<0.1	25.0
AL04	Residence	24.8	0.1	<0.1	25.0
AL05	Residence	24.8	<0.1	<0.1	24.8
AL06	Residence	24.8	<0.1	<0.1	24.9
AL07	Residence	24.8	<0.1	<0.1	24.9
AL08	Residence	24.8	<0.1	<0.1	24.9
AL09	Residence	24.8	0.2	<0.1	**25.0**
AL10	Residence	24.8	0.3	<0.1	**25.1**
AL11	Residence	24.8	0.2	<0.1	**25.1**
AL12	Emergency service	24.8	0.2	<0.1	**25.1**
AL13	Residence	24.8	<0.1	<0.1	24.9
AL14	School	24.8	0.2	<0.1	**25.0**
AL15	School	24.8	<0.1	<0.1	24.9
AL16	School	24.8	<0.1	<0.1	24.9
AL17	Unknown	24.8	0.2	<0.1	**25.1**
AL18	Childcare	24.8	<0.1	<0.1	24.9
AL19	Cultural	24.8	0.2	<0.1	**25.0**
AL20	Childcare	24.8	<0.1	<0.1	24.9
AL21	Unknown	24.8	<0.1	<0.1	24.9
AL22	Unknown	24.8	0.3	0.3	**25.4**
AL23	Unknown	24.8	0.3	0.2	**25.3**
AL24	Unknown	24.8	0.3	0.4	**25.5**
AL25	Residence	24.8	0.2	<0.1	**25.1**
AL26	Residence	24.8	0.2	<0.1	**25.1**
AL27	Residence	24.8	0.3	<0.1	**25.1**

Table 7.73 Contributions to 24-hour PM2.5 concentration on day with highest background below criterion (2034)

Assessment location	Assessment location type	Background contribution (µg/m³)	MLP contribution (MPE only) (µg/m³)	Project contribution (µg/m³)	Total (µg/m³) [Criterion = 25 µg/m³]
AL01	Residence	24.8	0.5	<0.1	**25.3**
AL02	Residence	24.8	0.6	<0.1	**25.5**
AL03	Residence	24.8	0.7	<0.1	**25.5**
AL04	Residence	24.8	0.5	<0.1	**25.4**
AL05	Residence	24.8	0.1	<0.1	24.9
AL06	Residence	24.8	0.2	<0.1	25.0
AL07	Residence	24.8	<0.1	<0.1	24.9
AL08	Residence	24.8	0.2	<0.1	25.0
AL09	Residence	24.8	0.3	<0.1	**25.2**
AL10	Residence	24.8	0.4	<0.1	**25.3**
AL11	Residence	24.8	0.4	<0.1	**25.3**
AL12	Emergency service	24.8	0.6	<0.1	**25.4**
AL13	Residence	24.8	0.3	<0.1	**25.1**
AL14	School	24.8	0.3	<0.1	**25.2**
AL15	School	24.8	0.2	<0.1	25.0
AL16	School	24.8	0.2	<0.1	25.0
AL17	Unknown	24.8	0.5	<0.1	**25.4**
AL18	Childcare	24.8	0.3	<0.1	**25.1**
AL19	Cultural	24.8	0.7	<0.1	**25.5**
AL20	Childcare	24.8	0.2	<0.1	**25.0**
AL21	Unknown	24.8	0.2	<0.1	**25.0**
AL22	Unknown	24.8	0.9	0.3	**26.0**
AL23	Unknown	24.8	0.8	0.2	**25.7**
AL24	Unknown	24.8	0.8	0.4	**26.0**
AL25	Residence	24.8	0.4	<0.1	**25.3**
AL26	Residence	24.8	0.4	<0.1	**25.3**
AL27	Residence	24.8	0.4	<0.1	**25.3**

c Spatial impacts

Contour plots (see Appendix D to the AQIA (Appendix J) illustrate that, for annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$, the spatial distribution of the project contribution was similar. The contribution of the Project was confined to a distance of a few hundred metres from the Project, and contributions at sensitive assessment locations were low.

d Significance of impact

For NO_2, both the total annual mean concentration and the maximum total 1-hour concentration were well below the impact assessment criteria in both scenarios and at all assessment locations.

For PM_{10}, both the total annual mean concentration and the maximum total 24-hour concentration were below the impact assessment criteria in both scenarios and at all assessment locations. The largest project contribution to annual mean PM_{10} at an assessment location was 0.5 µg/m3, or 2% of the corresponding criterion. The largest contribution to 24-hour PM_{10} was 1.6 µg/m3, or 3% of the corresponding impact assessment criterion.

For $PM_{2.5}$, the annual mean background concentration already exceeded the criterion, and therefore the total concentration at all assessment locations was also above the standard. Additional exceedances of criteria were only predicted for 24-hour $PM_{2.5}$, and in the absence of the MLP, the Project would only be responsible for additional exceedances at assessment locations AL22 and AL24. In such circumstances, the Approved Methods for Modelling require the dispersion modelling to be revised to include best management practices to minimise emissions of air pollutants as far as is practical, and until compliance is achieved. However, this would not be appropriate for the Project, as it is a public road that will be managed by TfNSW, with few options for mitigating impacts.

It was considered that the significance of air quality impacts of the Project as a whole can be expressed as either 'minor' or 'negligible', with no recommendation for changes to the Project design.

7.10.4 Management and mitigation measures

Mitigation measures to be implemented for potential air quality impacts are summarised in Table 7.74.

Table 7.74 Management and mitigation measures for air quality

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of air quality measures	AIR01	An Air Quality Management Plan (AQMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The AQMP will provide details for the ongoing management and maintenance of air quality management and mitigation measures during the construction phase of the Project.
Complaint management	AIR02	Prior to commencement of construction activities, the Project will develop appropriate communications to notify the potentially impacted residences of the Project (duration, types of works, etc), relevant contact details for environmental complaints reporting.
Complaint management	AIR03	A complaints logbook will be maintained throughout the construction phase which should include any complaints related to dust. Where a dust complaint is received, the details of the response actions to the complaint should be detailed in the logbook.
Incident recording	AIR04	The Project will record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the logbook.
Dust management	AIR05	The Project will hold regular meetings with the operators of other high-risk construction sites within 500 m of the Project site boundary (if applicable) to ensure that cumulative particulate matter emissions are minimised.
Site inspections	AIR06	Regular site inspections will be undertaken with results recorded within a logbook.
Dust management	AIR07	Shade cloth barriers to site fences will be erected around potentially dusty activities such as trench excavations and material stockpiles where practicable.
Dust management	AIR08	Site fencing and barriers will be kept clean using wet methods.
Dust management	AIR09	A maximum-speed-limit of 20 km/h on all internal roads and work areas during construction will be implemented.

Table 7.74 Management and mitigation measures for air quality

Aspect/impact	Reference	Mitigation measure
Dust management	AIR10	Proper maintenance and tuning of all equipment engines will be undertaken.
Dust management	AIR11	Water carts will be deployed to ensure that exposed areas and topsoils/subsoil are kept moist.
Dust management	AIR12	Adequate water supply on the construction site will be provided for effective dust/particulate matter suppression/mitigation.
Dust management	AIR13	Working practices will be modified to limit clearing, stripping and spoil handling during periods of adverse weather (hot, dry and windy conditions) and when dust is seen leaving the Project site.
Dust management	AIR14	The extent of clearing of vegetation and topsoil will be limited to the designated footprint required for construction and appropriate staging of any clearing.
Dust management	AIR15	Drop heights from loading or handling equipment will be minimised.
Dust management	AIR16	Revegetation of earthworks and exposed areas/soil stockpiles to stabilise surfaces will be undertaken as soon as practicable.
Dust management	AIR17	Water-assisted dust sweeper(s) will be utilised to remove, as necessary, any material tracked out of the Project site.
Dust management	AIR18	Dry sweeping of large areas will be avoided.
Vehicle emissions	AIR19	Trips and trip distances will be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips.
Dust management	AIR20	All trucks delivering fill or leaving the Project site with spoil material will have their load covered.
Site inspections	AIR21	Daily on-site and off-site inspections, where receptors are nearby, will be undertaken to monitor dust. The inspection results will be recorded in a specific log. Inspections will include regular dust soiling checks of surfaces such as street furniture and cars.
Site monitoring	AIR22	At the commencement of each day's activities, the local meteorological forecast will be reviewed, including the timing of notable increases in wind speed and/or temperature. Appropriate increased intensity or additional mitigation measures will be planned for the day based on this forecast review. The likely meteorological conditions and implications for dust emissions and impacts will be discussed at the morning toolbox meeting.
Site inspections	AIR23	Site inspections will occur at increased frequencies when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Should notable visual dust emissions be observed leaving the Project site, increased intensity or additional mitigation measures will be deployed.
Operational emissions	AIR24	Policies will be implemented which aim to minimise emissions from the vehicles visiting the Project, such as queue management, and restrictions on idling and the use of auxiliary equipment

7.11 Social

7.11.1 Overview

A Social Impact Assessment (SIA) (Appendix K) was prepared with reference to the methods outlined in the *Social Impact assessment guideline for State Significant mining, petroleum production and extractive industry development* (SIA Guideline) (DPE 2017).

Stakeholder engagement and community consultation were undertaken for the Project during the preparation of this EIS. These engagement and consultation activities include:

- a newsletter that informed residents of the Project;
- information provided on the SIMTA webpage;
- an interactive web-map which presented the proposed site of the Project and enabled stakeholders to add comments and markers to specific sites within the area of the Project;
- a community survey that allowed residents to provide feedback on the Project and rate their perceived potential impacts/benefits; and
- a community ideas wall which allowed community members and stakeholders to voice their ideas, views, and concerns related to the Project and how it could impact or benefit the community with consideration of community values, strengths, and vulnerabilities.

Table 7.72 identifies the SEARs that relate to social impact and identifies where they are addressed in this EIS.

Table 7.75 SEARs for the Project - Social

Requirement	Where addressed in this EIS
11. Social	
1. Potential social impacts of the project from the points of view of the affected community/ies and other relevant stakeholders, ie how they expect to experience the project.	Potential social impacts arising from the Project are described in Section 7.11.3 of this EIS and Sections 6.1.3, 6.1.4, 6.2 and Chapter 7 of the SIA.
2. How potential environmental changes in the locality may affect people's (including, but not limited to):	
(a) community;	Section 7.11.3 of this EIS and Chapter 5, 6 and 7 of the SIA.
(b) access to and use of infrastructure, services, and facilities;	Section 7.11.3 of this EIS and Chapter 5, 6 and 7 of the SIA.
(c) culture;	Section 7.11.3 of this EIS and Chapter 5, 6 and 7 of the SIA.
(d) decision-making systems; and	Section 7.11.3 of this EIS and Chapter 4 and 6 of the SIA.
(e) fears and aspirations, as relevant and considering how different groups may be disproportionately affected.	Section 7.11.3 of this EIS and Chapter 5, 6 and 7 of the SIA.
3. Identify actions and outcomes that address both negative and positive social impacts.	Actions and outcomes to address negative and positive social impacts are described in Section 7.11.4 of this EIS and Chapter 7 and 8 of the SIA.

7.11.2 Existing environment

The Project is located within the suburb of Moorebank and is directly surrounded by the suburbs of Casula, Wattle Grove, and Glenfield. The community of these suburbs comprise the local area of social influence for the Project. The Project is likely to have a broader reach due to supply chains, haulage routes, transportation of goods, materials and equipment, and the movement of its workforce (DPE 2017), accordingly the regional area of social influence comprise the LGAs of Liverpool and Campbelltown. The local area and regional area are located within the South Western Sydney Local Health District (LHD).

In 2016 the local area had a total population of 43,994 people, representing a 27.8% population increase since 2006. Within the local area, Glenfield experienced the largest population growth (42.5%). Overall, the population of the local area has been increasing by a larger proportion compared to the regional area and NSW. The projected population of the regional area is estimated to increase from 373,533 in 2016 to 690,677 by 2041 (DPIE 2019).

In terms of the local area economy, the top three occupations are professionals (20.6%), clerical and administrative workers (17.5%) and technicians and trades workers (13.4%). This is consistent for each of the communities within the local area, as well as the regional area. The top industries of employment in the local area are healthcare and social assistance (12.1%), retail trade (9.1%) and public administration and safety (8.4%). There is a significant number of healthcare providers and community/social service providers within the local area. There is also a large number of local shops operating within the area.

Within the regional area economy, 20,244 registered businesses operated in 2018, none of which employed more than 200 employees. Of these registered businesses, 98.4% were classed as small businesses employing fewer than 20 people or non-employing. Of these registered businesses, 20.5% were in the wholesale trade industry, 13.2% were in the wholesale trade industry and 8.6% were in professional, scientific and safety services.

The local area is very well serviced in terms of social infrastructure and services. Residents within the local and regional areas have access to childcare services, primary and secondary schools, and tertiary education. Community services located in the regional area service the local area. These services are mainly concentrated in the suburb of Liverpool within the Liverpool LGA and the suburbs of Macquarie Fields and Ingleburn within Campbelltown LGA, all of which are easily accessible from the local area. Residents in the local area are also serviced by the emergency services located in the regional area including:

- four police stations, two of which are in Liverpool LGA and two in Campbelltown LGA;
- two ambulance stations located in Campbelltown LGA;
- one NSW Ambulance Superstation in Liverpool within Liverpool LGA;
- two fire and rescue stations (one each in Liverpool LGA and Campbelltown LGA); and
- two State Emergency Services (SES) local units (one each in Liverpool LGA and Campbelltown LGA).

In terms of the overall health and well-being of the communities within the local area and regional area, the instances of overweight and obese persons have been increasing in South West Sydney LHD with a higher proportion of overweight and obese persons on average compared to the rest of NSW (Ministry of Health 2019). The proportion of persons who smoke in South Western Sydney LHD was also generally above the state average from 2002-2019.

The proportion of vulnerable groups within the local area is generally lower than that of the rest of NSW. The population within the regional area has a greater need for assistance compared to NSW, with 6.1% of the population of the regional area requiring assistance compared to 5.4% in NSW in one or more of the three core activities of self-care, mobility and communication due to a long-term health condition, disability, or old age.

7.11.3 Assessment of impacts

i Way of life impacts

a Livelihood from employment of local residents

Construction of the Project will require a workforce comprising supervisors, tradesmen, and plant operators. Technicians and trades workers and managers are amongst the top occupations within the local area and a certificate qualification is the top qualification in the local area amongst persons with a non-school qualification (31.1%) (ABS 2016). Accordingly, it is reasonable to assume that some persons living within the local area have the necessary qualifications to contribute to the construction phase of the proposed project. These trends extend to the regional area. Further, there are unemployed persons within the local and regional area including persons who are qualified for employment during the construction phase of the Project.

Most of the construction workforce is anticipated to be sourced locally. A commitment from SIMTA and their contractors to implement a local participation strategy and plan as part of their construction strategy would increase access to full-time employment for the duration of the construction. Assuming the enhancement strategy is effectively implemented, there would be an increase in the number of employed persons from the local and regional area. This would contribute to reductions in unemployment and improve the lives of those employed by providing financial and job security in the short-term.

Notwithstanding this, it is noted that some of the skills required during the construction phase will be highly specialised and as such specialist firms and workers will be contracted for these tasks. This may require sourcing firms and workers from outside of the local and regional areas due to shortages of specialised skills.

b Dust causing amenity related issues

Concerns regarding air quality were raised by participants via the online community survey and interactive web-map. The issue of dust due to construction and movement of trucks was also raised on nine occasions by local community members on the SIMTA online complaints register for other projects occurring between 2018 and 2020.

The AQIA indicates that that various dust impacts related to amenity are likely to occur during the construction of the Project. This includes dust generation which may result in dust accumulation at homes and residential area and affected visual and recreational amenity. However, these adverse consequences will be negligible as any potential amenity impacts from dust will take a relatively small effort to restore, are not anticipated to threaten local livelihoods and will occur over a short timeframe. Dust mitigation and management measures will be incorporated during construction of the Project (refer Table 7.71) to mitigate these impacts.

c Noise from construction causing amenity and lifestyle related issues

Local residents highly value their local environment and their ability to engage in local recreation activities, such as visiting local parks. Noise from construction works has the potential to detract from the current amenity of the local community and affect some neighbouring residents during the day, particularly those who work from home due to the circumstances surrounding COVID-19 (or otherwise).

Noise is a primary concern of local residents. Nine out of ten survey respondents perceiving noise related to the Project as posing a 'very negative' impact. Noise complaints related to construction of other projects related to the MLP have also previously been raised by local community members on the SIMTA online complaints register occurring between 2018-2020, primarily regarding perceived works occurring during night-time hours and prior to 7 am.

The NVIA found that construction noise levels are predicted to exceed NMLs at the closest assessment locations, with exceedances of 5-9 dB above NML at locations closest to the site. This noise could impact the amenity of the local area for up to 16 months, affecting at-home work arrangements and the ability for local residents to engage in relaxation and recreation activities, such as golf and interaction with the natural environment.

The likelihood of noise impacting the amenity of the local area for residents in the vicinity of the immediate construction works is likely to occur with moderate consequences as impacts on amenity and liveability could continue for the entire 16-month construction period.

SIMTA and their contractors will adopt noise management and mitigation measures (refer Table 7.39) to reduce noise from construction causing amenity and lifestyle related issues. Notwithstanding these measures, the negative consequence remains moderate as noise will still occur.

ii Access to and use of infrastructure, services and facilities impacts

The population of the regional area is projected to increase by 84.9% by 2041. Therefore, it is reasonable to assume that there will be an increasing demand for and use of social infrastructure, services, and facilities by residents, within the local and regional area into the future.

As noted in Section 7.11.2, the local area is largely serviced by social infrastructure, services, and facilities that are located in the regional area.

The Project will further accommodate population and traffic increases. Once operational, the Project would reduce traffic congestion and generally improve traffic amenity along Moorebank Avenue and nearby intersections. Generally, where routes are congested or constrained, people avoid making trips that have unacceptable travel times. Accordingly, reduced travel times supported by the Project will likely make some trips more attractive, thereby helping to facilitate community access and interaction.

The Project will also provide for enhanced connection for communities between Liverpool and Moorebank in the north and the Glenfield and Macquarie Fields and other suburbs in the south. This connection will support:

- improved economic opportunities through improved access to education and employment opportunities;
- enhanced opportunities for social interaction, by making some trips more attractive and encouraging people to take trips where they otherwise may have been avoided; and
- opportunities to increase community wellbeing through improved access to services, including health, community services, recreation, and leisure facilities.

The Project will therefore improve access to and use of infrastructure, services, and facilities with permanent benefits being realised in the short to medium term.

iii Health and well-being impacts

a Physical and mental health benefits due to promotion of exercise

As noted in Section 7.11.2, the instances of overweight and obese persons have also been increasing in South West Sydney LHD, which encompasses the local area, with a higher proportion of overweight and obese persons on average compared to the rest of NSW.

Walkability is an essential component of facilitating a healthy, liveable built environment. Increasing the amount that a person walks or cycles may increase their overall level of physical activity, which is associated with health benefits such as reduction in risk of obesity and the promotion of mental well-being.

The inclusion of an off-road shared user path will support safer access and connectivity for pedestrians and cyclists which is likely to encourage increased walking and cycling, helping to increase general levels of physical activity and impact positively on community health outcomes.

b Dust exacerbating health related issues

The AQIA identifies a high risk related to dust creation and human health during the construction phase for earthworks, and a medium risk for demolition, construction, and track-out (refer Section 7.10.3).

It is assumed that a proportion of local residents within the Project construction footprint will have respiratory conditions or asthma that increase their pre-existing vulnerability to dust emissions and their potential to be affected by dust. However, these potentially affected people do have the ability to adapt and cope with these impacts given the adequacy and availability of health services in the local area.

Unmitigated, while unlikely, the potential impacts on local residents who have existing respiratory conditions could survive the life of the Project. However, the socioeconomic impact will likely require minimal additional external resources to recover. Dust management and mitigation measures will be implemented (refer Table 7.71) to reduce impact from dust exacerbating health related issues.

iv Livelihood impacts

There is the potential for local procurement of various goods and services required for the construction of the Project, resulting in increased opportunity for revenue for local business and therefore having a positive impact on livelihoods, Industries of employment in the regional area including retail trade, manufacturing, construction (9.3%), and accommodation and food services – all of which could be used during the construction phase of the Project.

The greater MLP Project has established mechanisms to ensure opportunities for local businesses and contractors to provide goods and services for the site. This includes providing a pre-registration portal for local companies wanting to work on the MLP Project through the Industry Capability Network and requiring all major contractors to demonstrate their efforts to local procurement. Due to these efforts, audits conducted over the past two years consistently found an average of $20 of every $100 invested into the MLP Project has been spent in the local region (Qube 2020a).

If these procurement mechanisms and strategies are extended to the Project it will increase the likelihood of local procurement of goods and services and thereby increase the benefits to the local economy during the construction phase of the Project.

v Cumulative impacts

There are four infrastructure and urban development projects that are planned or under construction in the vicinity of the Project. These include the MPE project, MPW project, the Glenfield Road upgrade project (Cambridge Avenue road upgrade), and expansion of the existing Glenfield Resource Recovery Facility. Interaction with these projects may produce cumulative socio-economic impacts, particularly those near the Project. During construction, there is potential for cumulative impacts including:

- prolonged duration of construction impacts (eg extended traffic disruptions for road users, pedestrians and cyclists and increased noise, dust, and traffic); and
- increase in construction traffic, associated with haulage of materials, plant and equipment for the various construction projects.

Where construction timeframes for these projects occur sequentially, there is potential for disturbance and disruptions over an extended period, potentially resulting in construction fatigue for some people. Cumulative impacts during operation may also occur in the form of livelihood benefits arising from local access to adequate employment and continued procurement of local goods and services – particularly from local procurement and employment associated with the MLP.

7.11.4 Management and mitigation measures

Mitigation and mitigation measures to be implemented for potential social impacts are summarised in Table 7.76.

Table 7.76 Management and mitigation measures for social impact

Aspect/impact	Reference	Mitigation measure
Ongoing management and maintenance of social measures	SOC01	Implementation of a monitoring and management framework to ensure that the identified positive and negative impacts are monitored over time to measure the effectiveness or otherwise of the proposed management measures.
Livelihood benefits from employment of local residents	SOC02	Implementation of a local participation strategy and plan as a part of the construction strategy.
Physical and mental health benefits due to promotion of exercise	SOC03	Provision of signage which provides informative and motivating messaging about physical activity.
Increased economic activity from industry procurement and use of local retail and food outlets	SOC04	Continued use of local procurement mechanisms.

7.12 Visual and landscape character

7.12.1 Overview

A Landscape Character and Visual Impact Assessment (LCVIA) (Appendix L) was undertaken in accordance with the methods described in *Environmental Impact Practice Note EIA-N04: Guideline for landscape character and visual impact assessment* (TfNSW 2020).

Table 7.77 sets out the SEARs that relate to visual and landscape character and identifies where they are addressed in this EIS.

Table 7.77 SEARs for the Project – Visual and landscape character

Requirement	Where addressed in this EIS
9. **Design, Place and Movement**	
3. Include and illustrate place designs, actions and outcomes for the project that protect and facilitate improvements to the built environment, including in relation to:	
(c) views and vistas.	Impacts to views and vistas are described in Section 7.12.3 of this EIS and Chapter 4 and Chapter 6 of the LCVIA.
4. The provision of visual representations of the project from key locations to illustrate the project.	Impacts to key locations are provided in Section 7.12.3 of this EIS and Section 3.3.4 of the LCVIA.
5. Include and illustrate green infrastructure designs, actions and outcomes for the project including in relation to: (c) the use of local provenance species (trees, shrubs and groundcovers) propagated from locally source seeds from the impacted native vegetation communities (or from those that once existed).	Actions and outcomes of the project are identified in Section 7.12.4 of this EIS and Chapter 7 of the LCVIA.

7.12.2 Existing environment

The Project site is located within an industrial setting with heavily vegetated bushland and remnant vegetation adjacent to the west and south. The Cumberland Plain has undergone extensive clearing, grazing and disturbance for agricultural, urban and industrial development. As a result, much of the area surrounding the Project site to the north has been transformed for industrial uses. The Project site is located near a number of residential and industrial suburbs, including Moorebank, Warwick Farm and Chipping Norton to the north, Casula and Glenfield to the east and south and Wattle Grove to the west. A description of the Project site and surroundings is provided in Section 2.1 of this EIS.

The landform surrounding the Project is generally flat with gentle undulating slopes closer to the Georges River and surrounding residential areas. To the north and north-east of the Project, large areas of industrial development are interspersed with fragmented vegetation along streets, reserves and waterways. To the south, the Project is encompassed by natural bushland vegetation that screens views to the Holsworthy Military Area, and Wattle Grove residents in the east.

Raised landforms in the east and south provide views into the Project site. These views are partially screened by existing vegetation in some cases.

Moorebank and the surrounding area have experienced increased a gradual increase in light pollution as a result of increased urbanisation and industrial expansion, particularly in the areas to the north and north-west of the Project. In 2012, light pollution levels within the Moorebank area and surrounds were commensurate to that of a bright suburban sky (between 3 W/cm^2) and in 2019 were equal to 10-12W/cm^2, similar to an urban or industrial sky (Light Pollution Map).

7.12.3 Assessment of impacts

i Visible project elements

During the construction phase, visual receptors would be able to see areas cleared of vegetation, cut and fill earthworks, plant and material storage areas, temporary construction buildings and light spill.

The following elements of the Project works would be visible by potential viewers during operations:

- bioretention and drainage basins;
- roadway, shared path and users;
- noise mitigation in north eastern corner of the Project;
- retaining walls and batters;
- roadside lighting;
- signage and fencing; and
- relocated overhead transmission lines.

ii Landscape character impacts

Impact to landscape character is measured based on a combination of the sensitivity of an existing area or view to change and the magnitude (eg scale, contrast, quality, distance) of a proposal on that area or view.

Within the study area, four distinct landscape types have been identified and are defined as landscape character zones (LCZs). The LCZs covering the Project site and adjoining areas, include:

- LCZ 1 – Moorebank Industrial Area – industrial/large scale commercial interspersed with leafy private open spaces;
- LCZ 2 – Surrounding Residential Suburbs – low and medium density residential and town centres;
- LCZ 3 – Fragmented Vegetation – high quality plant communities with threatened plant species, leafy open spaces with parks, playing fields and golf courses, publicly accessible pathways, edged with roadside vegetation; and
- LCZ 4 – Riparian Zone – Georges River foreshore, categorised by riparian vegetation and bushland.

LCZs surrounding the study area are presented in Figure 7.17.

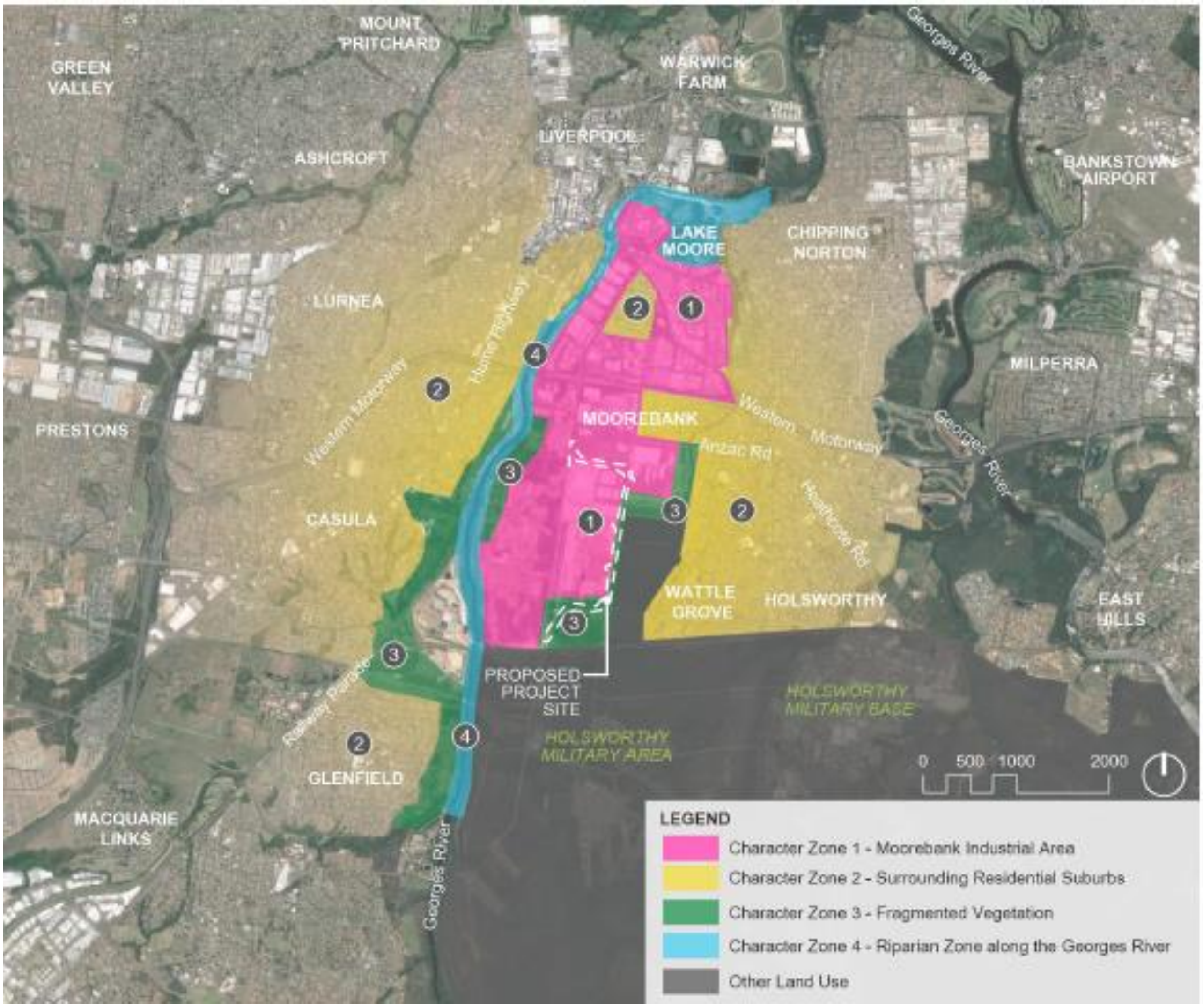

Figure 7.17 Landscape character zones surrounding the study area

Source: SMM 2020

a LCZ 1 – Moorebank Industrial Area

This LCZ comprises the industrial suburb of Moorebank and the Project site. It is surrounded by expansive areas of natural dense bushland and other lands occupied and owned by the DoD.

Sensitivity

The character of this zone is relatively open, with maintained turf verges and fragmented street vegetation However, given the flat terrain throughout this LCZ, views are somewhat condensed to the street level and tend not to extend beyond surrounding industrial buildings.

The footprint of the built elements within this LCZ are extensive and given the current land use and fragmented vegetation that sits on the fringes of this LCZ, these elements assist in absorbing any visual changes, as they are of a similar nature. For these reasons, the overall landscape sensitivity is considered to be low.

Magnitude

The Project would introduce an increased road footprint into a landscape that is currently predominantly a large industrial area. In addition, supplementary light spill from new lighting associated with the Project will have low impact on this LCZ due to the existing lighting currently operating in the MLP and nearby industrial areas.

Although increased traffic and light spill will affect this LCZ, especially during the night, this is consistent with current industrial land uses and therefore will not adversely alter the existing character of this zone. Therefore, the magnitude of the Project within this zone is considered to be low.

Impact

The landscape character impact of the Project in this zone is considered to be low.

b LCZ 2 – Surrounding Residential Suburbs

This LCZ comprises the residential suburbs that surround the study area, including Chipping Norton, Moorebank and Wattle Grove (east) in addition to Casula and Glenfield (west) which overlooks the Project from higher topography.

Sensitivity

Most of the suburbs within this zone have minimal views on the Project due to the viewing distances, undulating topography and landform, or screening from other existing structure and vegetation. However, elevated views from Casula receivers' impact upon the sensitivity of this LCZ. Due to elevated open views in some instances, visual change would not be readily absorbed or concealed. It should be noted that the character sensitivity of this is zone has been previously impacted by the presence of existing infrastructure that supports electrical lines, industrial uses and transport movements. Accordingly, the sensitivity rating of this zone is considered to be moderate.

Magnitude

There are no physical works within the zone, however there will be changes to existing views due to the removal of vegetation, increased traffic and light spill, particularly at night, as well as screened views of the new realigned and widened roadway. The Project would introduce additional built elements to views somewhat dominated by vegetation. Therefore, the magnitude of the Project within this zone is considered to be moderate.

Impact

The landscape character impact of the Project in this zone is considered to be moderate.

c LCZ 3 – Fragmented Vegetation

This LCZ comprises the fragmented areas adjacent to the south, south-east and west of the Project. It is characterised by areas of bushland vegetation, parklands and farmland.

Sensitivity

Areas toward the east and south of the Project are proposed for clearing and comprise Broad-leaved Ironbark-Grey box, Hard-leaved Scribble Gum and Broadleaved Iron Bark plant communities.

In areas to the west, Leacock Regional Park and along the flood prone areas of the Georges River area characterised by Forest Red Gum and Parramatta Red Gum plant communities which provide dense vegetation which assists in screening the Project.

Visitors to parkland including Leacock Regional Park and the Anzac Creek walking track include walkers, joggers, cyclic and picnic goers. While transient in nature, existing views from these areas would be slightly impacted, particularly at night due to light spill and removal of existing vegetation to the east of the Project.

The character of this LCZ includes narrow, screened areas, with layered district views to the east, partially screened by mature vegetation. Therefore, the clearing of vegetation will provide the LCZ with difficulty absorbing the change from natural bushland to a widened built element. Accordingly, the overall landscape sensitivity for LCZ 3 is high.

Magnitude

The works within this LCZ are in the form of natural bushland vegetation clearing, increases to traffic and light spill. Visual impacts on this LCZ are in the form of vegetation clearing along the eastern site boundary and in the south of the Boot Land which will experience transient vehicles driving through the realigned Moorebank Avenue and workers within MPE. Larger scale visual impacts to the west and east of the Project site are in the form of vegetation clearing and the impacts of light spill on users of Leacock Regional Park and Anzac Creek walking track. Accordingly, the magnitude of the Project within this zone would be moderate.

Impact

The landscape character impact of the Project in this zone is considered to be moderate to high.

d LCZ 4 – Riparian Zone

This LCZ comprises riparian vegetation along the Georges River. It generally sits west of the study area on the foreshore of the Georges River, adjacent to much of the Moorebank Industrial area to the east and residential areas to the west.

Sensitivity

Vegetation is a mix of Coastal Freshwater Lagoons, Parramatta Red Gum and Forest Red Gum plant communities along the foreshore of the Georges River, and with much of this LCZ, flood prone, the resulting terrain is relatively flat throughout.

This LCZ is mostly made up of vegetation, lacking built elements apart from fencing and footpaths which run adjacent to vegetation and the river. It is highly vegetated with areas of vegetated screening close to the river. It is experienced predominantly through pedestrian use along the Casula Parklands and vehicular and pedestrian access along Powerhouse Road.

Although the terrain is flat, the ability of the zone to absorb visual change is varied due to the proximity of the industrial activity located adjacent to the Georges River. This coupled with the intended users of this LCZ results in a moderate landscape character sensitivity rating.

Magnitude

There are no works within this LCZ. Changes to the LCZ and addition of built elements would not be visible from this LCZ due to screening from existing built elements and vegetation and given the flat topography of the surrounding areas between LCZ 4 and the Project. Accordingly, the magnitude of the Project in this zone is considered to be negligible.

Impact

The landscape character impact of the Project in this zone is considered to be negligible.

e Summary of impacts to landscape character zones

The result of the landscape character impact assessment is summarised in Table 7.78.

Table 7.78 Summary of results of character impacts

Landscape character zone		Sensitivity	Magnitude	Impact
LCZ 1	Moorebank industrial area	Low	Low	Low
LCZ 2	Surrounding residential suburbs	Moderate	Moderate	Moderate
LCZ 3	Fragmented vegetation	High	Moderate	Moderate - High
LCZ 4	Riparian zone	Moderate	Negligible	Negligible

iii Light pollution impacts

Light pollution would occur as a result of the Project through increased illumination of the new road alignment. Light pollution would have an impact on surrounding receivers, particularly residents in Casula and Glenfield, given the raised topography of these areas. This impact would be lesser for residents in Wattle Grove, given the existing screening and relatively flat topography.

As noted in Section 7.12.2, the Project site and surrounds have experienced a gradual increase in light pollution as a result of increased urbanisation and industrial expansion and is now commensurate to that of an urban or industrial sky.

During construction, the Project would slightly impact light spill overall as works would mainly occur during standard construction hours, consistent with the construction period of the MLP.

During operational periods, the introduction of new visual elements, including lighting have the potential to impact surrounding receivers, long term. However, given the existing light pollution in this area, there would not be a significant increase to operational light pollution to nearby residents.

iv Visual impacts

A total of 11 viewpoints were identified and verified from various locations, distances and directions to assess the potential visual impacts of the Project. An analysis of the Project was undertaken to determine potential visibility of the Project infrastructure at viewpoint locations. This analysis was generated using a digital elevation model.

The viewpoints were selected within the visual catchment, defined by the Zone of Theoretical Visibility, and include roadways, residential housing, a walking track and a lookout.

The assessed viewpoint locations and summary of the key features of each location are illustrated in Figure 7.18 and described in Table 7.79.

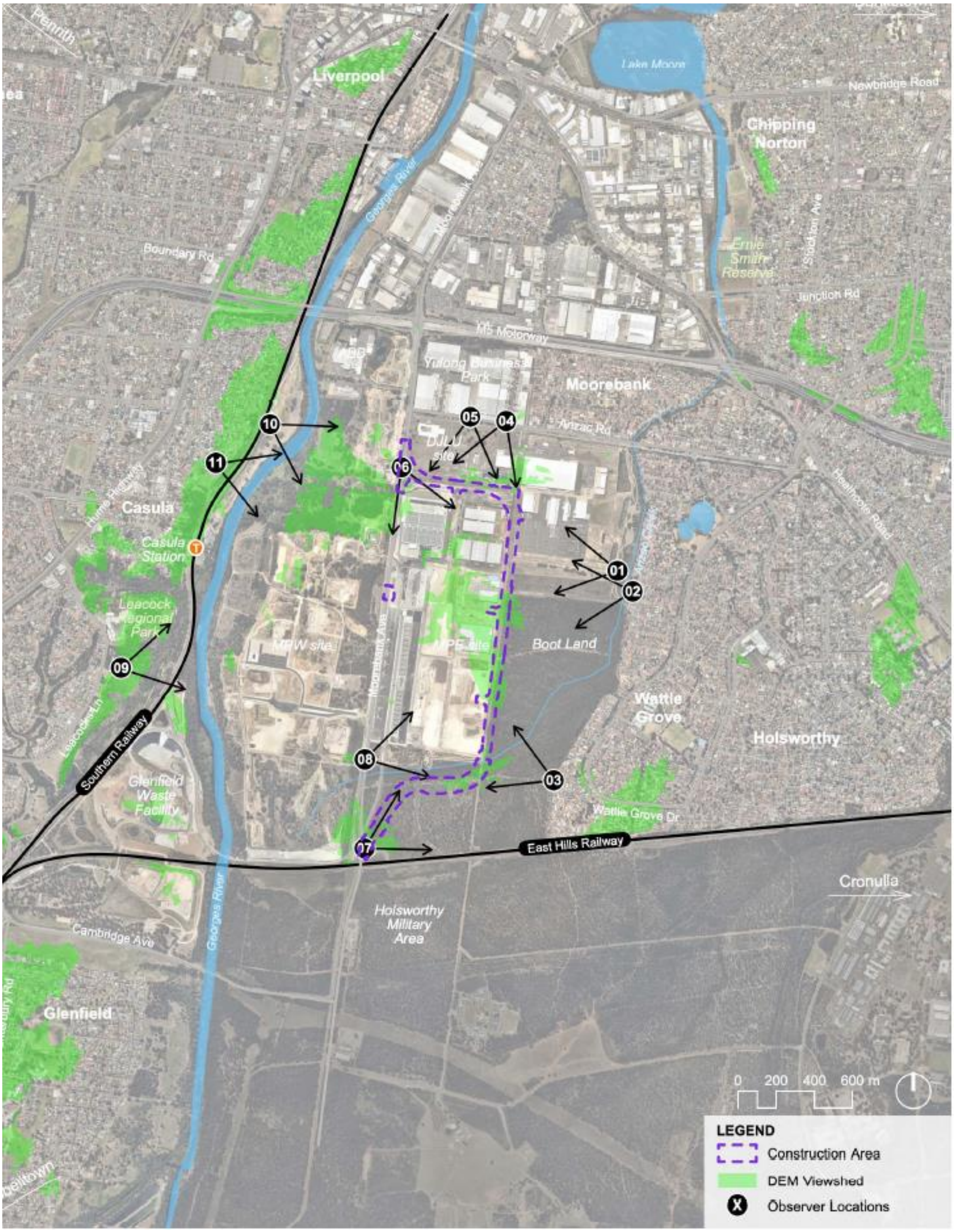

Figure 7.18 Assessed viewpoint locations

Source: SMM 2020

Table 7.79 Assessed viewpoint locations summary

No	Location	LCZ	Direction of view	Visual Project elements	Potential viewers	Notes
1	Anzac Creek Walking Track, Wattle Grove	LCZ 3	West	Screened bioretention & attenuation basin, screened roadway, screened noise wall, screened retaining wall, roadside lighting, high voltage transmission lines.	Visitors using the Anzac Creek walking track.	Partially screened by fragmented vegetation and fencing.
2	Banyule Circuit, Wattle Grove	LCZ 2	West	Screened noise wall, screened retaining wall, screened roadside lighting and screened high voltage transmission lines.	Residential properties along Banyule Circuit.	Almost entirely screened by existing trees at ground level.
3	Yallum Circuit, Wattle Grove	LCZ 2	North-West	No Visible elements.	Residential properties along Yallum Circuit.	Almost entirely screened by existing trees at ground level.
4	S.M.A.R.T Repairs, Anzac Road, Moorebank	LCZ 1	South-West	Retaining wall, roadside lighting, screened bioretention and attenuation basin, screened noise wall and screened high voltage transmission lines.	Vehicles accessing the Moorebank Industrial Area and businesses along Moorebank Avenue and Anzac Road, as well as Industrial businesses along Anzac Road.	Partially screened by existing trees and existing built elements.
5	BMW Group, Anzac Road, Moorebank	LCZ 1	South	Retaining wall, roadside lighting, screened bioretention and attenuation basin, screened noise wall and screened high voltage transmission lines.	Vehicles accessing the Moorebank Industrial Area and businesses along Moorebank Avenue and Anzac Road, as well as Industrial businesses along Anzac Road.	Partially screened by existing trees and existing built elements.
6	Moorebank Avenue (near DJLU site)	LCZ 1	South-East	Roadway (Moorebank Avenue intersection), shared path, roadside batter and roadside lighting.	Vehicles accessing the Moorebank Industrial Area and businesses along Moorebank Avenue.	Exposed with open views to the Projects intersection at Moorebank Avenue.
7	Moorebank Avenue (near East Hills Railway Line)	LCZ 1	North-East	Bioretention & attenuation basin, roadside batters and roadway, shared path and roadside lighting.	Vehicles accessing the Moorebank Industrial Area and businesses along Moorebank Avenue and Anzac Road.	Exposed with open views overlooking the Project and existing vegetation to be cleared.
8	Moorebank Avenue (near MPE south-west boundary)	LCZ 1	East	Screened bioretention & attenuation basin, roadside batters and roadway, screened retaining wall and roadside lighting.	Vehicles accessing the Moorebank Industrial Area, users of the Royal Australian Engineers Golf Course and businesses along Moorebank Avenue and Anzac Road.	Partially screened by existing trees and industrial properties.

Table 7.79 Assessed viewpoint locations summary

No	Location	LCZ	Direction of view	Visual Project elements	Potential viewers	Notes
9	Leacock	LCZ 3	East	Screened bioretention & attenuation basin, screened roadside batters and roadway, noise wall, retaining wall, roadside lighting and high voltage transmission lines.	All Saints Catholic College, Visitors using the Leacock, Lookout and Walking Track.	Partially screened by existing trees
10	Casula Parklands	LCZ 3	South-East	Screened roadside Lighting and screened high voltage transmission lines.	Park Users.	Screened by existing vegetation.
11	Carroll Park, Casula	LCZ 2	East	Screened bioretention & attenuation basin, screened roadside batters and roadway, retaining wall, roadside lighting and high voltage transmission lines.	Residential properties in Casula along Marsh Parade and Buckland Road and users of Carroll Park.	Partially screened by existing trees and industrial properties.

During construction, the landscape will undergo physical changes through tree removal, increased traffic from construction vehicles, earthworks and grading, stockpile sites, construction machinery, temporary structures and light spill. During operation, impact would be in the form of increased vehicle movements and increased light spill.

When considering topography and potential screening features of the landscape within the Project site and surrounding area, the result of the analysis indicate that the Project infrastructure will be visible to varying degrees from ten of the 11 viewpoints assessed.

The assessment indicates the potential for shielding features in the landscape to reduce the visibility of Project infrastructure from a number of the selected viewpoints. This is largely due to scattered remnant vegetation, planted landscaping and built landform. Three of the 11 viewpoints will experience open elevated views of Project infrastructure (predominantly to the west and south).

The most significant visual impact will be experienced by motorists travelling north along Moorebank Avenue (viewpoint 7) who currently have an elevated view of dense vegetation, some of which would be removed allowing views to the Project. At this location, motorists will experience visual impacts including increased traffic from construction vehicles, vegetation clearing, stockpile sites, construction machinery, temporary structures and light spill.

Given that the users of this road are transiting and temporary in nature, the sensitivity of this view to change is considered to be moderate. The magnitude of change has also been assessed as moderate due to the removal of a visible track of vegetation to accommodate the Project. Accordingly, the impact rating assigned to this viewpoint is 'moderate'.

At most viewpoints, Project infrastructure will be partially screened by existing built elements, vegetation and landform. Viewpoint 2, viewpoint 3, and viewpoint 11 are representative of views from residential dwellings. Viewpoints 2 and viewpoint 3 are almost entirely screened by existing trees at ground level. Viewpoint 10, while on raised landform, is partially screened by existing trees and industrial properties.

A summary of results of the analysis for each of the 11 viewpoints is provided in Table 7.80.

Table 7.80 Summary of results of visual impacts at each viewpoint

Viewpoint	Location	Existing Condition	Receptor	LCZ	Project infrastructure visible	Sensitivity	Magnitude	Impact
Viewpoint 1	Anzac Creek Walking Track, Wattle Grove, looking west towards MPE.	Semi-open views through a chain fence and scattered trees to open views of the Project and existing industrial built elements.	Visitors using the Anzac Creek walking track.	LCZ 3	Screened bioretention basin, screened roadway, screened noise wall, screened retaining wall, roadside lighting and transmission lines.	Low	Low	Low
Viewpoint 2	Banyule Circuit, Wattle Grove, looking west towards MPE	Bushland adjacent to residences, delineated with mature tree plantings along the boundary lines that mostly screen the MLP.	Residential properties along Banyule Circuit	LCZ 2	Screened noise wall, screened retaining wall, screened roadside lighting and screened transmission lines.	Moderate	Low	Low - Moderate
Viewpoint 3	Yallum Circuit, Wattle Grove, looking north-west towards MPE	Bushland adjacent to residencies, delineated with mature tree plantings along the boundary lines that mostly screen the MLP	Residential properties along Yallum Circuit	LCZ 2	No visible elements.	Moderate	Negligible	Negligible
Viewpoint 4	S.M.A.R.T Repairs, Anzac Road, Moorebank, looking south-west towards MPE.	Existing DJLU site with existing tree plantings partially screening industrial built elements in the background towards the MPE.	Industrial properties and vehicles along Anzac Road	LCZ 1	Retaining wall, roadside lighting, screened bioretention and attenuation basin, screened noise wall, screened transmission lines.	Low	Low	Low
Viewpoint 5	BMW Group, Anzac Road, Moorebank, looking south towards MPE	Existing DJLU Site with existing tree plantings partially screening industrial built elements in the background.	Industrial properties and vehicles along Anzac Road	LCZ 1	Retaining wall, roadside lighting, screened bioretention and attenuation basin, screened noise wall and screened transmission lines.	Low	Low	Low
Viewpoint 6	Moorebank Avenue looking south towards MPE.	Existing built elements including MLP and Cafe with built elements atop retaining walls in the background and the existing Moorebank Avenue alignment in the foreground.	Vehicles accessing Moorebank Avenue towards Holsworthy Military Area	LCZ 1	Roadway (Moorebank Avenue intersection), shared path, roadside batter and roadside lighting.	Low	Low	Low
Viewpoint 7	Moorebank Avenue looking north-east towards MPE.	Open views over dense bushland with built elements including existing fencing and existing Moorebank Avenue roadway in the foreground and railway line to the south-east.	Vehicles accessing Moorebank Avenue towards the Moorebank industrial area.	LCZ 1	Bioretention and attenuation basin, roadside batters and roadway, shared path and roadside lighting.	Moderate	Moderate	Moderate

Table 7.80 Summary of results of visual impacts at each viewpoint

Viewpoint	Location	Existing Condition	Receptor	LCZ	Project infrastructure visible	Sensitivity	Magnitude	Impact
Viewpoint 8	Moorebank Avenue looking east towards MPE	Industrial storage areas, built elements including fencing, power poles and storage containers.	Vehicles accessing Moorebank Avenue towards the Moorebank industrial area.	LCZ 1	Screened bioretention and attenuation basin, roadside batters and roadway, screened retaining wall and roadside lighting.	Low	Low	Low
Viewpoint 9	Leacock Regional Park, looking east towards MPE and MPW.	Long-distance views over MPE and MPW and built elements located in amongst natural bushland vegetation and undulating topography.	All Saints Catholic College, visitors using the Leacock Regional Park and users of the lookout and walking track.	LCZ 3	Screened bioretention and attenuation basin, screened roadside batters and roadway, retaining wall, roadside lighting and transmission lines.	Moderate	Low	Low - Moderate
Viewpoint 10	Casula Parklands, looking south-east towards the Georges River and MPE.	Heavily vegetated waterfront of the Georges River screens the existing industrial precinct and provides a soft edge along the recently built Casula Parklands. Relatively flat topography assists with this screening, providing little opportunity for views over this vegetation.	Visitors to Casula Parkland.	LCZ 3	Screened roadside lighting.	Low	Low	Low
Viewpoint 11	Carroll Park, adjacent to Buckland Road residencies, Casula, looking east towards Moorebank Avenue.	Long-distance views over MPE and MPW sites and built elements located in amongst natural bushland vegetation and undulating topography.	Residential properties in Casula along Marsh Parade and Buckland Road and users of Carroll Park.	LCZ 2	Screened bioretention & attenuation basin, screened roadside batters and roadway, retaining wall, roadside lighting and transmission lines.	Moderate	Low	Low - Moderate

7.12.4 Management and mitigation measures

Mitigation and mitigation measures to be implemented for potential visual impacts are summarised in Table 7.81.

Table 7.81 Management and mitigation measures for visual impact

Aspect/impact	Reference	Mitigation measure
Project design	VIS01	Wherever feasible, ancillary sites will be located where they would have least visual impact.
Structures	VIS02	Detailed design of structural elements, including noise barriers, retaining walls and retaining wall finishes, will be in accordance with Beyond the Pavement, urban design policy, procedure and design principles (Roads and Maritime, 2013) and the associated design guidelines.
Structures	VIS03	Consideration to the design of the new retaining walls will be given in order to minimise the apparent height of the walls, including planting to the base of the wall and terracing.
Structures	VIS04	New retaining walls will be designed to have a finish that relates to the character of the surrounding landscape.
Drainage	VIS05	Where there is sufficient space, operational water quality devices will be designed with consideration of reducing visual impacts.
Lighting	VIS06	The design of temporary and permanent lighting will be undertaken in accordance with AS 1158.1-1986 and would avoid unnecessary light spill on adjacent residents or sensitive receivers.
Landscape Implementation	VIS07	The removal of existing vegetation within the road corridor will be minimised.
Landscape Implementation	VIS08	The potential for planting of shrub species in medians and verges will be considered in detailed design, where the width of the median allows, taking into account clear zone requirements for headlight glare screening.
Landscape Implementation	VIS09	Screen planting will be provided where feasible to proposed retaining walls to screen the Project from sensitive adjacent land uses where applicable.

7.13 Waste and resource management

7.13.1 Overview

This section describes the potential waste that may be generated by construction and operation of the Project and presents a proposed waste management approach for the Project.

The key legislation and regulation which provides the framework for the management of waste in NSW are described below.

i Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* promotes waste avoidance and resource recovery, and establishes the following waste management hierarchy:

- avoidance – minimise the potential for waste generation by avoiding unnecessary consumption of resources, including materials and materials that have excessive packaging;
- recovery – reuse, reprocess or recycle waste products to minimise the amount of waste requiring disposal; and

- disposal – as a last resort, dispose of resources that cannot be recovered.

ii Protection of the Environment Operations Act 1997

The POEO Act is the key piece of environment protection legislation administered by the NSW EPA, and sets the statutory framework for:

- specification of requirements for licences and the regulation of various activities that have the potential to pollute or harm the environment. Activities listed under Schedule 1 of the POEO Act require an EPL;
- integration with NSW EPA licensing with the development approval procedures under the EP&A Act;
- provision for the issuing of clean-up notices, prevention notices and environment protection notices;
- classification of environment protection offences and penalties; and
- allowance for mandatory audits and provision for authorised officers with the power to carry out investigations.

iii Protection of the Environment Operations (Waste) Regulation 2014

The Protection of the Environment Operations (Waste) Regulation 2014 (NSW) (Waste Regulation) sets out the provisions related to the following:

- storage and transportation of waste;
- reporting and record-keeping requirements for waste facilities;
- special requirements for the management of certain special waste including asbestos;
- payment of waste contributions (referred to as a waste levy) by the occupiers of licensed waste facilities; and
- exemption of certain occupiers or types of waste from paying waste contributions and from requiring an EPL under Part 9 of the Waste Regulation.

Part 9 of the Waste Regulation provides for exemptions to some of the requirements of the POEO Act and Waste Regulation for certain activities where it can be demonstrated that waste reuse would not cause harm to human or environmental health.

There are a number of Resource Recovery Orders and Exemptions allowing specified reuse of waste streams that are relevant to road construction projects, including:

- excavated natural material;
- recovered aggregate;
- excavated public road material;
- treated drilling mud;
- reclaimed asphalt pavement;
- mulch; and

- stormwater.

Clause 71 of the Waste Regulation prohibits the transport of waste for disposal more than 150 km from the place of generation.

iv Environmentally Hazardous Chemicals Act 1985

This Act provides the NSW EPA with the authority to declare chemicals as chemical waste, and to make a Chemical Control Order to appropriately manage the potential risk associated with any such waste to human and environmental health. In addition, a licence may be required under the Act for certain activities relating to manufacturing, processing, keeping, distributing, conveying, using, selling or disposing of an environmentally hazardous chemical or a declared chemical waste. Construction of the Project may require the use and storage of chemicals onsite that may generate chemical waste.

v Assessment methodology

Waste streams that have the potential to be generated during the construction and operational stages of the Project were identified via a desktop assessment. Potential waste types and quantities that may be generated by the projects were estimated by reviewing the construction and operational activities for the Project (as outlined in Chapter 5), their scale and extent, as well as by reviewing relevant guidelines and waste generated on similar projects.

Management and mitigation measures were identified with respect to the relevant legislation and guidelines to manage waste as outlined below.

7.13.2 Assessment of impacts

Potential waste generated during Project construction would be managed using the waste hierarchy approach; whereby avoiding the generation of waste and reusing materials are prioritised over waste disposal. All waste would be managed in accordance with the waste provisions contained within the POEO Act and the Waste Regulation. Where waste would be reused offsite, relevant NSW EPA Resource Recovery Orders and Exemptions would be followed.

Construction of the Project would require a greater quantity of fill than the quantity of excavation material generated, and all material that is suitable for reuse would be used for construction activities. The total quantity of fill required for the Project is approximately 105,000 m^3.

Should waste be found to be unsuitable for reuse or recycling, disposal methods would be selected based on the classification of the waste material in accordance with the Waste Classification Guidelines: Part 1 Classifying Waste (NSW EPA, 2014a). The Waste Classification Guidelines provide direction on the classification of waste, specifying requirements for management, transportation and disposal of each waste category.

Resource recovery would be applied to the management of construction waste and would include:

- recovery of resources for reuse – reusable materials generated by the Project would be segregated for reuse onsite, or offsite where possible, including the reuse of the major waste streams;
- recovery of resources for recycling – recyclable resources (such as metals, plastics and other recyclable materials) generated during construction and demolition would be segregated for recycling and sent to an appropriate recycling facility for processing; and
- recovery of resources for reprocessing – cleared vegetation would be mulched or chipped onsite and used for landscaping, in the absence of a higher beneficial use being identified.

Waste would be managed in accordance with the requirements presented in Section 7.13.1, and the management measures presented in Table 7.82. A Construction Waste and Resource Management Plan (CWRMP) would be prepared and implemented as part of the CEMP for the Project. As a result, the overall impact of construction waste is considered to be manageable and acceptable.

Waste generated during construction would primarily be from works associated with clearing, stripping, earthworks and construction of road carriageways, retaining soil structures and/or walls, bridges and drainage infrastructure.

i Excavated material

The Project would generate topsoil and other excavated material (eg excavated soil, sediment, rock, gravel, clay, sand etc) during bulk earthworks. This includes any potentially contaminated earthworks material.

About 25,000 m^3 of material would be excavated during construction of the Project, however the total quantity of fill required for the Project is about 105,000 m^3, so there will be a net deficit of 80,000 m^3. Therefore, the only waste resulting during earthworks would comprise excavated material that is unsuitable for reuse. The potential to encounter contaminated material during earthworks, along with a management approach for any contaminated materials encountered during construction, is discussed in Section 7.6.

Wherever possible, excavated material would be stockpiled onsite and reused for construction. The ability to reuse excavated material would depend on the physical properties of the excavated material and require that the material is of suitable quality.

If previously unidentified contaminated material is discovered during construction, the contaminated material would be managed in accordance with an unexpected contaminated finds procedure.

Where excavated material cannot be reused onsite, it would be managed in the following order of priority:

- transport off site for reuse by a third party in accordance with relevant NSW EPA resource recovery exemption or to a NSW EPA licensed waste recovery facility; or
- disposed at an accredited materials recycling or waste disposal facility.

Where excavated material is deemed unsuitable for reuse or emplacement due to contamination, it would be taken to a waste facility licensed to accept the waste.

ii Waste disposal locations

Remaining excavated material that is determined unsuitable for reuse would be transported offsite for reuse, recycling or disposal at an appropriately licensed facility.

A number of waste facilities throughout Sydney are licensed to accept each type of waste that may be generated by the Project. Specific facilities and collection contractors for the disposal of waste would be identified and engaged during the detailed design and delivery of the Project.

The selection of one or more of the below facilities, or any other facility, would be dependent on the nature and volume of waste streams generated and the capacity of the receiving facilities to accept material, at the time of the waste generation:

- SUEZ Wetherill Park Resource Recovery Facility;
- Widemere Resource Recovery Facility (Boral);
- Bettergrow Resource Recovery Facility, Wetherill Park;

- Ingleburn Battery Recycling Facility;
- Bingo Minto - Resource Recovery Facility;
- Lucas Heights Resource Recovery Park;
- SUEZ Kemps Creek Resource Recovery Park; and
- SUEZ Eastern Creek waste management centre.

iii Potential construction impacts

The mismanagement of waste generated by the Project has the potential to result in the following impacts:

- excessive materials being directed to landfill due to inadequate collection, reuse, and recycling;
- impacts on human health resulting associated with various types of waste being generated and stored onsite, with the potential for misclassification or mishandling resulting in potential cross contamination; and
- environmental impacts from the incorrect storage, classification, transport and disposal of waste.

Given that the management measures presented in Section 7.13.3 would be implemented, the risk of the above impacts would be minor during construction of the Project.

iv Potential operational impacts

Waste generated by the operation of the Project would be limited and be mostly from maintenance and minor repair works. Major repair work or upgrade work, beyond standard maintenance, would be subject to separate assessment and approval.

The routine maintenance requirements for the Project would be carried out as agreed by TfNSW. Where required, waste materials would be managed in accordance with TfNSW waste management procedures and either reused if appropriate or disposed of at an appropriately licensed waste facility.

The overall impact of operational waste is expected to be minimal and would be managed through the application of standard TfNSW operating and maintenance Environmental Management Systems and procedures.

The following waste management related impacts have the potential to occur during operation of the Project:

- excessive waste being directed to landfill due to inadequate collection, classification and disposal of waste; and
- operation of the Project may result in the diversion of excessive waste to landfill due to inadequate collection, classification and disposal of waste.

7.13.3 Management and mitigation measures

Waste will be managed and mitigated through the development of construction management plans and implementation of standard approaches to operational waste management. Mitigation measures to be implemented for potential waste management impacts are summarised in Table 7.82.

Table 7.82 Management and mitigation measures for waste management

Aspect/impact	Reference	Mitigation measure
Inappropriate handling and/or disposal of waste	WAS01	A CWRMP will be prepared for the Project and encompassed within the CEMP. The CWRMP will outline appropriate management procedures and include, but not be limited to: • identification of the waste types and volumes that are likely to be generated by the Project; • adherence to the waste minimisation hierarchy principles of avoid/reduce/reuse/recycle/ dispose; • waste management procedures to manage the handling and disposal of waste, including unsuitable material or unexpected waste Volumes; and • identification of reporting requirements and procedures for tracking of waste types and quantities.
Inappropriate handling and/or disposal of waste	WAS02	A Spoil Management Plan (SMP) will be prepared for the Project as part of the construction waste and resource management plan. The SMP will outline appropriate management procedures for the generation and importation of spoil. It will include, but not be limited to: • procedures for classification of spoil; • identification of spoil reuse measures; • spoil stockpile management procedures; • spoil haulage routes; • spoil disposal and reuse locations; and • imported spoil sources and volumes.
Unexpected waste volumes and types during construction	WAS03	Suitable areas will be identified to allow for contingency management of unexpected waste materials, including contaminated materials. Suitable areas will be required to be hardstand or lined areas that are appropriately stabilised and bunded, with sufficient area for stockpile storage.

7.14 Economic

7.14.1 Overview

The ensuing section provides an overview of the existing socio-economic environment and identifies potential economic impacts during construction and operation of the Project.

7.14.2 Existing environment

The local economic area comprises the suburbs of Moorebank, Wattle Grove, Casula and Glenfield and has a combined population of 43,994 (ABS 2016).

The Project is geographically located in the industrial suburb of Moorebank, within the Liverpool LGA. Despite its industrial character, Moorebank is one of Sydney's fastest growing suburbs in Sydney. It grew from a population of 7,595 in 2011 to 9,747 in 2016 (representing a growth rate of 28.33%). Liverpool LGA experienced a growth in population from 180,143 in 2011 to 204,326 in 2016 (representing a growth rate of 13.42%). Growth in the Liverpool LGA is expected to continue, reaching approximately 251,350 persons in 2021 (DPIE 2020).

Within the local areas of Moorebank, Wattle Grove, Casula and Glenfield, the top industries of employment in the local area are healthcare and social assistance (12.1%), retail trade (9.1%), public administration and safety (8.4%) and construction (8.0%). Within the regional area (comprising the areas of Liverpool LGA and Campbelltown LGA), the top industries of employment are healthcare and social assistance (11.9%), retail trade (10.4%), manufacturing (9.4%) and construction (9.3%).

7.14.3 Construction economic impacts and benefits

During construction, the Project would provide benefits to businesses, including increased demand for services or expenditure at businesses within the local and regional areas. The economic benefits of construction will include:

- increased expenditure at local and regional businesses through purchases by construction workers;
- direct employment associated with on-site construction activities;
- direct expenditure associated with on-site construction activities; and
- indirect employment and expenditure through the provision of goods and services required for construction.

As of 30 June 2015, approximately 21% of registered businesses in the Liverpool LGA are engaged in the construction industry (ABS 2016). These businesses may benefit from increased demand in construction materials and construction services.

Construction of the Project would require a peak workforce of 122 persons, comprising construction workers and contractor site staff. Outside of this peak, workforce numbers are expected to average at about 83 persons over the 16 month construction period. The Project will contribute to indirect employment benefits through construction workers generating additional sources retail expenditure for nearby businesses. This would be spent predominantly on convenience-related items such as food and consumer goods.

Economic activity associated with project construction is predicted to occur over the heavy and civil engineering construction sector (which includes businesses involved in road construction) and construction services sector, (which includes businesses involved in site preparation services, concreting services, hire of construction machinery with operator and etc). Economic activity is likely to be realised within the surrounding local area, across the LGAs of Liverpool and Campbelltown, and Greater Sydney.

During construction, access to the MLP and through the precinct would be maintained via the existing Moorebank Avenue.

7.14.4 Operational economic impacts and benefits

The Project will improve traffic flow and travel times for road users, including local residents, community members and travellers in approximately 2029. The Project will provide long-term benefits for business in the local area and Greater Sydney, through:

- enhanced road network capacity and connectivity thereby improving the efficiency of freight and commercial vehicle movements, broadening trade catchments and reducing overhead costs associated with transport;
- improved road network travel speeds and travel times, potentially attracting new business and customers to the local area;
- improved connectivity to Liverpool and Campbelltown for businesses in the local area, expanding economic supply chains and attracting new investment;
- redistributing traffic (including heavy vehicles) from local to arterial roads, improving the amenity and safety of the business environment and enhancing access and connectivity; and
- general improvements in the reliability, connectivity and safety of the road network.

The Project should be considered in the context of the broader precinct. Realignment of Moorebank Avenue is fundamental to the MLP's effective and efficient operation. The MLP is a nationally-significant intermodal terminal facility project linking Port Botany directly to rail terminals and warehousing in southwest Sydney. In operation, the MLP will deliver significant economic benefits to the regional and surrounds, including:

- a reduction in the volumes of heavy vehicle movements along the M5 Motorway and Sydney roads in the order of 3,000 heavy truck movements per day;
- a reduction in distance travelled by container trucks on Sydney's road network by 150,000 kilometres every day, and the distance travelled by long distance interstate freight trucks by 93,000 kilometres every day; and
- creation of about $11 billion economic benefits over 30 years, including $120 million a year for the economy of south-western Sydney, through the improvements to productivity as well as reduced business costs, reduced road congestion and better environmental outcomes (Qube 2020).

Once constructed, the MLP will provide up to 6,800 direct employment opportunities (Qube 2020) across administration, operational and maintenance positions and indirect employment opportunities. It is likely, however, that while some workers would be sourced from within the Liverpool LGA, the rest of the workforce would be sourced from outside the Liverpool LGA (Parsons Brinckerhoff 2014).

Economic impact assessments were undertaken to support the environmental assessment for MPE and MPW. An Economic Assessment (Urbis 2013) prepared to support the approval of the MPE Concept Plan had found that the MPE Project would generally have a positive impact on the surrounding area through increased employment and a reduction in the volumes of truck movements along the M5 Motorway. Similarly, a Social Impact Assessment and Economic Assessment (Parsons Brinckerhoff 2014), prepared to support the environmental assessment for the approval of the MPW Concept Plan had found that the MPW Project at full build is expected to boost freight efficiency, thereby contributing towards benefits for the regional and national economy.

7.14.5 Management and mitigation measures

No management or mitigation measures are proposed.

7.15 Sustainability

7.15.1 Overview

This section presents an assessment of the Project's consistency with the principles of ESD and how they have been considered and incorporated into the design, construction and operation of the Project.

7.15.2 Assessment of impacts

i Precautionary principle

The Precautionary Principle requires evaluation of the risks of serious or irreversible environmental damage associated with a proposed development.

Of the five ESD principles, the Precautionary Principle is the most relevant to risk management. This risk-based approach is the most responsible way to balance project objectives with the need to reduce risk to as low as reasonably practicable. The premise is that where uncertainty or ignorance of impacts exists, and there is scope for environmental harm, decision makers should be cautious. The Project has been assessed with the purpose of reducing the risk of serious and permanent impacts on the environment.

The Precautionary Principle approach has been applied throughout the preparation of the design of the Project, including route selection, and all technical studies with intent to minimise potential environmental impacts.

Technical specialist studies were undertaken to provide accurate information to assist with the evaluation and development of the Project, including:

- ecology;
- heritage;
- traffic;
- bushfire;
- air quality;
- water;
- noise; and
- visual.

The application of the Precautionary Principle requires careful evaluation of options to avoid, wherever practicable, serious or irreversible environmental damage.

Where a level of uncertainty was identified in the data used for the assessments, a conservative worst-case scenario analysis was undertaken. Where these assessments identified potential impacts to the environment, mitigation measures have been proposed to be implemented. The technical specialist studies provided a detailed analysis of both the construction and operational phases of the Project, to consider the environmental impacts, having regard to the Precautionary Principle.

Subject to the implementation of mitigation measures, these specialist studies did not identify any issues that may cause serious and irreversible environmental damage as a result of the Project.

ii Inter-generational equality

Inter-generational equity is concerned with ensuring that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The Project facilitates the operation of the MLP, which has been designed to benefit both existing and future generations through the provision of a high standard freight management, which will remove significant numbers of freight vehicles from main roads between Port Botany and Moorebank. When completed, the MLP will and provide up to 850,000 m^2 of high specification warehousing where containers can be unpacked before delivery of their contents to their final designations. This is a high growth area for a wide variety of activities. In the absence of any alleviating measures the cumulative effects of congestion would significantly reduce amenity and regional accessibility for local communities.

The *Greater Sydney Region Plan 'A Metropolis of Three Cities'* (Greater Sydney Commission 2018) responds to the future structural challenges for Sydney. With an outlook to 2056, this strategic plan takes a genuine inter-generational perspective. The Plan addresses the needs of the freight and logistics sector and notes that the Moorebank Intermodal Precinct, along with Western Sydney Airport, support and contribute to the momentum for economic growth in the region.

The *NSW Freight and Ports Plan 2018-2023* (TfNSWa 2018) also notes that congestion is driving up freight costs and that management of traffic in key freight areas, including Moorebank, is an essential key to a sustainable traffic future. Currently, about 80% of the freight in Greater Sydney is moved by road. The establishment of intermodals such as Moorebank is critical for increasing the utilisation of the freight rail network, particularly containerised freight.

Infrastructure Australia has estimated that the cost of road congestion in Sydney will rise from $8,038,000 currently to $15,693,000 in 2031 (Australian Infrastructure Audit 2019). A similar analysis prepared by the Grattan Institute (Terrill *et al* 2017) finds that the economic costs of congestion are very large.

The *Australian Infrastructure Audit 2015* (Infrastructure Australia 2015) identified the M5 corridor – the key corridor linking the MLP and Port Botany – as highly economically significant. The delay cost per km in this corridor is projected to be the 10th highest of any corridor in New South Wales in 2031, even after accounting for the duplication of the M5 East as part of WestConnex. The current road network surrounding provides a single point of access to MLP. Accordingly, road network connectivity to Moorebank Intermodal Terminal was added to the Infrastructure Priority List on 17 February 2016 and notes the proposed initiative to upgrade Moorebank Avenue to improve safety and capacity, among other infrastructure improvements (Infrastructure Australia 2016). The upgrade will contribute to the realisation of this priority and will improve road safety and travel efficiency.

The *State Infrastructure Strategy 2018-2038* (Infrastructure NSW 2018) recognises the need for a reliable road network to enable efficient access to the MLP. The strategy references TfNSW's MITRA Strategy as the framework for achieving this. The Project is identified as the 'Moorebank Avenue Realignment option', a key upgrade component in addressing the forecast growth over Liverpool CBD and regional traffic, together with the construction of the MLP (TfNSW 2019). The intergenerational need is highlighted by Clause 7.36 of the Liverpool LEP which acknowledges the proposed development of the intermodal terminal at Moorebank and requires satisfactory arrangements to be put in place for relevant State public infrastructure (including regional roads) before a consent authority can grant development consent. The Liverpool LEP sits within a broader long-term strategic planning framework and has as a function, as set out in the objects of the EP&A Act, to facilitate ESD. The Liverpool LEP clause requiring the provision of public infrastructure in the form of a road demonstrates that the construction of the Moorebank Avenue Realignment serves a publicly agreed and long-term need.

The Project includes the provision of a facilities to maintain or improve safe passage for road users during storm or flood events (generally designed for 10-year annual recurrence interval (ARI)). There is also an objective to maintain or reduce risk and impact to adjacent property resulting from flooding (generally designed for 100-year ARI). This is a key consideration noting the prospect of more severe weather events under climate change in coming decades.

The Project will facilitate use of public and active transport through use of a north-south shared-user path and bus stops along most of the alignment. Additionally, the shared-user path will facilitate access to and from the open space network of Moorebank (Ernie Smith Reserve, Anzac Creek shared path) and Glenfield (Blinman Oval, Trobriand Reserve, Childs Reserve and Lalor Park).

During the construction phase, the Project will generate up to 122 direct and indirect jobs in the local economy.

iii Conservation of biological diversity and ecological integrity

This principle stipulates that biological diversity and ecological integrity should be fundamentally considered when assessing the impacts of a Project.

When the four options for road improvements were considered, there was a biodiversity assessment component based on detailed ecological assessments by Hyder Consulting (2012, 2015) and Parsons Brinkerhoff (2015). The key area representing the greatest potential biodiversity values is the 'Boot Land' of Defence land. The clearing footprint for the Project was considered and impacts were assessed with respect to the area of threatened ecological communities which may be impacted, the number of flora species impacted; and the area of threatened species habitat.

The southern component of the preferred route for realignment consists of a 'dog leg' road configuration in order to avoid impacts on the main cluster of vegetation containing *Grevillea parviflora*. The preferred option for the realignment does result in fragmentation of threatened ecological community (clearing approximately 4.74 ha) however the alternative option of upgrading the existing Moorebank Avenue in its current alignment was not able to facilitate efficient movement within the MLP.

A biodiversity assessment of the existing local environment for the site of the Project has been undertaken to recognise any potential impacts of the Project on local biodiversity. The biodiversity values of the proposed alignment are well understood, as the MPE and surrounding Boot Land have been extensively investigated as part of the previous concept plan and SSD application.

The construction footprint of the Proposal sits largely within the 93 ha parcel known as the Boot Land. The Boot Land is largely vegetated across its extent, with intact remnant vegetation area that is a registered Biobanking Offset site (agreement no. 341) established to meet the offset requirements of the MLP.

The alignment of the Project within the southern portion of the Boot Land has been subject to a refinement process to minimise substantial impacts to high value ecological features particularly to threatened flora species such as *Persoonia nutans*. Additionally, consideration has been given to the sitting of the construction compound and other transient equipment/plant set-down areas as either within the existing MPE site or along the footprint of construction.

Minimisation and mitigation measures to reduce impacts to ecological values will be implemented (refer Section 7.2.4). These measurements include weed management and waste management during construction to minimise risk of introducing weeds and feral animals to the extant Boot Lands.

The CM SEPP applies to the coastal zone which includes the tidal areas of estuaries such as the Georges River. The CM SEPP maps coastal management areas including Coastal Wetlands and Littoral Rainforests Area. There are coastal wetlands mapped at the southern tip of the Boot Land but the proposed road alignment does not interact with those mapped wetlands.

In terms of riparian impacts, water quality objectives for the Project include the maintenance of existing flow regimes, the maintenance or improvement to water quality criteria, and emergency management or spill containment facilities. The design includes three combined water quality and detention basins – one in the northern and two in the southern catchments of the proposed alignment - to capture runoff from impervious surfaces before discharge to Anzac Creek or drainage lines. The management controls for water quality along the length of the proposed alignment include vegetated swales, bioretention basins and spill containment devices. Anzac Creek will be rehabilitated following instream works associated with the construction of the proposed culvert to ensure water flow, though intermittent, remains unimpeded.

Earthworks are proposed as part of the Project including activities such as cut and fill. Locally excavated material will, where possible, be reused onsite for fill and compaction. There is a fill balance deficit (ie more fill required than excavated material generated by the works) and therefore there is an opportunity to apply locally soured ENM or other suitable material, such as tunnel excavation spoil, and diverting that material from landfill.

iv Improved valuation, pricing and incentive mechanisms

Adoption of policy instruments such as improved valuation, pricing and incentive mechanisms, allow development to meet the needs of the present without compromising the ability of future generations to meet their own needs.

This principle requires that costs to the environment are incorporated or internalised in terms of the overall project costs, ensuring that decision making takes into account the environmental impacts.

Economic considerations, such as valuation, pricing and incentives include concepts such as:

- polluter pays and/or beneficiary pays;
- the users of goods and services should pay prices based on the full lifecycle of costs of providing goods and services; and
- environmental goals should be pursued in the most efficient and cost effective way, in order to maximise the benefits and minimise the costs.

Costs and valuation are not limited to market priced items. For road projects the ‘cost’ can be expressed as congestion and time delays for transport trips. In this respect, the upgrade and realignment of Moorebank Avenue avoids a cost of congestion in the absence of the proposed works. Moorebank Avenue would operate at Level of Service E in approximately 2029 based on background traffic projections. The upgrade and realignment are also required to ensure the operational efficiency of the MLP which is currently bisected by Moorebank Avenue as a main thoroughfare.

The upgrade and realignment of the Project is therefore a means of internalising the costs (ie traffic congestion; travel time delays) associated with the development of the MLP and that would otherwise manifest due to background traffic levels.

7.15.3 Management and mitigation measures

The Project will include the implementation of a number of management and mitigation measures (refer Chapter 8), to ensure that ESD principles are integrated into the Project. In addition to those mitigation measures, specific sustainability initiatives will be employed during the construction phase (refer 7.79).

Table 7.83 Management and mitigation measures for sustainability

Aspect/impact	Reference	Mitigation measure
Resource preservation	SUS01	Excavated material will be reused of as much as possible from cut activities associated with the Project.
Resource preservation	SUS02	Recycled materials and sources such as crushed pavement for select fill, fly ash as an additive to concrete production and reclaimed water will be used wherever possible.
Greenhouse gas emissions	SUS03	The Project will explore options for green energy usage for ancillary facilities and measures to minimise greenhouse gas emissions.
Preservation of habitat	SUS04	The removal of trees and the area of disturbance around riparian habitat and waterways will be minimised as far as possible.

7.16 Cumulative impacts

7.16.1 Overview

This section provides an assessment of the potential cumulative impacts that may arise as a result of the construction and operation of the Project. Cumulative impacts are incremental environmental impacts that are caused by past, present or reasonably foreseeable future activities that, when combined, may have a cumulative effect. When considered in isolation, the environmental impacts of any single project upon a receiver may not be significant. However, the potential impacts may increase when individual effects are considered in combination.

7.16.2 Existing environment

As part of the preparation of the EIS, a review of other major projects in South West Sydney that may have the potential to coincide with the delivery of the Project were identified.

In determining which other projects were relevant to the cumulative impact assessment, the following criteria were considered:

- Location – whether the projects are proximate to the Project;
- Timing – whether the projects are likely to be under construction concurrent with the Project; and
- Scale – whether the projects were listed on the DPIE Major Projects or portal of local government approvals registers.

Other major projects in the vicinity of the Project that may coincide with the delivery are identified in Table 7.84.

Table 7.84 Other major projects in the vicinity of the Project

Project and location	Description of proposed works	Status
SIMTA MPE	Refer to Section 1.4.1	Partially under construction, with some early stages in operation.
SIMTA MPW	Refer to Section 1.4.1	Under construction.
TfNSW Glenfield Road Upgrade	Cambridge Avenue is an important future transport corridor providing access to the Moorebank Logistics Park, the Western Sydney Employment Area, Badgerys Creek Airport, and the South West Growth Centre. The Upgrade would facilitate additional traffic movements in the region.	Review of Environmental Factors (REF) under preparation by TfNSW.
Glenfield Waste Services Resource Recovery Facility (RRF)	The expansion of an existing resource recovery facility to accept and process up to 450,000 per annum of non-putrescible waste from construction and demolition, and commercial and industrial sources.	EIS has been exhibited (SSD-6249) in 2016. Glenfield Waste Services is preparing a response to submissions raised during the exhibition period.

7.16.3 Assessment of impacts

i SIMTA MPW and MPE

A number of environmental impact assessments have been carried out for the development of MLP dating back to 2014. These assessments are summarised in Section 1.4.1.

Key potential environmental impacts associated with the development of the MLP site include:

- Traffic – the realignment of Moorebank Avenue was proposed as part of planning approvals for the development of the MLP. In 2030, at the highest forecast levels of activity on site, the Project operational traffic was not predicted to have a significant impact on most of the intersections in the vicinity of Moorebank. Any increase in congestion at these intersections was expected to be offset by the significant wider network benefits, especially around the Sydney Airport/Port Botany area, resulting from the diversion of container traffic from the roads in this area.

- Rail access – the MLP IMEX operation would consist of freight trains travelling between the MLP and Port Botany via the SSFL and the Port Botany Rail Link. The interstate freight transport to and from the Project site would involve a number of major rail lines, including freight rail lines such as the Northern Sydney Freight Corridor and major arterial roads. The Project would have no impact on the public passenger train network.

- Noise and vibration – Noise levels at the assessed receivers were predicted to mostly comply with the adopted construction noise management levels (NMLs). Construction noise management and mitigation measures were proposed to mitigate the potential noise levels at the assessed receivers in Wattle Grove, Casula and North Glenfield to achieve the adopted NMLs. A number of detailed construction noise and vibration management plans have been adopted for operational noise, including source controls, design considerations and ongoing community consultation/complaints management systems and monitoring.

- Air quality – key measures proposed in assessments for the MLP include during construction — best practice measures for dust management, including screening and watering processes (eg of stockpiles/exposed surfaces), avoidance of dust generating activities during dry and windy conditions, and monitoring; and during operation — maintenance and inspection program for all equipment, adoption of cleaner fuel technology when feasible, and ongoing monitoring of air quality.

- Biodiversity – a detailed Biodiversity Offsets Strategy was implemented to offset impacts on threatened species and endangered ecological communities which included the Boot Lands. The MLP approvals include long-term weed removal/riparian vegetation restoration in the Georges River corridor and a number of other measures to minimise impacts on biodiversity during construction and operation.

- Water – previous assessments provided for the implementation of a stormwater treatment system and drainage strategy, incorporating sedimentation and bio-filtration basins upstream of stormwater detention basins.

- Aboriginal heritage – measures were adopted to avoid the development of riparian land adjacent to the Georges River through the establishment of a conservation area (predicted to be of high sensitivity for Aboriginal heritage). An Aboriginal Heritage Interpretation Strategy was developed in consultation with stakeholders, particularly registered Aboriginal parties. Archaeological and surface salvage programs were also carried out. An Unanticipated Discoveries Protocol was adopted during construction. Consultation with registered Aboriginal parties is ongoing through the delivery of the MLP.

- Historic heritage – several investigations, documenting and archiving those deposits identified as having the greatest research potential have been carried out as part of the assessment for the MLP. A European Heritage Interpretation Strategy and a comprehensive salvage program was carried out.

ii TfNSW Glenfield Road Upgrade

As the REF is currently under preparation, it has not been reviewed as part of the preparation of this EIS.

Key impacts of the Project are assumed likely to include biodiversity, bushfire, traffic, noise and vibration, air quality, and flooding, drainage and water quality.

iii Glenfield Waste Services RRF

The expansion of the existing waste facility at Glenfield will likely have the following key environmental impacts associated with the construction and operation of the project, as detailed in the January 2016 EIS:

- Waste management – the nature of the RRF is to reduce the amount of waste sent to landfill resulting in a positive waste management benefit.

- Air quality – having regard to the existing landfill operations, the additional operational area would likely have minimal changes to operational air quality impacts.

- Odour – the Glenfield Waste Services EIS modelled predictions were considerably less than recommended criteria at all receptors. Having regard to the predictions of the modelling, no mitigation measures were proposed to control odour as part of the proposal.

- Soils, geology and contamination – the EIS assessment concluded that the RRF is not expected to have any effect on salinity or acid sulphate soils. A desktop and field assessment indicated that there were no potential contaminants or contamination pathways, and consequently the Project site poses a low risk to human health.

- Hydrology – the EIS concluded that the predicted impact on the nearest receiving waters, the Georges River, will be minimal. The soil and water impact assessment concluded that the RRF is not expected to change the level or frequency of floods, nor is the site to be inundated during the PMF.

- Noise and vibration – following noise modelling, it was proposed to not operate the RRF during the winter morning shoulders (May to August inclusive before 7:00 am) unless monitoring shows that operations can meet the RRF project criteria during temperature inversions.

- Hazard and risk management – a qualitative Level 1 Preliminary Hazard Assessment (PHA) prepared in accordance with State Environmental Planning Policy No 33-Hazardous and Offensive Development found that the RRF does not pose a significant risk.

- Biodiversity – the RRF will impact approximately 9.5 ha of the Cumberland Plain Woodland CEEC and the federally listed Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest CEEC. The removal of the 9.5 ha of Cumberland Plain Woodland is unlikely to affect the extent of the CEEC such that its local occurrence would be placed at risk of extinction. The threatened bats species recorded were Grey-headed Flyingfox, Yellow-bellied Sheathtail-bat, East-coast Freetail-bat, Little Bentwing bat and Eastern Bentwing bat. No other threatened fauna was recorded. A range of compensatory measures are proposed including a biodiversity offset in relation to impacts upon the Cumberland Plain Woodland and nest boxes to offset the loss of tree hollows (which comprise potential habitat for threatened microchiropteran bats).

- Traffic – all inbound access for RRF vehicles will be via the existing access. The RRF will add 350 vehicles movements per day and analysis shows that acceleration and slip lanes will continue to operate effectively, and the western egress at Railway Parade will operate with a high level of service throughout the day. The RRF will have no significant impact on the operation of intersections through the local road network, all of which are capable of operating at a good level of service through to 2024.
- Heritage – two Aboriginal artefacts of low significance were identified within the RRF construction footprint. Past land uses caused significant land disturbance and so significantly reduced the likelihood of additional sites surviving intact.

iv Conclusion

Consideration of cumulative impacts were inherently addressed as part of the detailed modelling for several technical assessments including traffic and transport (Section 7.4), noise and vibration (Section 7.5), air quality (Section 7.10), and visual and landscape character (Section 7.12).

Having regard to the likely impacts of the other major projects located in the vicinity of the Project that may coincide with the delivery of the Project, the potential for cumulative impacts are low.

7.16.4 Management and mitigation measures

The Project will implement the mitigation measure to manage cumulative impacts of the Project in Table 7.85.

Table 7.85 Management and mitigation measures for cumulative impacts

Aspect/impact	Reference	Mitigation measure
Consultation with other major projects	CUM01	SIMTA will liaise with the relevant project manager of major projects in the vicinity of the Project to coordinate disruptive activities (eg tie in works on the existing Moorebank Avenue) to minimise cumulative impacts.

8 Management and mitigation measures

This chapter collates the environmental management measures identified throughout this EIS. The environmental management measures for the Project are summarised in Table 8.1. This table identifies:

- environmental issues that the management measures are addressing;
- actions that SIMTA will undertake to achieve the environmental outcomes, with each action assigned a number for future cross reference; and
- timing for implementation of the action.

These environmental management measures may be revised in response to public submissions on this EIS and/or design changes, during the detailed design phase, or to improve environmental outcomes.

8.1 Environmental management

The Project's construction contractor will be required to have an Environmental Management System (EMS) in accordance with the requirements of the Environmental Management Systems Guidelines (NSW Government 1998). A CEMP is to be prepared by each contractor and will identify measures to be implemented to minimise environmental impacts. The CEMP will be required to include:

- roles and responsibilities for planning, approval, implementation, assessment and monitoring of environmental controls;
- required licences, approvals and permits;
- environmental legislation that will be required to be complied with;
- potential environmental impacts resulting from construction of the proposed upgrade and the control and mitigation measures to be implemented;
- objectives and targets for environmental performance;
- environmental monitoring programs and a mechanism for evaluating environmental performance;
- communication procedures;
- document control procedures;
- emergency response procedures to mitigate potential environmental damage;
- training, competence and awareness assessment procedures and programs; and
- an environmental auditing program and a mechanism for control and management of nonconformances.

The CEMP would provide specific information in particular areas of environmental management, either by way of direct reference or by environmental management sub-plans.

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Biodiversity				
Ongoing management and maintenance of biodiversity protection measures	BIO01	A biodiversity management plan (BMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The BMP plan will provide details for the ongoing management and maintenance of biodiversity protection measures during the construction phase of the Project.	Pre-construction	Section 7.2
Location of road and associated work compounds	BIO02	Work compounds, temporary laydown and stockpile areas will be located within the existing MPE construction site and/or within the road construction footprint.	Construction	Section 7.2
Location of road and associated work compounds	BIO03	Survey and fencing of the Biobanking site boundary to be the first works completed. The construction footprint avoids direct impacts on the Biobanking site, to ensure this the inclusion of details about the Biobanking site boundary, and the importance of avoiding impacts within these lands as part of worker induction program.	Construction	Section 7.2
Location of road and associated work compounds	BIO04	Use of the existing road network to minimise requirement for removal of native vegetation, minimising fragmentation to existing areas.	Construction	Section 7.2
Location of road and associated work compounds	BIO05	Minimisation of clearing during construction, wherever possible.	Design development	Section 7.2
Location of road and associated work compounds	BIO06	Detailed design will seek to minimise changes to runoff regimes that may impact Anzac Creek and the natural drainage lines that flow into Boot Land.	Construction	Section 7.2
Location of road and associated work compounds	BIO07	Sediment controls will be developed and implemented at Anzac Creek crossing.	Design development	Section 7.2
Removal of native vegetation and threatened species habitat	BIO08	Exclusion zones will be established around retained vegetation, including fencing and signage.	Construction	Section 7.2
Removal of native vegetation and threatened species habitat.	BIO09	Pre-clearing surveys will be conducted prior to clearing, including translocation of fauna into areas of retained vegetation.	Pre-construction	Section 7.2
Removal of native vegetation and threatened species habitat.	BIO10	Vegetation clearing will be undertaken in accordance with the two-stage process.	Pre-construction	Section 7.2
Removal of native vegetation and threatened species habitat.	BIO11	Hollows logs and limbs will be retained for placement within the Biobanking site retained vegetation.	Pre-construction	Section 7.2
Increase in weeds and pathogens	BIO12	Weed control prior to construction works will be undertaken, where possible.	Pre-construction	Section 7.2
Increase in weeds and pathogens	BIO13	Weeds will be actively controlled in areas where significant weeds occur.	Pre-construction	Section 7.2

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Increase in weeds and pathogens	BIO14	Construction of wash-down stations at a suitable location.	Construction	Section 7.2
Increase in weeds and pathogens	BIO15	Re-vegetation of cleared areas as quickly as possible following construction.	Operation	Section 7.2
Increase in weeds and pathogens	BIO16	Screening of water that is used for dust suppression.	Construction	Section 7.2
Increase in weeds and pathogens	BIO17	Appropriate disposal and management of weeds during clearing works.	Construction	Section 7.2
Increase in predatory and pest species.	BIO18	Waste to be stored appropriately in inaccessible bins and disposed off-site.	Construction	Section 7.2
Increase in predatory and pest species.	BIO19	No waste will be left outside in open areas accessible to feral animals.	Construction	Section 7.2
Light, vibration and noise pollution	BIO20	Use of directional lighting to retain lighting within works area and road alignment and to minimise light spill as much as possible.	Construction	Section 7.2
Changes to runoff regimes and sedimentation	BIO21	Siting of infrastructure away from sensitive receiving environments such as Anzac Creek.	Construction	Section 7.2
Changes to runoff regimes and sedimentation	BIO22	Use of natural erosion controls incorporating organic materials, micro water capture and contour shaping.	Construction	Section 7.2
Changes to runoff regimes and sedimentation	BIO23	Diversion of clean water around construction areas, rather than through them.	Construction	Section 7.2
Changes to runoff regimes and sedimentation	BIO24	Stabilisation and rehabilitation of works areas as soon as practicable.	Construction	Section 7.2
Changes to runoff regimes and sedimentation	BIO25	Siting of sediment basins to manage run-off from construction areas and use of captured water for dust suppression.	Construction	Section 7.2
Changes to runoff regimes and sedimentation	BIO26	Management of sedimentation via sediment and erosion control plans for the entire construction footprint.	Construction	Section 7.2
Fragmentation	BIO27	Incorporating the construction of a dry culvert allowing for local fauna populations to pass between fragmented areas ensuring all available habitats are accessible during all types of weather events. Construction of fauna fencing to guide fauna towards the culvert entrances to maximise the effectiveness of the culvert.	Design development	Section 7.2

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Fragmentation	BIO28	Incorporation of culverts within Anzac Creek to provide some connectivity between the areas either side of the project. Mostly smaller mammals, frogs and reptiles will be able to utilise the culverts, mostly in dry conditions when water flow is minimal.	Design development	Section 7.2
Fragmentation	BIO29	To mitigate the risk of fauna vehicle mortality during construction a driver's code of conduct is to be prepared and implemented, with a recommended maximum speed limit of 40 km per hr within Boot Land in the morning period (prior to 7 am and after 5 pm).	Pre-construction	Section 7.2
Bushfire				
Ongoing management and maintenance of bushfire protection measures	BUS01	A BFMP will be developed for the Project post-approval and will be encompassed within the CEMP. BFMP will provide details for the ongoing management and maintenance of bushfire protection measures during the construction phase of the Project, and will encompass the provisions outlined within Section 3.4 to Section 3.8 of the BFHA (Appendix C) including: • APZ locations and management details (if required); • access provisions such as access locations and alternative emergency access; • management of potential ignition sources; • landscaping requirements including indicative design layout and vegetation density thresholds; • water supplies (eg static water supple, location of hydrants etc); • details regarding bushfire emergency management procedures (refer BHF26); and • any other essential bushfire safety requirements.	Pre-construction	Section 7.3
Bushfire risk to assets	BUS02	Where temporary construction compounds as well as temporary stockpile and laydown areas require access roads, on-site parking, and hardstand/loading areas, these facilities will be located in the most appropriate location in order to establish defendable space for fire-fighting purposes, as well as to mitigate the potential for ignition of surrounding bushland from project sources.	Construction	Section 7.3
Bushfire risk to assets	BUS03	Temporary construction buildings will also have fully compliant fire safety systems in accordance with AS and National Construction Code requirements and as appropriate to the building type, including some or all of the following features: • fire extinguishers; • fire hose reels; • fire hydrant systems; and • automatic sprinkler systems.	Construction	Section 7.3

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Bushfire risk to assets	BUS04	Temporary construction compound will be constructed and routinely serviced to comply with the specific requirements, as relevant to the structure type.	Construction	Section 7.3
Bushfire risk to assets	BUS05	Road furniture (eg safety barriers, kerbs, fencing, signposting, bus facilities), line marking and lighting will be designed in accordance TfNSW standards and guidelines, as well as in accordance with the relevant AS.	Design development	Section 7.3
Responder access	BUS06	Consultation with RFS and Fire and Rescue NSW (FRNSW) will be undertaken during construction to ensure emergency access is maintained during and after construction.	Construction	Section 7.3
Responder access	BUS07	All site offices will be accessible via access roads suitable for firefighting appliances similar to NSW RFS category 1 tankers.	Construction	Section 7.3
Responder access	BUS08	All access roads and tracks must be inspected annually and management actions undertaken if roads and tracks are considered unsuitable for emergency vehicle passage (inspect for erosion, fallen timber, locked gates, and dead end tracks). Where locked gates are required, keys will be provided to RFS and FRNSW (if required).	Construction	Section 7.3
Responder access	BUS09	Gates will be kept in good condition for entry and exit of fire fighting vehicles.	Construction	Section 7.3
Responder access	BUS10	Ongoing maintenance to ensure a minimum 4 m vertical clearance through the removal of overhanging branches or objects that would prevent access within the Project site.	Construction	Section 7.3
Responder access	BUS11	All pumps and water sources will be maintained in working order, clearly marked and easy to find.	Construction	Section 7.3
Responder access	BUS12	All fittings will be compatible with RFS and FRNSW fire trucks.	Construction	Section 7.3
Responder access	BUS13	Security clearances, communication and access arrangements will be kept updated and confirmed with RFS and FRNSW in readiness for upcoming season.	Construction	Section 7.3
Responder access	BUS14	APZs and/or defendable space will be kept free of obstacles to provide access for RFS and FRNSW fire-fighting appliances and personnel.	Construction	Section 7.3
Potential ignition source	BUS15	Diesel generators and associated fuel storage tanks will be designed, housed, and maintained so as not serve as an unacceptable risk to surrounding forest. Diesel generators and associated fuel storage tanks will be located away from the hazard, wherever possible.	Construction	Section 7.3
Potential ignition source	BUS16	Hazardous materials will be located away from the hazard wherever possible.	Construction	Section 7.3
Potential ignition source	BUS17	Equipment will be maintained in good working order.	Construction	Section 7.3
Potential ignition source	BUS18	Plant and equipment will be fitted with appropriate spark arrestors, where practical, and limiting vehicle movement over long grass.	Construction	Section 7.3
Potential ignition source	BUS19	All vehicles will be provided with portable fire extinguishers that comply with relevant AS.	Construction	Section 7.3

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Potential ignition source	BUS20	Site staff will be informed of the site rules included designated smoking areas and putting rubbish in designated bins.	Construction	Section 7.3
Potential ignition source	BUS21	Hot work permits will be obtained where required and no hot works on total fire bans and/or conditions associated with severe fire weather.	Construction	Section 7.3
Potential ignition source	BUS22	Adequate storage and handling requirements for potentially flammable substances in accordance with relevant guidelines.	Construction	Section 7.3
Potential ignition source	BUS23	Emergency services will be immediately notified of the location and nature of any accidental ignition of surrounding vegetation and/or structures, that was unable to be successfully extinguished.	Construction	Section 7.3
Potential ignition source	BUS24	The Project will assist RFS/FRNSW in the investigation of the cause of any unplanned fires in proximity to the Project, should they occur.	Construction	Section 7.3
Potential ignition source	BUS25	The contractor will appropriately design landscape treatments along the road corridor to reduce potential fuel risk, including use of low combustibility vegetation and regular maintenance (through slashing) and in accordance with TfNSW guidelines and relevant AS.	Design development	Section 7.3
Location and adequacy of services	BUS26	The temporary construction compound will be constructed and routinely serviced to comply with the specific requirements, as relevant to the structure type and to be determined by the contractor at the detailed design stage.	Construction	Section 7.3
Location and adequacy of services	BUS27	The road alignment will be designed in accordance with TfNSW standards and guidelines, as well as in accordance with AS (refer to Chapter 2 of the EIS), which will include the provisions of fire hydrants.	Design development	Section 7.3
Construction emergency management	BUS28	Where applicable and as suitable for the scale and size of the development type, emergency management procedures will be developed for the construction phase of the Project, in line with the requirements and approach of: • *A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan* (NSW RFS 2014); and • Australian Standard 3745-2010 *Planning for emergencies in facilities* (Standards Australia 2010).	Construction	Section 7.3
Construction emergency management	BUS29	Emergency management procedures will be reviewed after incidents of bushfire or other fires as well as annually at the end of each bushfire season and amended, if required, to improve the effectiveness of the plan.	Construction	Section 7.3
Construction emergency management	BUS30	Bushfire awareness training/induction will be provided to all new staff members and contractors, prior to and during the bushfire season for bushfire specific awareness and regularly for other fire awareness (eg structure fire and ignition sources).	Construction	Section 7.3

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Construction emergency management	BUS31	Details of requirements for pre-season fire drills will be provided during staff briefings.	Construction	Section 7.3
Construction emergency management	BUS32	Formal meetings will be conducted with relevant stakeholders prior to the bushfire season, when higher fire weather is forecast or there are fire events in the surrounding area. Potential participants to include staff, contractors, neighbouring community representatives and external fire authorities and land managers (eg RFS and FRNSW).	Construction	Section 7.3
Construction emergency management	BUS33	Fire weather warnings, severe weather warnings and total fire bans will be communicated daily during the bushfire danger season to all staff, contractors, and visitors at the Project. Information can be found on the fire information page (Fire danger ratings and total fire bans) of the RFS website.	Construction	Section 7.3
Construction emergency management	BUS34	The recognition of very high or greater fire danger days triggering will be used as a requirement to view the fire information page (Fires Near Me, Major fire updates) on the RFS website (NSW RFS 2020).	Construction	Section 7.3
Construction emergency management	BUS35	Staff, contractors, and visitors will be made aware of and required to respond accordingly to the three levels of alert under the national bushfire warning system (Advice, Watch and Alert, Emergency Warning).	Construction	Section 7.3
Traffic and transport				
Ongoing management and maintenance of bushfire protection measures	TRA01	A transport and traffic management plan (TTMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The TTMP will provide details for the ongoing management and maintenance of traffic management and mitigation measures during the construction phase of the Project.	Pre-construction	Section 7.4
Traffic control	TRA02	Prior to the commencement of construction, traffic control plans (TCPs) will be developed and will be encompassed within the traffic management plan. TCPs shall be developed in accordance with the AS and the RMS *Traffic Control at Work Sites Manual - Version 5* (RMS 2018).	Pre-construction	Section 7.4
Traffic control	TRA03	All traffic controllers engaged on-site will be accredited by TfNSW, and act in accordance with TfNSW Standard Conditions, including: • no stopping of traffic on public streets; and • no stopping of pedestrians in anticipation of truck movements. Pedestrians may only be held for short periods, for their safety, whilst a truck is entering or leaving the site.	Construction	Section 7.4
Traffic control	TRA04	No marshalling or queuing of trucks will be permitted on the public road.	Construction	Section 7.4
Licencing	TRA05	A Road Occupancy Licence application will be submitted to the Transport Management Centre for approval prior to any road closures.	Construction	Section 7.4

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Road safety	TRA06	Safety barriers will be installed for the sections of the new route which is closest to the new terminal rail line to prevent any chance of a vehicle on the new road losing control and crashing onto the rail track below.	Construction	Section 7.4
Noise and vibration				
Ongoing management and maintenance of noise and vibration measures	NVI01	A noise and vibration management plan (NVMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The NVMP will provide details for the ongoing management and maintenance of noise and vibration management and mitigation measures during the construction phase of the Project.	Pre-construction	Section 7.5
Work practices	NVI02	The Project will regularly reinforce (such as at toolbox talks) the need to minimise noise and vibration.	Construction	Section 7.5
Work practices	NVI03	The Project will review and implement feasible and reasonable mitigation measures that reduce construction noise levels.	Construction	Section 7.5
Work practices	NVI04	Avoidance of portable radio use, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents.	Construction	Section 7.5
Work practices	NVI05	Routes for the delivery of materials and parking of vehicles to minimise noise will be used, where feasible.	Construction	Section 7.5
Work practices	NVI06	Where possible, the Project will avoid the use of equipment that generates impulsive noise.	Construction	Section 7.5
Work practices	NVI07	Residents will be notified prior to the commencement of intensive works.	Construction	Section 7.5
Plant and equipment	NVI08	Where possible, quieter plant and equipment will be used based on the optimal power and size to most efficiently perform the required tasks.	Construction	Section 7.5
Plant and equipment	NVI09	Plant and equipment will be operated in the quietest and most efficient manner.	Construction	Section 7.5
Plant and equipment	NVI10	Regular inspection and maintenance of plant and equipment will be undertaken to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.	Construction	Section 7.5
Contamination				
Ongoing management and maintenance of contamination measures	CON01	A Contamination Management Plan (CMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The CMP will provide details for the ongoing management and maintenance of contamination management and mitigation measures during the construction phase of the Project.	Pre-construction	Section 7.6
Stockpiled materials	CON02	Classification and appropriate removal/disposal of the stockpiled materials observed in and around the southern portion of the Project site.	Construction	Section 7.6
Exploded ordnance	CON03	A clearance survey and removal of EOW observed in and around the southern portion of the Project site.	Construction	Section 7.6

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Soil and sediments	CON04	Targeted investigation of any areas of soil/sediment disturbance proposed as part of the development (ie assessment of soils/sediments required to be excavated to assess waste classification or re-use suitability)	Construction	Section 7.6
Unexpected finds	CON05	Preparation of an Unexpected Finds Protocol to be encompassed within the CEMP.	Construction	Section 7.6
Acid sulfate soils	CON06	An acid sulfate soil monitoring program will be developed for the Project and encompassed within the CMP and will be maintained during construction.	Construction	Section 7.6
Water				
Ongoing management and maintenance of water measures	WAR01	A Water Management Plan (WMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The WMP will provide details for the ongoing management and maintenance of water management and mitigation measures during the construction phase of the Project.	Pre-construction	Section 7.7
Construction water impacts	WAR02	A Soil and Water Management Plan (SWMP) will be prepared in accordance with Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004) for the construction phase of the Project and will be encompassed within the CEMP.	Pre-construction	Section 7.7
Construction water impacts	WAR03	A surface water monitoring program for the construction phase of the Project will be developed as part of the SWMP. Monitoring locations will target discharge locations such as temporary sediment basins and receiving waters.	Construction	Section 7.7
Construction water impacts	WAR04	An Erosion and Sediment Control Plan (ESCP) will be prepared in accordance with Managing Urban Stormwater: Soils and Construction – Volume 1 (Landcom 2004) for the construction phase of the Project.	Pre-construction	Section 7.7
Operational water impacts	WAR05	Implementation of diversion channels and drains will be constructed to divert water around the Project site for up to the 10-year ARI design storm event.	Construction	Section 7.7
Operational water impacts	WAR06	Bioretention basins are proposed to attenuate stormwater runoff from the Project site for up to the 100-year ARI design storm event.	Construction	Section 7.7
Operational water impacts	WAR07	Bioretention basins will include bioretention systems to achieve pollutant reduction targets and provide spill containment.	Construction	Section 7.7
Operational water impacts	WAR08	Longitudinal and transverse drainage will be in accordance with design criteria set out in best practice guidelines and have minimal impact on peak discharge and afflux effects.	Construction	Section 7.7
Operational water impacts	WAR09	Scour protection will be provided to reduce erosion and sedimentation at stormwater discharge outlets for up to the 50-year ARI design storm event.	Construction	Section 7.7

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Operational water impacts	WAR10	Where areas of the Project site is constrained at tie-ins to existing roads (eg areas where the terrain is flat, and levels limit the use of some water management measures). At these areas, where practical, alternative water management measures will be implemented.	Construction	Section 7.7
Flooding	WAR11	A flood emergency response and evacuation plan or equivalent will be prepared and implemented for the construction phase of the Project to minimise hazard to construction personnel, construction plant/equipment and downstream watercourses.	Construction	Section 7.7
Historic heritage				
Ongoing management and maintenance of historic heritage measures	HIH01	A historic heritage management plan (HHMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The HHMP will provide details for the ongoing management and maintenance of historic heritage management and mitigation measures during the construction phase of the Project.	Pre-construction	Section 7.8
Unexpected finds	HIH02	If unanticipated finds, including potential relics, is found during Project activities, work in the vicinity (ie within 10 m) will cease until an assessment of the find is made by an archaeologist. An Unexpected Finds Protocol will be developed for the Project and encompassed within the CEMP.	Construction	Section 7.8
Human remains	HIH03	Where human remains (including skeletal material) are found work will halt, and the remains will not be tampered with. The police and coroner will be contacted for investigation, which may include the involvement of Heritage NSW and advice from a physical anthropologist.	Construction	Section 7.8
Viewshed from Glenfield Farm	HIH04	Where possible, trees that provide visual shielding to Glenfield Farm will be retained to minimise visual impacts to viewsheds from the farm, particularly in the southern sector where the Project would traverse vegetated land.	Construction	Section 7.8

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Aboriginal heritage				
Ongoing management and maintenance of Aboriginal heritage measures	ABH01	An Aboriginal heritage management plan (AHMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The AHMP will provide details for the ongoing management and maintenance of Aboriginal heritage management and mitigation measures during the construction phase of the Project. The AHMP is to include details of: • the process, timing, and communication methods for maintaining Aboriginal community consultation and participation through the Project; • the procedure for identifying and managing any culturally modified trees and/or vegetation with cultural values; • the methods of any additional investigative and/or mitigative archaeological actions that may be required prior to works commencing or during the Project (eg inductions for personnel and subcontractors); • the methods for undertaking further Aboriginal heritage assessment, investigation and mitigation of any areas of the Project site that have changed following completion of the preliminary Aboriginal heritage assessment and/or during the final design and construction phases of the Project; • the methods of post-excavation analysis and reporting of any archaeological investigations and activities implemented as part of the AHMP; • the procedure for managing the unexpected discovery of Aboriginal objects, site and/or human remains; • the procedure for curation and long-term management of cultural materials recovered as part of the works outlined in the AHMP; and • the process for reviewing, monitoring, and updating the AHMP as the Project progresses.	Construction	Section 7.9
Cultural landscape	ABH02	The CEMP (or equivalent) will include the consideration of the cultural landscape throughout the Project and as part of the rehabilitation of the study area.	Construction	Section 7.9
Consultation with Aboriginal stakeholders	ABH03	Consultation with Aboriginal stakeholder will be maintained during the finalisation of the assessment process and throughout the Project	Construction	Section 7.9
Consultation with Aboriginal stakeholders	ABH04	A copy of the PAHA will be lodged with AHIMS and be provided to each of the Aboriginal stakeholders.	Construction	Section 7.9
AHIMS site recording	ABH05	Site Recording Forms for the newly identified Aboriginal objects and/or sites within the study area will be submitted to the AHIMS database.	Construction	Section 7.9
Staff and contractor briefing	ABH06	So as to avoid inadvertent impact prior to the establishment of an Aboriginal heritage management plan, personnel and contractors involved in the Project will be advised of the heritage considerations, legislative requirements, and recommendations of the PAHA.	Construction	Section 7.9

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Air quality				
Ongoing management and maintenance of air quality measures	AIR01	An air quality management plan (AQMP) will be developed for the Project post-approval and will be encompassed within the CEMP. The AQMP will provide details for the ongoing management and maintenance of air quality management and mitigation measures during the construction phase of the Project.	Pre-construction	Section 7.10
Complaint management	AIR02	Prior to commencement of construction activities, the Project will develop appropriate communications to notify the potentially impacted residences of the Project (duration, types of works, etc), relevant contact details for environmental complaints reporting.	Pre-construction	Section 7.10
Complaint management	AIR03	A complaints logbook will be maintained throughout the construction phase which should include any complaints related to dust. Where a dust complaint is received, the details of the response actions to the complaint should be detailed in the logbook.	Construction	Section 7.10
Incident recording	AIR04	The Project will record any exceptional incidents that cause dust and/or air emissions, either on or off site, and the action taken to resolve the situation in the logbook.	Construction	Section 7.10
Dust management	AIR05	The Project will hold regular meetings with the operators of other high-risk construction sites within 500 m of the Project site boundary (if applicable) to ensure that cumulative particulate matter emissions are minimised.	Construction	Section 7.10
Site inspections	AIR06	Regular site inspections will be undertaken with results recorded within a logbook.	Construction	Section 7.10
Dust management	AIR07	Shade cloth barriers to site fences will be erected around potentially dusty activities such as trench excavations and material stockpiles where practicable.	Construction	Section 7.10
Dust management	AIR08	Site fencing and barriers will be kept clean using wet methods.	Construction	Section 7.10
Dust management	AIR09	A maximum-speed-limit of 20 km/h on all internal roads and work areas during construction will be implemented.	Construction	Section 7.10
Dust management	AIR10	Proper maintenance and tuning of all equipment engines will be undertaken.	Construction	Section 7.10
Dust management	AIR11	Water carts will be deployed to ensure that exposed areas and topsoils/subsoil are kept moist.	Construction	Section 7.10
Dust management	AIR12	Adequate water supply on the construction site will be provided for effective dust/particulate matter suppression/mitigation.	Construction	Section 7.10
Dust management	AIR13	Working practices will be modified to limit clearing, stripping and spoil handling during periods of adverse weather (hot, dry and windy conditions) and when dust is seen leaving the Project site.	Construction	Section 7.10
Dust management	AIR14	The extent of clearing of vegetation and topsoil will be limited to the designated footprint required for construction and appropriate staging of any clearing.	Construction	Section 7.10

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Dust management	AIR15	Drop heights from loading or handling equipment will be minimised.	Construction	Section 7.10
Dust management	AIR16	Revegetation of earthworks and exposed areas/soil stockpiles to stabilise surfaces will be undertaken as soon as practicable.	Construction	Section 7.10
Dust management	AIR17	Water-assisted dust sweeper(s) will be utilised to remove, as necessary, any material tracked out of the Project site.	Construction	Section 7.10
Dust management	AIR18	Dry sweeping of large areas will be avoided.	Construction	Section 7.10
Vehicle emissions	AIR19	Trips and trip distances will be controlled and reduced where possible, for example by coordinating delivery and removal of materials to avoid unnecessary trips.	Construction	Section 7.10
Dust management	AIR20	All trucks delivering fill or leaving the Project site with spoil material will have their load covered.	Construction	Section 7.10
Site inspections	AIR21	Daily on-site and off-site inspections, where receptors are nearby, will be undertaken to monitor dust. The inspection results will be recorded in a specific log. Inspections will include regular dust soiling checks of surfaces such as street furniture and cars.	Construction	Section 7.10
Site monitoring	AIR22	At the commencement of each day's activities, the local meteorological forecast will be reviewed, including the timing of notable increases in wind speed and/or temperature. Appropriate increased intensity or additional mitigation measures will be planned for the day based on this forecast review. The likely meteorological conditions and implications for dust emissions and impacts will be discussed at the morning toolbox meeting.	Construction	Section 7.10
Site inspections	AIR23	Site inspections will occur at increased frequencies when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. Should notable visual dust emissions be observed leaving the Project site, increased intensity or additional mitigation measures will be deployed.	Construction	Section 7.10
Operational emissions	AIR24	Policies will be implemented which aim to minimise emissions from the vehicles visiting the Project, such as queue management, and restrictions on idling and the use of auxiliary equipment	Operation	Section 7.10
Social				
Ongoing management and maintenance of social measures	SOC01	Implementation of a monitoring and management framework to ensure that the identified positive and negative impacts are monitored over time to measure the effectiveness or otherwise of the proposed management measures	Pre-construction	Section 7.11
Livelihood benefits from employment of local residents	SOC02	Implementation of a local participation strategy and plan as a part of the construction strategy.	Pre-construction	Section 7.11

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Physical and mental health benefits due to promotion of exercise	SOC03	Provision of signage which provides informative and motivating messaging about physical activity.	Design development	Section 7.11
Increased economic activity from industry procurement and use of local retail and food outlets	SOC04	Continued use of local procurement mechanisms.	Construction	Section 7.11
Visual impact and landscape character				
Project design	VIS01	Wherever feasible, ancillary sites will be located where they would have least visual impact.	Design development	Section 7.12
Structures	VIS02	Detailed design of structural elements, including noise barriers, retaining walls and retaining wall finishes, will be in accordance with Beyond the Pavement, urban design policy, procedure and design principles (Roads and Maritime, 2013) and the associated design guidelines.	Design development	Section 7.12
Structures	VIS03	Consideration to the design of the new retaining walls will be given in order to minimise the apparent height of the walls, including planting to the base of the wall and terracing.	Design development	Section 7.12
Structures	VIS04	New retaining walls will be designed to have a finish that relates to the character of the surrounding landscape.	Design development	Section 7.12
Drainage	VIS05	Where there is sufficient space, operational water quality devices will be designed with consideration of reducing visual impacts.	Design development	Section 7.12
Lighting	VIS06	The design of temporary and permanent lighting will be undertaken in accordance with AS 1158.1- 1986 and would avoid unnecessary light spill on adjacent residents or sensitive receivers.	Design development	Section 7.12
Landscape Implementation	VIS07	The removal of existing vegetation within the road corridor will be minimised.	Construction	Section 7.12
Landscape Implementation	VIS08	The potential for planting of shrub species in medians and verges will be considered in detailed design, where the width of the median allows, taking into account clear zone requirements for headlight glare screening.	Construction	Section 7.12
Landscape Implementation	VIS09	Screen planting will be provided where feasible to proposed retaining walls to screen the Project from sensitive adjacent land uses where applicable.	Construction	Section 7.12

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Waste and resource management				
Inappropriate handling and/or disposal of waste	WAS01	A CWRMP will be prepared for the Project and encompassed within the CEMP. The CWRMP will outline appropriate management procedures and include, but not be limited to: • identification of the waste types and volumes that are likely to be generated by the Project; • adherence to the waste minimisation hierarchy principles of avoid/reduce/reuse/recycle/ dispose; • waste management procedures to manage the handling and disposal of waste, including unsuitable material or unexpected waste Volumes; and identification of reporting requirements and procedures for tracking of waste types and quantities.	Pre-construction	Section 7.13
Inappropriate handling and/or disposal of waste	WAS02	A Spoil Management Plan (SMP) will be prepared for the Project as part of the construction waste and resource management plan. The SMP will outline appropriate management procedures for the generation and importation of spoil. It will include, but not be limited to: • procedures for classification of spoil; • identification of spoil reuse measures; • spoil stockpile management procedures; • spoil haulage routes; • spoil disposal and reuse locations; and • imported spoil sources and volumes.	Construction	Section 7.13
Unexpected waste volumes and types during construction	WAS03	Suitable areas will be identified to allow for contingency management of unexpected waste materials, including contaminated materials. Suitable areas will be required to be hardstand or lined areas that are appropriately stabilised and bunded, with sufficient area for stockpile storage.	Construction	Section 7.13
Sustainability				
Resource preservation	SUS01	Excavated material will be reused of as much as possible from cut activities associated with the Project.	Construction	Section 7.15
Resource preservation	SUS02	Recycled materials and sources such as crushed pavement for select fill, fly ash as an additive to concrete production and reclaimed water will be used wherever possible.	Construction	Section 7.15
Greenhouse gas emissions	SUS03	The Project will explore options for green energy usage for ancillary facilities and measures to minimise greenhouse gas emissions.	Construction	Section 7.15
Preservation of habitat	SUS04	The removal of trees and the area of disturbance around riparian habitat and waterways will be minimised as far as possible.	Construction	Section 7.15

Table 8.1 Summary of mitigation measures

Aspect/impact	Reference	Mitigation measure	Timing	Relevant section
Cumulative impacts				
Consultation with other major projects	CUM01	SIMTA will liaise with the relevant project manager of major projects in the vicinity of the Project to coordinate disruptive activities (e.g. tie in works on the existing Moorebank Avenue) to minimise cumulative impacts.	Construction	Section 7.16

8.2 Statement of outcomes

Implementation of the management and mitigation described in Chapter 7 and summarised in Table 8.1 are deemed appropriate to achieve desired outcomes for the Project. Key issues and the associated outcomes after implementation of management and mitigation measures are described in Table 8.2.

Table 8.2 Statement of outcomes for each key issue

Key issue	Statement of outcomes
Impacts to biodiversity values	The focus of design and operation selection has been to minimise and avoid, where feasible impacts to high biodiversity values. A suite of management and mitigation measures will be implemented to minimise residual impacts associated with the Project, these include measures to avoid unnecessary vegetation clearing, to minimise indirect impacts to extant biodiversity values and to incorporate design elements to reduce the extent of fragmentation. Notwithstanding these measures, impacts to biodiversity values would require offsetting in accordance with the BAM. A total of 189 ecosystem credits and 876 species credits are required to offset the residual impacts of the Project. Construction of the Project will be appropriately managed by a BMP to provide details for the ongoing management and maintenance of biodiversity protection measures.
Bushfire risk	Construction of the Project would be appropriately managed by a BFMP to provide details for the ongoing management and maintenance of bushfire protection measures during the construction phase of the Project.
Impacts to network performance	Construction for the Project would not result in changes to the LOS for key surrounding intersections and is unlikely to be noticeable by road users. The existing non-compliance of mid-block capacity of Moorebank Avenue is not expected to have any significant impact on construction traffic. The Project would not impact on public transport services and Moorebank Avenue would remain publicly accessible for pedestrians and cyclists throughout construction of the Project. The section of Moorebank Avenue to be realigned would extend typical journey times by up to 78.9 seconds owing to the additional travel distance (an additional 1 km) while still maintaining a posted speed limit of 60km/hr. Construction of the Project would be appropriately managed by a TTMP, Traffic Control Plans and traffic controllers.
Noise and vibration impacts	Predicted construction noise levels satisfy NMLs at nearby commercial and industrial assessment location, however, could be exceeded at residential assessment locations to the east of the works, however would be limited to phase 2 construction works only. There are no buildings, sensitive structures or heritage items identified within the safe working distances for cosmetic damage or human response from construction vibration. Vibration impacts at residential assessment locations are highly unlikely given setback distances. The Project is predicted to increase road traffic noise levels at residential areas to the east, however it would be less than the recommended RNP criteria for 2024 and 2034 build scenarios. Management and mitigation measures have been recommended and would be implemented to limit, so far as practically possible, impacts to surrounding users. Construction of the Project will be appropriately managed by a NVMP to provide details for the ongoing management and maintenance of noise and vibration management and mitigation measures during the construction phase of the Project.

Table 8.2 Statement of outcomes for each key issue

Key issue	Statement of outcomes
Contamination risk	Construction of the project will be guided by a CMP to provide details for the ongoing management and maintenance of contamination management during the construction phase of the Project.
Impacts to water, hydrology and flooding	During construction impacts to flow regime, streamflow volume and discharge rates are predicted to occur due to removal of vegetation and establishment of engineered surfaces such as roads and hardstand areas. Potential changes to watercourse geomorphology could occur in the form of altered bed and bank conditions due to changes in streamflow characteristics. Management and mitigation measures will be implemented to minimise, so far as possible impacts to water quality in the form of increased loads of suspended solids, nutrients, and metals in runoff, accidental leaks and spills and instream works. Groundwater interception during the installation of culverts within Anzac Creek is not anticipated. Water management infrastructure will function during operation of the project to minimise impacts to hydrology and water quality. For the 100-year ARI flood event, changes in peak flood level are minor and do not affect existing development. Localised increases in peak flood level reach a maximum of about 230 mm outside the road corridor. This affects bushland area with no development potential nor environmental value that would be materially affected. No material changes to flood extent are predicted to occur upstream of the Project. However, inundation depths are generally expected to decrease for the 20-year and 100-year ARI flood events and increase for the 500-year ARI and PMF events. Construction of the Project will be appropriately managed by a WMP to provide details for the ongoing management and maintenance of water management and mitigation measures.
Impacts to historical heritage values	The potential for European archaeological material to be present within the Project site to be nil to low. Construction of the Project will be appropriately managed by a HHMP to manage unexpected finds and viewshed impacts.
Impacts to Aboriginal heritage values	The site of Project is best characterised as containing very low densities of stone artefacts. Artefacts present would be in disturbed contexts. Therefore, the Project would likely impact very low densities of cultural material, which would generally be considered of low significance. Construction of the Project will be appropriately managed by an AHMP to provide details for the ongoing management and maintenance of Aboriginal heritage management and mitigation measures.

Table 8.2 Statement of outcomes for each key issue

Key issue	Statement of outcomes
Air quality impacts	Dust generated during Project construction is unlikely to represent a serious ongoing problem to the surrounding environment, given the significant distance between the Project and receptors. Any effects would be temporary and relatively short-lived and would only arise during dry weather with wind blowing towards a receptor at a time when dust is being generated and the mitigation measures are not being fully effective. For NO_2, both the total annual mean concentration and the maximum total 1 hour concentration were well below the impact assessment criteria in both scenarios and at all assessment locations. For PM_{10}, both the total annual mean concentration and the maximum total 24-hour concentration were below the impact assessment criteria in both scenarios and at all assessment locations. For $PM_{2.5}$, the annual mean background concentration already exceeded the criterion, and therefore the total concentration at all assessment locations was also above the standard. Additional exceedances of criteria were only predicted for 24-hour $PM_{2.5}$, and in the absence of the MLP, the Project would only be responsible for additional exceedances at two assessment locations. Construction of the Project will be appropriately managed by an AQMP to provide details for the ongoing management and maintenance of air quality management and mitigation measures.
Social impacts	Local communities have the potential to experience change during the construction and operation of the Project. The Project is expected to benefit residents of the local and regional area who possess the relevant qualifications to contribute to the construction of the Project. The Project is expected to impact upon the amenity of residents in the local and regional area, particularly during construction. In particular, there is potential for dust and noise from construction activities which has the potential to causing impact on the amenity and lifestyle of nearby residents. The Project will reduce traffic congestion and generally improve traffic amenity along Moorebank Avenue and nearby intersections. This may make travel more attractive thereby enhancing community access and interaction. The Project has the potential to enhance physical and mental health through the allocation of an off-road shared user path that would support connectivity for pedestrians and cyclists thereby encouraging residents to walk and cycle. Public safety has been considered in the design of the Project to minimise risk to residents of the local and regional area from vehicle collision, flooding and dust exuberating health related issues.
Visual impacts	During construction of the Project, visual receptors would be able to see areas cleared of vegetation, cut and fill earthworks, plant and material storage areas, temporary construction buildings and light spill. Once the Project is built, some elements of the Project would be visible to visual receptors. The Project is predicted to impact the character of surrounding landscapes. The greatest impact is expected to be to the fragmented vegetation adjacent to the south, south-east and south-west of the Project through vegetation clearing activities, increases to traffic and light spill. Light pollution would occur as a result of the Project through increased illumination of the new road alignment. The Project site and surrounds have experienced a gradual increase in light pollution as a result of increased urbanisation and industrial expansion and therefore the Project would not represent a significant increase to light pollution during construction and operation.

9 Evaluation and conclusion

This chapter presents a justification of the Project and a conclusion to the EIS. It considers a range of issues including project benefits, protection of the environment, the objects of the EP&A Act, including ecologically sustainable development and community consultation.

9.1.1 The Project

This EIS addresses the requirement for the Moorebank Avenue Realignment as required by the Planning Agreement and consent condition A58 of the MPW Stage 2 Approval (SSD 7709).

A full project description is provided in Section 5.

Key features of the Project include:

- realigning a section of Moorebank Avenue from a point approximately 130 metres (m) south of the Anzac Road/Moorebank Avenue intersection to the bridge over the East Hills railway;
- constructing approximately 3 kilometres (km) of new road to bypass the MLP to the east, comprising:
  - a four-lane road (two lanes in each direction) in the vicinity of MPE, commencing from a point approximately 130 m south of the Anzac Road/ Moorebank Avenue intersection to the south-eastern corner of the MPE site;
  - a two-lane road (one lane in each direction) from the south-eastern corner of the MPE site to a point immediately north of the bridge over the East Hills railway;
- decommissioning of the existing Moorebank Avenue road section, and alterations to enable it to function as a restricted access to the MLP;
- four accesses between the new road and the MLP. The accesses would include signalised intersections with auxiliary left and right turn lanes at entry points and would replicate existing accesses on Moorebank Avenue;
- constructing a central median, typically six metres wide, tapering to zero width where the new road becomes two lanes;
- tie-ins and infrastructure adjustments to the existing Moorebank Avenue, bridge over the East Hills railway, and MLP;
- constructing retaining walls;
- noise mitigation in the vicinity of the Defence Joint Logistics Unit (DJLU) site (chainage 600-800);
- constructing operational drainage infrastructure, onsite stormwater detention basins, and operational water quality controls (including vegetated swales, bioretention systems, and spill containment);
- installing a culvert within Anzac Creek and extending existing culverts within existing watercourses/drainage lines;
- installing road furniture including security fencing, guideposts, traffic signs, and street lighting;

- adjusting public utilities; and
- constructing temporary ancillary facilities, including a work site compound, lay-down areas, and construction water detention basins.

The Project is expected to take approximately 16 months to construct using a workforce of up to 122 personnel. In line with arrangements made under the Planning Agreement, the new road section would be operational in 2024.

Upon completion, the new road section (not including those sections extending into the MLP) would be transferred to TfNSW to operate as a local road. The existing road section would continue to be owned by the Commonwealth and would be operated as an internal service road to the MLP, with limited public access.

9.2 Strategic justification

The Project is consistent with the objectives of the MLP, and relevant NSW and Commonwealth Government planning and transport policies. These aspects are discussed in detail in Chapter 3 and reviewed below.

9.2.1 Objectives of the Moorebank Logistic Park

SIMTA is developing the MLP, a nationally-significant freight infrastructure project in the south-western Sydney suburb of Moorebank. In operation, it will include an IMEX rail terminal, interstate/intrastate terminal, significant warehousing, auxiliary services including retail and service offerings, and a rail connection to the SSFL providing direct access to the facility. When completed, the MLP will and provide up to 850,000 m^2 of high specification warehousing where containers can be unpacked before delivery of their contents to their final destinations.

9.2.2 Consistency with government policy and strategy

The Project is declared to be SSI under Section 5.12 of the EP&A Act, by virtue of Clause 7 and Schedule 4 of the State and Regional Development SEPP. An application for SSI must be accompanied by an EIS and be determined by the NSW Minister for Planning and Public Spaces.

On 1 March 2021, DPIE issued the SEARs for the Project. These SEARs are provided in Appendix A and summarised in Table 1.5. This EIS has been prepared in accordance with these SEARs.

Under the EPBC Act proposed ‘actions’ that have the potential to have a significant impact on MNES or the environment inside or outside the Australian jurisdiction. MNES include World and National heritage properties and places, and Commonwealth listed threatened ecological communities and species.

On 11 November 2020, SIMTA referred the Project (Referral Number 2020/8839) to the Commonwealth Minister for the Environment, and on a precautionary basis, nominated that it had potential to have a significant impact on listed threatened species and threatened ecological communities. On 8 February, the Project was determined to be a controlled action and will be assessed under the bilateral agreement with NSW (Appendix A). On 16 February 2021, DAWE provided project assessment notes to DPIE.

The Project provides for freight connections between MLP and the Sydney Motorway network. An assessment of the Project’s consistency with national and NSW transport policies and strategies in included in Chapter 3 of this EIS.

9.2.3 Need for the Project

The delivery of the Project is a requirement of the Planning Agreement that was triggered as a Condition of Consent of the MPW Stage 2 (SSD 7709) project. Without development of the Project, the addition of future background traffic would result in Moorebank Avenue operating at an unacceptable Level of Service (LoS) in approximately 2029. If the Project were not to proceeded, the Planning Agreement would require upgrading the road along its current alignment (refer to Section 4.3 as to why this is not an ideal build outcome).

Realignment of Moorebank Avenue would enhance access and egress arrangements between MLP and Moorebank Avenue by separating public vehicles and heavy vehicles transferring freight between MPE and MPW and by minimising traffic congestion from the intermingling of background public local traffic and traffic generated by the MLP.

The Project is required to maintain north/south connection between Cambridge Avenue, Glenfield and Anzac Road, and Moorebank. Once the construction of the MLP is complete and operations substantially commence, the section of Moorebank Avenue function as a service road to the MLP and be closed to public traffic. The Project would divert traffic to the new alignment, generally to the east of MPE.

Additionally, the Project would deliver operational benefits to the MLP by removing the existing Moorebank Avenue alignment which currently functions as a physical barrier between the MLP rail link, terminals, warehouses, and MPE and MPW sites. By relocating this road section, shorter, more efficient container-carrying vehicle movements within the MLP are possible, improving the MLP’s ability to meet precinct throughput targets. Further, the Project would allow for the MLP to be managed as operated as a single facility on a unified site.

9.2.4 Consequences of not proceeding with the Project

Under the Planning Agreement, Qube is obliged to upgrade the existing Moorebank Avenue (South) along its current alignment, should all approvals not be achieved for the realignment by December 2021.

Upgrading the existing Moorebank Avenue along its current alignment is not desirable as it:

- would result in container-transporting vehicles interacting with public vehicles (resulting in potential safety and travel time implications for road users);
- create the potential for congestion from the intermingling of background traffic and traffic generated by the MLP;
- would resulting in Moorebank Avenue continuing to intersect the MLP, creating a barrier to east-west movements and thereby reduce the operational efficiency of terminals;
- provide for longer, less efficient and less direct travel route for MLP traffic between the rail link, terminals and warehouses;
- involves a potential constraint to the future automation of the MLP; and
- it would result in negative time/cost implications.

It should also be noted that upgrading Moorebank Avenue along its current alignment would still result in impacts (including acquisition of land) to the DJLU site, the MLP, Boot Land and land owned by RailCorp.

9.2.5 Objectives of the EP&A Act

The objectives of the EP&A Act provide a framework within which the justification of the Project can be considered. A summary of this assessment is provided in Table 9.1.

Table 9.1 Consideration of the objectives of the EP&A Act

EP&A Act objective	Commentary
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources	The Project would adopt resource efficiency measures throughout construction and operation where practical, including: • Energy efficiency measures, including recovery of virgin excavated natural material and a range of other materials, reuse of topsoil, diversion of office waste from landfill minimising the volume of fill required, minimising transport emissions associated with haulage of imported fill • Water efficiency measures would be implemented during construction and operation, including use of recycled water during where practical • The Project would seek to reuse or recycle uncontaminated spoil generated where possible. Construction and demolition waste would be reused and/or recycled where possible. Sustainability measures are described in Section 7.15. The outcomes from this EIS, including any relevant conditions that may be applied to the Project by the Minister for Planning and Public Spaces, would be used to finalise the sustainability objectives and targets for the Project. The Project integrates a shared user path utilising the corridor to connect with existing pathways and facilitate future connections between Glenfield and Moorebank, providing an important community benefit.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment	The Project is consistent with the four principles of ecologically sustainable development, which are: • the precautionary principle; • inter-generational equity; • conservation of biological diversity and ecological integrity; and • Improved valuation and pricing and incentive mechanisms. A detailed assessment of the Project against the principles of ecologically sustainable development is provided in Section 7.15.
(c) to promote the orderly and economic use and development of land	The primary function of the Project is to maintain road access between Glenfield and Moorebank. This provides economic benefits for South Western Sydney and NSW by supporting the MLP and enabling connectivity to the Sydney motorway network for freight transport. A discussion of how the Project fulfills national and State strategic planning objectives is provided in Chapter 5. Socio-economic, land use and property impacts are assessed in Section 7.11 and Section 5.2.4, respectively.
(d) to promote the delivery and maintenance of affordable housing	Not relevant to this project.

Table 9.1 Consideration of the objectives of the EP&A Act

EP&A Act objective	Commentary
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats	Biodiversity values were considered in designing the Project and selection of the preferred alignment as set out in this document. Environmental management measures were identified to further reduce the severity of direct and indirect impacts of the Project on biodiversity. Once all practicable steps to avoid or minimise impacts were implemented at the design phase, mitigation measures would be implemented to further reduce the potential ecological impacts of the Project. Biodiversity impacts are assessed in Section 7.2 within this EIS and a BDAR has been prepared in Appendix B.
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage)	The alignment of the Project and design development has sought to minimise impacts on Aboriginal and non-Aboriginal heritage values in the study area. The measures for managing the impacts of the Project on heritage values are described in Section 7.8 and Section 7.9. A PAHA has been prepared to assessed Aboriginal heritage values associated with the Project (Appendix I). To assess non-Aboriginal built heritage values associated with the Project a SoHI has been prepared (Appendix H).
(g) to promote good design and amenity of the built environment	The design development process identified several design objectives and features that were incorporated into the Project as set out in this document to promote an improvement in the design and amenity of the surrounding landscape. The Project has been designed through an iterative process which included review of related policy documents, guidelines and standards and provided a platform for the engagement of relevant stakeholders to inform the physical designs proposed.
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants	Not relevant to the Project.
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State	Consultation was carried out with the relevant local councils and government agencies throughout the development of the Project and the preparation of this EIS. Consultation carried out to date is described in Chapter 6.
(j) to provide increased opportunity for community participation in environmental planning and assessment	As part of the preparation of this EIS, SIMTA has sought community consultation through the Project's development. Engagement activities to date include a letterbox drop to local residents and an online survey. Community consultation would continue through the detailed design and construction, should the Project be approved. Details of community involvement are provided in Chapter 6.

9.3 Management and mitigation measures

The Project's construction contractor will be required to have an Environmental Management System (EMS) in accordance with the requirements of the Environmental Management Systems Guidelines (NSW Government 1998). A CEMP is to be prepared by each contractor and will identify measures to be implemented to minimise environmental impacts. The CEMP will be required to include:

- roles and responsibilities for planning, approval, implementation, assessment and monitoring of environmental controls;
- required licences, approvals and permits;
- environmental legislation that will be required to be complied with;
- potential environmental impacts resulting from construction of the proposed upgrade and the control and mitigation measures to be implemented;
- objectives and targets for environmental performance;
- environmental monitoring programs and a mechanism for evaluating environmental performance;
- communication procedures;
- document control procedures;
- emergency response procedures to mitigate potential environmental damage;
- training, competence and awareness assessment procedures and programs; and
- an environmental auditing program and a mechanism for control and management of nonconformances.

The CEMP would provide specific information in particular areas of environmental management, either by way of direct reference or by environmental management sub-plans.

Chapter 7 identified management and mitigation measures to address the potential impacts of the Project. These measures are listed in Section 8.1.

9.4 Conclusion

This EIS has addressed the requirements issued by the Secretary of DPIE under Division 5.2 of the EP&A Act.

The Project is a requirement of the Planning Agreement between RMS (now TfNSW) and Qube arising from the development of the MLP, a significant contributor to local traffic along Moorebank Avenue. It is required to demonstrate satisfactory arrangements have been made for the provision of State public infrastructure, in accordance with Clause 7.36 of Liverpool LEP 2008.

This EIS confirms that the Project has a strong justification for proceeding considering the significant transport efficiency and safety benefits it would provide. Without development of the Project, Moorebank Avenue would operate at an unacceptable LoS in approximately 2029. Realignment of Moorebank Avenue would enhance access and egress arrangements between MLP and Moorebank Avenue by separating public vehicles and heavy vehicles transferring freight between MPE and MPW and by minimising traffic congestion from the intermingling of background public local traffic and traffic generated by the MLP.

Additionally, the Project would deliver operational benefits to the MLP by removing the existing Moorebank Avenue alignment which currently functions as a physical barrier between the MLP rail link, terminals and warehouses and MPE and MPW sites. By relocating this road section, shorter, more efficient container-carrying vehicle movements within the MLP are possible, improving the MLP's ability to meet precinct throughput targets. Further, the Project would allow for the MLP to be managed as operated as a single precinct on a unified site.

The Project is consistent with Australian and NSW government planning strategies and policies. The Project would meet regional traffic objectives between Liverpool and Glenfield, including safety and congestion issues, while also providing infrastructure in response to significant future economic and population growth expectations for South Western Sydney. In meeting the objectives of Australian and NSW government planning strategies and policies, the Project is expected to have significant functional, environmental, social and economic benefits on a local and regional scale.

The development of Project design has considered avoiding or minimising potential adverse impacts, incorporating the principles of ESD and taking full account of community input.

For this EIS, a range of specialist investigations were undertaken and, as would be expected from a major and complex infrastructure development, potential environmental impacts are predicted. These impacts include the removal of vegetation and threatened species habitat, the fragmentation of habitat, construction traffic, construction noise and vibration, change in stormwater flow volume and water quality, and visual impacts associated with construction activities and built project elements.

This EIS addresses these potential impacts on the biophysical and socio-economic environment and identifies a range of management and mitigation measures to avoid, minimise, mitigate and offset potential adverse impacts. These include an offset strategy for residual impacts that cannot be mitigated. These measures are summarised in Chapter 8 and the implementation of these measures would seek to manage the adverse impacts of the Project.

The Project has been designed to avoid and minimise adverse biophysical, social and economic impacts where possible. This EIS has identified and assessed those residual impacts of the Project. Overall, while there are some unavoidable impacts, principally due to spatial constraints arising from the surrounding built and natural environment, the Project would deliver significant longer-term benefits to the local community and MLP.

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