URBAN DESIGN AND LANDSCAPE PLAN

Moorebank Precinct East Stage 1

29 August 2019

SYDNEY INTERMODAL TERMINAL ALLIANCE PROJECT

Moorebank Precinct East Stage 1

Urban Design and Landscape Plan

Version Author	Adam Costenoble
Checker	Ketan Patel
Approver	Ketan Patel
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REVISIONS

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001	05/05/17	Prepared for internal review	BF	BOD
002	09/05/17	Draft issue to SIMTA for comment	BF	BOD
003	16/05/17	Submission to DP&E	BF	BOD
004	25/05/17	Minor updates	BF	BOD
005	30/10/17	DP&E review comments and minor clarification	DD	KP
006	04/01/2018	Details of the seed mix	KP	-
007	29/01/2018	Obtrusive lighting compliance clarification	DD	KP
008	20/02/2018	Reference to AS 4284 corrected in section 6.6	DD	KP
009	22/11/2018	Updates to seed mix, access tracks, reinforced earth fill and sustainability	KP	HT
010	19/12/2018	Update with Rail Link Detailed Design Drawings	JH	KP
011	29/08/2019	Update to reflect Detailed Design drainage changes since EIS. Update to landscape	AC	KP

Revision	Date	Description	Prepared by	Approved by
		planting timing. Inclusion of OCR portal equipment.		

ACRONYMS AND DEFINITIONS

Acronym / Term	Meaning
AHD	Australian height datum
ARTC	Australian Rail Track Corporation
AS	Australian Standard
Boot land	The area of native vegetation located to the east of Moorebank Avenue, north of the East Hills rail line and south and east of the MPE site. Owned by the Commonwealth of Australia. Lot 4 DP 1197707.
CoC	Conditions of Consent
CSWMP	Construction Soil and Water Management Plan
Cwth	Commonwealth
DNSDC	Defence National Storage and Distribution Centre
DCP	Development Control Plan
DP&E	Department of Planning and Environment
EIS	Environmental Impact Statement
EP&A Act	*Environment Planning and Assessment Act 1979*
EPA	Environment Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ESCP	Erosion and Sediment Control Plan
GPTs	Gross pollutant traps
HV	High voltage
IMEX	Import-export
IMT	Intermodal Terminal Facility. The MPE Stage 1 Project includes the construction of the following key components together comprising the IMT: • IMEX Terminal Facility including truck processing and loading areas • Rail loading and container storage areas • Administration facility and associated car parking • Rail Link.
km	kilometre
kV	kilovolt
LED	Light-emitting diode
LCC	Liverpool City Council
LV	Low voltage
m	metre
Moorebank Intermodal Terminal Precinct	The site which is the subject of both the MPE Concept Approval (MP_10_0913) and the MPW Concept Approval (SSD 5066)
MPE	Moorebank Precinct East
MPE Site	The site at Moorebank as approved by the Concept Plan (MP_10_0913)
The Project	The whole of the land to which the MPE Stage 1 Project approval SSD 6766 relates, including both MPE Stage 1 Package 1, and MPE Stage 1 Package 2.

Acronym / Term	Meaning
MPE Stage 1, Package 1	Also known as the Rail Link. The construction of the Rail Link connecting the Southern Sydney Freight Line to the IMEX Terminal Facility, traversing across the Boot land, RailCorp Land, Moorebank Avenue, the MPW Golf Course, Georges River, and Glenfield Waste Facility
MPE Stage 1, Package 2	Also known as the IMEX Terminal Facility. The construction of the IMEX Terminal Facility, including the following key components: • Truck processing, holding and loading areas - entrance and exit from Moorebank Avenue • Rail loading and container storage areas - installation of four rail sidings with adjacent container storage area serviced by manual handling equipment initially and overhead gantry cranes progressively • Administration facility and associated car parking - light vehicle access from Moorebank Avenue
MPW	Moorebank Precinct West
Native vegetation	Areas of plant community types mapped by Arcadis and WSP Parsons Brinckerhoff in the Moorebank Precinct (including MPE and MPW) being a consolidation of all assessments for the Moorebank Precinct conducted since 2011.
NSWFR	NSW Fire and Rescue
OCR	Optical Character Recognition portal
OEH	Office of Environment and Heritage
OSD	Onsite detention
POEO Act	*Protection of Environment Operations Act 1997*
Rail corridor	Area defined as the 'Rail Corridor' within the Concept Plan Approval (MP_10_0913). The Rail Link is also included within this area.
RailCorp Land	Lot 1 DP 825352 (part of the rail corridor) and owned by RailCorp
RL	Relative levels
REW	Reinforced Earth Wall
RMS	Road and Maritime Services
SIMTA	Sydney Intermodal Terminal Alliance
SME	School of Military Engineering
SSD	State Significant Development
SSFL	Southern Sydney Freight Line
UDLP	Urban Design and Landscape Plan
Wattle Grove Offset Area	Occurs within the Boot land. Contains all of the species credits that will deliver the direct offset for EPBC Act threatened flora. An application for a biobanking agreement has been lodged with the OEH to establish a biobank site which includes this offset area.
WSUD	Water sensitive urban design

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COMPLIANCE MATRICES

Table 1 Conditions of Consent (CoC)

CoC	Requirement	Document Reference
C3	The Application shall prepare and implement an Urban Design and Landscape Plan for the project. The Plan shall present an integrated urban design for the project. The Plan shall include, but not necessarily limited to:	This plan
	a) Final design details of the proposed external materials and finishes;	Section 6.1 Section 7.1 Appendix B
	b) Location of existing vegetation and proposed landscaping (including use of indigenous and endemic species where possible) and design features;	Section 3.4 Sections 4.1 Appendix A
	c) Strategies for progressive landscaping of other environmental controls such as erosion and sedimentation controls, drainage and noise mitigation; and	Section 6.2 Section 6.4 Section 6.5 Section 6.6 Sections 7.2 Section 7.4 Section 7.5 Appendix D
	d) Location and design treatments for any associated footpaths and cyclist elements and other features such as seating, lighting (in accordance with AS 4282-1997 Control of the Obtrusive Effective of Outdoor lighting), fencing, and signs;	Section 6.3 Section 6.7 Section 7.3 Section 7.6 Appendix C Appendix E Appendix F
G4	Signage shall be installed in accordance with Drawing A3001 Issue C (Terminal – Signage Details) dated 14/04/2015, unless otherwise agreed by the Secretary.	Section 6.3 Appendix C

Table 2 Commonwealth Mitigation Measures relevant to this plan

CMM	Requirement	Document Reference
Visual Amenity	The visual amenity impact of the Principal Proposal to the nearby residential receptors is anticipated to be low, however, the visual amenity impacts would be improved through implementing the following mitigation measures: • Optimising visual buffers within the land use layout of the Principal site	Section 4.4 Section 6.2 Appendix A
	• Establishing high quality landscaping to reinforce the surrounding natural context and ecological qualities	Section 6.2 Appendix A
	• Installation of an 18 metre-wide screening vegetation corridor and bio-retention swale along Moorebank Avenue, which will	Section 6.2 Appendix A

CMM	Requirement	Document Reference
	combine a selection of native tree species with dense tree canopy and low screen planting	
	• Punctuation of nodal points along Moorebank Avenue with appropriate landscaping	Section 6.2 Appendix A
	• Installation of a 'boundary treatment' or 'buffer zone' along the other site boundaries (from Moorebank Avenue), comprising of existing local species endemic to the area and providing an essential scale of planting to complement the built form, including:	Section 4.4 Section 6.2 Appendix A
	(a) a southern boundary landscape corridor (between 10 and 20 metres wide) and bio-retention basin	Section 6.2 Appendix A
	(b) an eastern boundary buffer zone of 13.5 metres comprising a 2.5 metre landscape corridor, six metre internal light vehicle access road and five metre wide bio-retention swale	Not applicable to the IMEX terminal
	(c) tall (20 metres at maturity) trees planted along the cleared railway alignment, interspersed with medium trees.	Section 4.4 Section 7.2
Hydrology	The following mitigation measures will be adopted for the SIMTA proposal to mitigate potential impacts on hydrology, water quality and flooding resulting from construction and operation of the SIMTA proposal:	
	• Rainwater tanks will be installed to collect roof water from the warehouses on the SIMTA site, and will be used for non-potable water demands such as toilet flushing and outdoor use	Not applicable to the IMEX terminal
	• Pre-treatment measures will be incorporated into the site stormwater design, including buffer strips and gross pollutant traps where deemed appropriate.	Section 4.5
	• Bio-retention systems will be incorporated into the site stormwater design, including rain gardens and bioswales, where deemed appropriate. These structures will also act as on-site detention basins, minimising the velocity and volume of flows leaving the site during storm events. Bio-retention systems will be designed to achieve the pollution reduction targets set out in the Liverpool DCP.	Section 4.5 Appendix A

Table 3 Final Compilation of Mitigation Measures

FCMM	Requirement	Document Reference
11	Visual Amenity, Urban Design and Landscape	
11A	The following mitigation measures will be included within the CEMP to mitigate impacts on visual amenity during construction of the Proposal:	Section 6.2 Appendix A
	• Re-vegetation / landscaping would be undertaken progressively and with species local to the area.	Section 6.2 Appendix A

FCMM	Requirement	Document Reference
	• Use of trees on the southern and western boundaries of the Stage 1 site, to provide a uniform canopy cover within vegetated areas and use of local species as understorey planting to support and enhance local habitat.	Section 6.2 Appendix A

1 INTRODUCTION

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 1 of the Moorebank Precinct East (MPE) Project, comprising an Intermodal Terminal (IMT) Facility including Rail Link (Package 1) and Import Export (IMEX) Terminal Facility (Package 2) on 12 December 2016 (SSD 6766). This Urban Design and Landscape Plan (UDLP) has been developed to satisfy condition C3 of the Conditions of Consent (CoC) and covers both Package 1 and Package 2 of the MPE Stage 1 Project (the Project).

This UDLP has been established to demonstrate SIMTA's approach to urban design for the Project. This UDLP addresses the relevant requirements of the Development Consent, including the Environmental Impact Statement (EIS), Submissions Report and Minister's CoC, and all applicable guidelines and standards.

1.1 Background and Scope

The MPE Project is located approximately 27 kilometres (km) south-west of the Sydney Central Business District (CBD) and approximately 26 km west of Port Botany and includes the former Defence National Storage and Distribution Centre (DNSDC) site.

The MPE Project involves the development of an IMT facility, including warehouse and distribution facilities, Rail Link, freight village (ancillary site and operational services), stormwater infrastructure, landscaping, servicing and associated works on the eastern side of Moorebank Avenue. It is to be developed in three key stages:

- Stage 1 - Construction of the IMEX Terminal Facility and Rail Link
- Stage 2 - Construction of warehouses and distribution facilities
- Stage 3 - Extension of the IMEX Terminal Facility and completion of warehouses and distribution facilities.

Stage 1 will be constructed across two packages:

- Package 1: The Rail Link includes a connection to the IMEX Terminal Facility, and traverses across Moorebank Avenue, Anzac Creek and Georges River prior to connecting to the Southern Sydney Freight Line (SSFL).
- Package 2: The IMEX Terminal Facility includes the following key components:
  - Truck processing, holding and loading areas - entrance and exit from Moorebank Avenue
  - Rail loading and container storage areas - installation of four rail sidings with adjacent container storage area serviced by handling equipment initially and overhead gantry cranes progressively
  - Administration facility and associated car parking - light vehicle access from Moorebank Avenue.

1.2 Project Description

The layout of the IMEX Terminal Facility generally comprises operational areas, an administration area, rail sidings, utilities and drainage infrastructure, landscaping and signage. The operational areas of the IMEX Terminal Facility consist of the primary and secondary container loading / unloading areas and container storage areas, and the truck holding area.

1.2.1 Environmental Planning Approval

The Project has been assessed by the Department of Planning and Environment (DP&E) under Part 4.1 (now division 4.7 as of 1 March 2018) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as State Significant Development (SSD). The Planning Assessment Commission (PAC) granted approval for the MPE Stage 1 Project on 12 December 2016 and is subject to the Minister's CoC, 18 December 2016 (SSD 6766). The construction and operation of the MPE Stage 1 project was subject to an appeal in September 2017 (Appeal Number 2017/00081889). The approval was upheld and the revised CoC were released on 13 March 2018.

The Project's impacts, consultation and mitigation were documented in the following suite of documents:

- State Significant Development Consent SSD 6766 (as amended in the Land and Environment Court 13 March 2018)
- SIMTA Intermodal Terminal Facility – Stage 1 – Environmental Impact Statement (EIS) (Hyder Consulting Pty Ltd, May 2014)
- SIMTA Intermodal Terminal Facility – Stage 1 – Response to Submissions (Hyder Consulting Pty Ltd, September 2015)
- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval (No. 2011/6229) granted on March 2014.

1.3 Purpose and Application

This UDLP has been prepared to satisfy CoC C3 to facilitate for the commencement of permanent built works for the Rail Link and IMEX Terminal Facility. CoC C3 of the Development Consent (SSD 6766) states the following:

The Applicant shall prepare and implement an Urban Design and Landscape Plan for the project. The Plan shall present an integrated urban design for the project. The Plan shall include, but not necessarily be limited to:

a. *final design details of the proposed external materials and finishes;*
b. *location of existing vegetation and proposed landscaping (including use of indigenous and endemic species where possible) and design features;*
c. *strategies for progressive landscaping of other environmental controls such as erosion and sedimentation controls, drainage and noise mitigation; and*
d. *location and design treatments for any associated footpaths and cyclist elements, and other features such as seating, lighting (in accordance with AS 4282-1997 Control of the Obtrusive Effect of Outdoor Lighting), fencing, and signs;*

The Plan shall be submitted for the approval of the Secretary prior to the commencement of permanent built works and/ or landscaping, unless otherwise agreed by the Secretary.

This UDLP provides the overarching design principles, visions and objectives for the Project and provides detail on how these have been incorporated into urban design and landscaping. The following steps were undertaken in this UDLP and the document has been structured accordingly:

- Identification of key features of the site that will influence the planning and design of the development (Section 3)
- Identification of local site context findings on the site and in the area surrounding the site that will influence the planning and design of the development (Section 3)
- Description of the potential impacts and mitigation measures associated with various aspects of the Project's regional and local site context, which have been assessed in the EIS (Section 4)
- Identification of the vision and objectives of the development relating to urban design and landscape (Section 5)
- Analysis of the key design feature strategies for progressive landscaping of other environmental control such as drainage, erosion and sedimentation control and noise mitigation (Section 6 and 7).

1.3.1 UDLP amendments for IMEX integration with MPE Stage 2

The IMEX terminal is directly adjacent to the MPE Stage 2 site to the east and north and the MPE Stage 2 Moorebank Avenue Upgrade Works (MAUW) to the west. As such, urban design elements along those boundaries have been adjusted during detailed design to provide a whole of precinct solution that better integrates the IMEX terminal with MPE Stage 2. The following design changes have resulted in adjustments to this UDLP (i.e. from version 10 to version 11):

- Deletion of the eastern boundary stormwater channel because the direct interfacing of the MPE Stage 2 and IMEX terminal stormwater drainage pipework renders the original channel redundant (discussed further in section 4.5)
- Delayed planting of landscaped screening vegetation alongside the frontage with Moorebank Avenue to facilitate the Moorebank Avenue upgrade works which will occur for MPE Stage 2 and the requirements for landscaping design to meet RMS specifications.
- Inclusion of the Optical Character Recognition (OCR) portal for railcar and container identification and monitoring.

2 DEVELOPMENT CONCEPT

Re-development of the Project involves the demolition of the former DNSDC site and will include the following typical built form and operating elements:

Intermodal Terminal (IMT) Facility: The IMT facility will be located on the western part of the Project site, adjacent to Moorebank Avenue. The total terminal area is approximately 244,000 m^2 including the following key elements:

- Four rail sidings of up to approximately 600 m in length
- Container hardstand to be used for container sorting and storage (up to 5 containers high or 12.5 m)
- Administration offices and ancillary operational facilities.

The IMT facility is anticipated to operate 24 hours a day, 7 days a week and use the following equipment:

- Automated and remote operated gantry systems to move containers from rail cars
- Modern container and secondary freight handling equipment
- An operations and control centre, ancillary facilities and amenities
- Optical Character Recognition (OCR) portal for railcar and container identification and monitoring
- Container washdown facilities (likely to be of steel construction)
- Diesel and LPG fuel storage tanks (steel construction).

Rail Link: Fundamental to the operation of the IMT facility is a 2.8 km train line along with its required infrastructure, to connect the IMEX Terminal Facility and Interstate Terminals to the SSFL, and which is capable of accommodating trains up to 1.8 km in length. These primary built form and operating zones will be integrated together in a cohesive manner by addressing the following supporting urban issues:

- **Accessibility**: Well defined roadways and pathways for vehicles, pedestrians and cyclists will be designed for safe and comfortable movement, whilst providing clear and legible internal connectivity.
- **Streetscape**: Defined streetscape and urban elements will provide visual character, theming and a sense of place throughout the development.
- **Landscaping**: The landscape design will create a strong uniform identity throughout the development through the reinforcement and extension of the surrounding natural context and ecological qualities. It will create clear entry markers, enhance vistas, and reinforce the hierarchy of roads within the Project.
- **Signage and Lighting**: Signage and lighting will be utilised throughout the development to enhance the quality and experience of the occupants and users. Signage will complement the design style and streetscape to create a unique identity and sense of place.
- **Safety and Security**: Measures will be implemented to ensure a high level of safety and security at all times, to the development, its occupants, and the community populating surrounding lands.

Warehousing on the MPE Site is subject to a separate approval, SSD 7628, and is not discussed within this UDLP.

3 IMPLEMENTATION

3.1 Context and Scale

The Project is located approximately 2.5 km to the south of Liverpool City Centre near a number of significant industrial areas, including Moorebank (Yulong and Amiens) and Warwick Farm to the north, Chipping Norton to the north-east, Prestons to the west and Glenfield and Ingleburn to the southwest. The Holsworthy Military Reserve is located to the south on the opposite side of East Hills Passenger Line. Nearby residential areas include Wattle Grove, Moorebank, Holsworthy and Casula, which are located to the east and northeast.

The Moorebank Industrial Area is north of the Project, with the majority situated to the north of the M5 Motorway between Newbridge Road, the Georges River and Anzac Creek. This industrial area comprises approximately 200 hectares, and supports a range of industrial uses including freight and logistics, heavy and light manufacturing office and business park developments.

The Rail Link connecting the SSFL to the IMEX Terminal Facility, traverses across the Boot Land (to the south of the Project), RailCorp Land, Moorebank Avenue, the Moorebank Precinct West (MPW) Golf Course, Georges River (running along the western boundary of MPW), and Glenfield Waste Facility.

3.2 Topography and Landform

The Project topography is generally flat with relative levels (RLs) ranging between 14 m and 16 m Australian height datum (AHD) along the eastern Project boundary. The land rises from approximately RL 14 m AHD at each end to a localised peak of RL 22 m AHD about midway along the length.

The Project site has been subjected to substantial development over the years, and considerable changes have been made to the natural landscape. Consequently, the Project is underlain with a mixture of residual soils and filled materials, with undisturbed areas retaining some residual topsoil.

The most prominent natural features in close proximity to the site include Anzac Creek external to the Southern Boundary of the IMEX Terminal Facility and Georges River to the west of the Project. There is an existing stormwater discharge point on Moorebank Avenue, and another two discharge points on the eastern site boundary. The riparian setback for Anzac Creek, as specified by the NSW Office of Water, is 30 m.

3.3 Land Use

The Project was previously occupied by the Department of Defence and is commonly known as the DNSDC site. Previous operational activities on the Project can be generally described as including warehousing and logistics operations, vehicle and equipment hardstands, as well as some container storage serviced by an internal road network.

The residential suburb of Wattle Grove is located to the northeast and east. The Casula residential area is approximately 1 km west of the Project and divided by the School of Military Engineering (SME), Georges River and the SSFL.

Approximately 1 km to 1.5 km west from the Project, the SSFL and passenger rail line run in a north-south direction and are bounded by the Casula residential area. To the south of the Project, the existing East Hills railway line runs in an east-west direction. The outer area to the east and north of the site comprises the Wattle Grove residential area (primarily low density), extensive commercial and industrial developments and major motorways.

Surrounding natural elements include:

- Georges River which runs along the western boundary of the SME
- Anzac Creek, which runs along the eastern boundary of the Commonwealth owned land, linking to Chipping Norton Lake and Georges River to the north
- Existing landscape and vegetation known as the ‘Cumberland Plain Woodland’ running along approximately one half of the eastern boundary and full length of southern boundary of the site, forming a physical barrier to surrounding areas. This bushland is primarily regenerated vegetation and includes

Anzac Creek. The density of the bushland provides significant screening to much of the south and east of the Project from surrounding areas.

3.4 Existing Vegetation

3.4.1 IMEX Terminal Facility

In its undeveloped state circa 1930, the area of the IMEX Terminal Facility appeared to be vegetated with a mosaic of low vegetation types, possibly including woodland and dense healthy shrub land, with some clearing in the east and numerous tracks intersecting the site and lands to the east and south.

Due to the industrial history, almost all the natural vegetation has been largely cleared from the Project with the exception of what appears to be an increase in growth of trees and shrubs in the south of the Project, particularly along the constructed drainage channels and adjoining areas to the south and west.

Based on the results of the field assessment reported in the Biodiversity Assessment Report (Hyder 2015), the vegetation within the IMEX Terminal Facility consists almost entirely of planted trees with a mown or managed understorey, and does not meet the criteria for any threatened ecological communities. The planted tree species are typical of cultivated eucalypts that are commonly found as mature street trees in suburban Sydney, with *Eucalyptus microcorys* (Tallowwood), *E. saligna* (Sydney Blue Gum), *Corymbia maculata* (Spotted Gum) and *C. citriodora* (Lemon-scented Gum) frequently recorded.

Photograph 1: Mature trees of *Eucalyptus saligna* and *Corymbia maculata* on the Project site (Hyder 2015)

Photograph 2: Mature trees of *Eucalyptus microcorys* on the Project site (Hyder 2015)

The ground layer in the non-paved areas of the Project consisted of mown grass lawns, dominated by *Cynodon dactylon* (Couch), *Pennisetum clandestinum* (Kikuyu) and other exotic grass species; there was a native grass component persisting in some locations, with native grasses observed including *Paspalidium distans*, *Austrodanthonia sp*. (Wallaby Grass) and *Eragrostis leptostachya* (Paddock Lovegrass) as well as some small native herbs.

To the south and southeast of the IMEX Terminal Facility, and north of the Boot Land, is a network of drainage channels with some tree plantings and some apparent tree and shrub regeneration. The channels supported a mixture of native, non-local native and exotic trees and shrubs including *Eucalyptus saligna, E. tereticornis* (Forest Red Gum), *Corymbia maculata, Melaleuca quinquenervia* (Broad-leaved Paperbark), *Casuarina glauca* (Swamp Oak) and *Eucalyptus parramattensis* (Parramatta Red Gum).

3.4.2 Rail Corridor

The rail corridor contains the Rail Link which extends through portions of the former DNSDC south and Southern Boot Land, RailCorp Land, MPW site, Glenfield Waste Facility, Georges River and connects to the SSFL.

To the south of the IMEX Terminal Facility is a fenced area of bushland bordered by the existing rail spur to the east, and Moorebank Avenue to the west. Anzac Creek runs from west to east in the northern portion of this bushland. The section of Anzac Creek supports dense stands of *Typha orientalis* (Broad-leaf Cumbungi) and *Bolboschoenus fluviatilis* (Club-rush) and contains the Wattle Grove Offset Area under the EPBC Act threatened flora.

Fringing Anzac Creek is a narrow band of swamp woodland dominated by *Melaleuca linariifolia* (Flax-leaved Paperbark); the understory of this forest varied from sedges, especially *Leptocarpus tenax* which dominated in patches, to ferns, grasses and dense shrubs. To the south of the eastern part of Anzac Creek there are occasional emergent trees of *Angophora subvelutina* (Broad-leaved Apple) and *Eucalyptus sclerophylla.* Adjoining the southern bank of the western section of Anzac Creek the vegetation is disturbed and dominated by exotic vegetation, with a large stand of *Phyllostachys aurea* (Golden Bamboo), thickets of *Acacia decurrens* (Black Wattle) and *Pennisteum clandestinum.*

To the south of Anzac Creek is a large tract of relatively intact woodland dominated by *Eucalyptus sclerophylla* and *E. parramattensis* with a sub-canopy of *Angophora bakeri* (Narrow-leaved Apple) and *Melaleuca decora* (White Cloud Tree). The understorey varies in structure from relatively open in the mid-layer with dense grass and low shrubs to dense shrubs and a sparse shrub and grass understorey.

The area adjoining the disused rail line in the south-east of the Project supports mature trees of *Eucalyptus sclerophylla* (Hard-leaved Scribbly Gum) and numerous shrubs of Acacia spp., *Allocasuarina littoralis* (Black She-oak), *Hakea salicifolia* (Willow Hakea) and *Melaleuca nodosa* (Ball Honey-myrtle). The ground layer was characterised by native grasses including *Aristida ramosa* (Wiregrass), *Entolasia stricta* (Wiry Panic), *Paspalidium distans* and *Themeda australis* (Kangaroo Grass) and there were a number of small groundlayer herb and shrub species including *Astroloma humifusum* (Cranberry Heath), *Laxmannia gracilis* (Slender Wire Lily), *Pimelea linifolia* (Slender Rice Flower) and *Lomandra* spp. Exotic cover was low, with *Eragrostis curvula* (African Lovegrass) dominating in patches.

The land within approximately 100 m of the eastern bank of the Georges River supports forest vegetation. On the steep slope adjacent to the riverbank, the riparian vegetation is severely degraded, currently reduced to mature trees of *Eucalyptus saligna* x *botryoides* (Blue Gum/Bangalay hybrid) and *E. longifolia* (Woollybutt) with an understorey dominated by *Ligustrum sinense* (Small-leaved Privet) and smothered by exotic weeds, mainly *Cardiospermum grandiflorum* (Balloon Vine), *Lantana camara* (Lantana) and *Delairea odorata* (Cape Ivy).

The vegetation is less disturbed upslope and includes a mixed native and exotic understorey with mature trees of *E. saligna* x *botryoides.* On the western bank of the Georges River, adjacent to the Glenfield Waste Facility, the vegetation is similar in structure and condition to that on the eastern bank. The southern part of the riparian forest on the study area supported a canopy dominated by *E. saligna x botryoides* to 20 m in height.

The understorey on the river flats near the existing rail bridge consists of a mixture of local native shrub, herb and grass species and some dense stands of *Olea europaea* subsp. *cuspidata* and *Lantana camara,* with *Tradescantia fluminensis* dominating the ground layer in some areas.

In the northern parts of the riparian corridor, the steep slopes support trees of *E. saligna* x *botryoides* and *E. baueriana* over a dense shrub layer of *Olea europaea* subsp. *cuspidata, Ligustrum lucidum* and *Lantana camara* (Plate 24). The native small tree species *Backhousia myrtifolia* (Grey Myrtle) and *Melaleuca decora* occurred sporadically.

Most of the area of Glenfield Waste Facility is currently an active quarry and landfill site. The natural landform has been excavated and the vegetation consists of weedy exotic herbs and grasses and some native shrubs and small trees, some of which may have been planted as part of revegetation of constructed slopes. The native trees and shrubs *Angophora floribunda, Acacia decurrens* and *Acacia binervia* were abundant on the slope adjoining the eastern haul road.

3.5 Transport Network

The Project is located approximately 1.3 km south of the intersection of Moorebank Avenue and the M5 Motorway. The M5 Motorway provides the main road link between the Project and the key employment and industrial areas within the West and South Western Sydney Sub-Regions. The M5 Motorway connects with the M7 Motorway to the west, providing access to the Greater Sydney Metropolitan Region and NSW road network. Similarly, the M5 Motorway is the principal connection to Sydney's north and north-east via the Hume Highway.

The Project is within close proximity of the M5 Motorway, which intersects with Moorebank Avenue approximately 600 m to the north. Moorebank Avenue runs in a north-south direction and provides a direct connection between the Liverpool City Centre, M5 Motorway on/off ramps to the north, and the Glenfield / Macquarie Fields residential areas to the south.

The SSFL is located 1 km to the west of the Project. The SSFL is a 36 km dedicated freight line between Macarthur and Chullora. The closest passenger railway stations are Casula and Liverpool. Casula railway station is separated from the Project by the Georges River. Casula railway station is situated on the South and Cumberland railway lines. Liverpool railway station is separated from the Project by the M5 Motorway to the north and the Georges River to the west. This interchange station services the South, Cumberland, Bankstown and Inner West railway lines. The East Hills railway line is to the south of the Project and also forms the boundary to the Rail Link. It crosses the Georges River to the south-west and runs through the Glenfield Waste Facility before connecting into the South and Cumberland railway line corridor.

3.6 Other

For additional information on other existing character aspects, refer to the following sections in the EIS:

- Section 5 - Statutory Planning Approvals (Pages 79-96)
- Section 11 Climate Change Risk and Adaptation Assessment (Pages 50-68)
  - Appendix X Greenhouse Gas and Climate Change Impact Assessment
- Section 16 and 17 - Indigenous Heritage and Non-Indigenous Heritage (Pages 345-368)
- Section 18: Hazard and Risk (Pages 395-413)
- Section 20.4: Property and Infrastructure (Pages 461-485)
- Operational Environmental Management Plan.

4 URBAN DESIGN CONTEXT

4.1 Vegetation

Large native trees and various understorey planting endemic to the local area have been selected to create a buffer and serve in minimising visual impacts from the surrounding urban landscape. Given that the Project site is bounded to the south with existing vegetation communities, the landscape design serves to integrate the development with the surrounding environment by using tree, shrub and groundcover species that are local to the area to create habitat opportunities and links to the surrounding context. The tree planting has been designed with the intent of creating a uniform canopy cover throughout the area.

Proposed plant species have been selected for their site-suitability with many species selected from Liverpool City Council's (LCC) recommended plant list. The selection and location of landscaping has been designed to minimise bushfire impact and through on-going maintenance will contribute to a reduction in bushfire threat.

4.2 Transport Network

An analysis conducted for the EIS found that during operation, the Project will have a minor impact on Moorebank Avenue, Anzac Road, Cambridge Avenue and M5 Motorway. Intersection modelling and analysis of the 2016 scenario indicated that Project will not exceed the current capacity on the M5 Motorway/ Moorebank Avenue, the M5 Motorway/ Hume Highway, the M5 Motorway / Heathcote Road and Cambridge Avenue, nor would it reduce the Level of Service of the Moorebank Avenue / Heathcote Road intersection once the upgrades that have been previously identified by Roads and Maritime Services (RMS) and Transport for NSW are complete.

A Preliminary Operational Traffic Management Plan has been prepared to identify the management strategies to minimise traffic impacts associated with operation of the facility and would be finalised prior to operation of the IMT facility. The Construction Traffic and Access Management Plan provides the management measures relating to traffic and access for the Project. A Final Operational Traffic and Access Management Plan is currently in development.

4.3 Access

Access to the Project will be to and from Moorebank Avenue. However, no heavy vehicles will be permitted to turn right from Moorebank Avenue into the Project. ,

Formal pedestrian facilities are currently provided on the western side of Moorebank Avenue only. The pedestrian pathway extends from the northern boundary of the IMEX Terminal Facility to Chatham Avenue. Traffic light controlled crossings to the eastern side of Moorebank Avenue are provided at:

- Intersection of the access road to the Defence Joint Logistics Unit (east)
- IMEX Terminal Facility main entrance (opposite the Defence Support Rd)
- IMEX Terminal Facility secondary entrance
- Intersection at Chatham Avenue.

The Project will have a pedestrian crossing and signals at the IMEX Terminal Facility Administration Building (near the car park). Further to these external signals and pedestrian crossing, there will be new pedestrian access pathways on the eastern and western boundaries of Moorebank Avenue adjacent to the IMEX Terminal Facility entrance.

4.3.1 Access Tracks

Access tracks will be constructed to facilitate construction and on-going maintenance of the Rail Link. The access tracks will also enable access for the Glenfield Waste Facility operators (on the Glenfield Waste Facility site) and for Sydney Trains (within the RailCorp Land and the East Hills Rail Corridor).

The access tracks will be a combination of pedestrian and vehicular. These access tracks will be located within the identified footprint of the Rail Link and will utilise previously disturbed corridors, wherever possible.

A summary of the access tracks is provided below in Table 4, and the RailCorp Maintenance Access Road detailed design is provided in Appendix G.

Table 4 Rail Link Access Tracks

Location	Track Section	Description
West of Georges River	From the Georges River Bridge to the SSFL, through the Glenfield Waste Facility	• Main access track located on the eastern side of the Rail Link • A level area will be provided near the southern and northern connections to facilitate maintenance • An informal level crossing will be provided over the southern connection at this location • Access through existing gate into Australian Rail Track Corporation (ARTC) / Sydney Trains Rail Corridor • Street access provided from Cambridge Avenue through the Glenfield Waste Facility main entrance.
East of Georges River	From the Georges River bridge to Moorebank Avenue	• Main access track located on the northern side of the Rail Link • The access track provides the opportunity to access under the proposed Georges River Bridge via an existing access track • Pedestrian (restricted personnel) access is available under the Moorebank Avenue overbridge • Street access will be from Moorebank Avenue.
East of Moorebank Avenue	From Moorebank Avenue to Rail Line	• Vehicle access is provided from Moorebank Avenue to Anzac Creek culvert • Vehicle access is also provided from Moorebank Avenue to the rail link just north of the bootland
RailCorp Maintenance Access Road	Access off Moorebank Avenue southbound lane, just north of the existing Moorebank Avenue Bridge over the East Hills Line	• This track is a combination of sealed and unsealed road stretching east approximately 150m from Moorebank Avenue to the existing East Hills rail corridor • 12m wide swing gate and lock at the intersection of the track with Moorebank Avenue • Gate linking the proposed access track to the East Hills Line corridor • Only be accessible to authorised maintenance personnel and is required to ensure members of the public do not enter. • Right hand turn movements into and out of the access road will be banned due to lack of sight; with access / egress restricted to left-in and left-out only.

4.4 View Corridors

There are a number of existing view corridors looking toward the Project. The prominence of these views are strongest passing along the direct frontage at Moorebank Avenue, and to some extent from further distances where there is currently minimal visual impairment across cleared or unobstructed land. Views from further surrounding residential areas generally have minimal or no views due to the significant viewing distance, undulated topography and landform, or shielding by other existing structures and vegetation.

Measures to reduce the visual impact of the Project primarily comprise of screen planting in key areas and visual buffers to produce a high-quality landscape that reinforces and extends the surrounding natural context and ecological qualities. The landscape treatment will visually and physically connect with the existing landscape and vegetation adjacent to the site.

Along the Moorebank Avenue frontage, an 18 m wide corridor of screening vegetation and a bio-retention swale will be comprised of native tree species with a dense tree canopy and lower screen planting. Along the site boundaries, a “Boundary Treatment” and “Buffer Zone” will incorporate landscape treatment consistent with existing local species in the area and provide an essential scale of planting to complement the developments built-form.

Where landscaping is clear of railway lines, planting will comprise mixed tree planting to create natural feeling through landscape zones and mixed under-storey planting consisting of native shrubs and ground covers to form a virtually impenetrable barrier when mature. This treatment will mitigate views from surrounding areas, and the existing tree planting (where retained) along Moorebank Avenue in conjunction with proposed screening and feature walls, would screen a large proportion of potential views from the north-west.

Overall, the proposed landscape treatments will result in an improvement in the visual amenity of the entire site and will increase the current level of screening.

4.5 Stormwater Management

Construction of the Project will require vegetation clearing and bulk earthworks, which have the potential to lead to erosion and generate sediment laden runoff into the Georges River or Anzac Creek, thereby impacting water quality. The Construction Soil and Water Management Plan (CSWMP) and Erosion and Sediment Control Plan (ESCP) has been prepared in accordance with the principles and requirements of the Blue Book.

The Project will result in changes to the Project’s site catchment boundaries during operations. In addition, the Project will result in an increase in surface water generation and pollutant loads as a result of the increase in impervious surfaces on the site. Onsite detention (OSD) basins, outlet channels and water sensitive urban design (WSUD) elements will be sized to provide adequate system capacities and mitigate potential adverse flood impacts and increases in stormwater discharge from the site that may otherwise result from the Project. WSUD measures, including gross pollutant traps (GPT) and rain gardens, will be designed to ensure the quality of stormwater leaving the Project will be of equivalent quality to the existing conditions, or provide an improvement to stormwater quality leaving the Project. Likewise, the stormwater infrastructure has been designed such that the stormwater quality also satisfies the pollution targets of the Liverpool DCP.

Refer to the Flood Emergency Response Plan for information on flood management strategy for the Project.

4.5.1 Stormwater design refinements

The design of the IMEX terminal as proposed in the MPE Stage 1 EIS included an open stormwater channel along the eastern and northern boundary to redirect stormwater flows from the adjacent land east of the IMEX terminal. This adjacent land is the site of the approved MPE Stage 2 Project. Consequently, the IMEX stormwater drainage design has been updated to remove the eastern and northern stormwater channel, which becomes redundant with implementation of the MPE Stage 2 drainage infrastructure; the Stage 2 drainage will directly interface with the IMEX terminal stormwater drainage pipes. This update to the design continues to satisfy the stormwater quality objectives of the Project as discussed in section 4.5 above.

4.6 Site Characteristic Analysis

An analysis of the Project, to demonstrate the integration of the general and local site context, and the proposed objectives and principles, was undertaken to determine constraints and opportunities for the development. The general and local site context findings are discussed in Section 3, while the landscape and building design objectives and principles are presented in Sections 5 and 6. The following constraints and opportunities were determined and are presented in relative importance:

- Due to site dimensional constraints, space is a premium within the Rail Link. The rail corridor must not exceed 20 m in width, as this area will be cleared for the construction and operation of the Rail Link. This corridor will also be 20 m wide within ecologically sensitive areas including the Southern Boot Land and Georges River riparian corridor. As such, this presents an opportunity for the development to integrate

into surrounding land uses and existing developments through use of considered structures, existing landforms and vegetation.

- The Project is located in an industrial area, and will be zoned as industrial. As such, this provides an opportunity for the development to provide safe and efficient circulation for pedestrian, cyclists and vehicles.
- Due to the large scale of the development, there is opportunity for landscape screening along the boundary of the Project site to partially shield the operating environment of the development. Utilising a 'Buffer Zone' for the Project along Moorebank Avenue, strong shielding vegetation will be provided on either side of a bio-retention swale and will include a combination of dense tree canopy cover as well as lower screen planting. However, see section 6.2.1 regarding timing for landscaping implementation along Moorebank Avenue.
- Opportunities to include the history of the site throughout the Project will be developed through a Heritage Interpretation Plan.

5 IDENTIFICATION OF VISION, OBJECTIVES AND PRINCIPLES

5.1 Vision

The Project will not only provide vital infrastructure and employment growth, it will be a premier business logistics centre, providing the Moorebank business area with a unique identity through urban renewal. The process will see the Project become an integrated component within the existing landscape and becoming a significant feature in terms of local and community identity and connectivity to the greater Sydney and Liverpool areas.

The design for the Project will aim to improve the existing landscape and be sensitive to existing environmental qualities. The urban design principles outlined in Section 5.2 are proposed to ensure that the unique aspects of the Project and surrounding areas are reflected in the development design solution.

The built form, open space and landscape elements aim to promote visually pleasing environments. Both the urban and building design principles proposed in this document are generally in accordance with the requirements and objectives stated in Sections 1.2 and 1.4 of the Liverpool Development Control Plan (DCP) 2008. It is intended that the built form shall be varied and interesting to provide an attractive and articulated streetscape. The selection of building materials and colours will be appropriate for intended use according to the land use structure.

5.2 Urban Design Principles

The urban design principles and overall Project vision have been formed around a set of core values, derived from Sections 3 and 4 presented above, which can be summarised as:

Responsive: the design will be both responsive and sympathetic to the form, colours and textures of the natural and cultural character of the existing landscape. The Project will integrate with, and improve the existing site character to form a high performance and quality urban landscape feature.

- **Community**: while the Project will have limited access to the general public, the Project will include a provision for suitable and sufficient amenity which may be accessible by both the occupants and the public (albeit predominantly indirectly). This improved local amenity will incorporate landscaping and open spaces for employees, creating a ‘sense of place’ and conveying a feeling of community.
- **Considerate**: landscape and urban treatments will be considerate of the need to provide visual and acoustic shielding in the form of vegetation, landform and structures. A positive visual, environmental and management relationship with adjoining lands will be reinforced.
- **Connectivity**: a suite of design instruments will connect the various MPE site precincts, including well defined landscaping, entry statements, newly constructed landforms and streetscape elements, signage, street furniture and other built elements. Provision will be made to accommodate on-site heritage interpretation options.
- **Identity**: the urban design and landscape form will express the character of the Project and communicate a strong and unique identity that complements the surrounding land uses.
- **Adaptability**: a high quality urban design standard will be adopted which is both adaptable and flexible in each key component to enable longevity, maintained value and ability to suit the needs of future generations, for its stakeholders, occupants and the community.
- **Sustainability**: ecologically sustainable development principles will be incorporated into all facets of the Project where feasible and reasonable. WSUD will be integrated into the built and landscaped elements of the development, and on-site collection and re-use of stormwater and recycled water will be considered.
- **Movement**: the urban design will support an internal vehicular and pedestrian traffic network that will be both safe and efficient and may incorporate an integrated public or on-site transport system as well as pedestrian and cycle connections throughout the Project and to surrounding areas
- **Visually Appealing**: the urban design will be visually appealing to the public and surrounding areas to ensure continuity between the Project and surrounding areas.

5.3 Objectives

A summary of the urban design objectives that have been adopted for the Project is outlined below:

- Preferential use of native and endemic plant species and maximise landscaped areas wherever possible
- Create a distinctive and attractive natural environment within the context of an industrial complex
- Maintain landscape values and be sensitive to the existing environmental values of the site and surrounding area
- Maximise environmentally sustainable design where feasible and reasonable
- Provide an aesthetically pleasing and safe environment for workers and visitors alike
- Signage to promote and enhance safety, security and efficient way-finding for pedestrians, cyclists and vehicles at all hours of operation
- Promote appropriate lighting and security systems design to ensure that all employment areas are safe and secure at all hours of operation as well as out of hours
- Minimise visual impacts on surrounding areas through façade design and integration of the Project with surrounding land uses
- Meet sustainability requirements of the Project (per the Clean Energy Finance Corporation mandated conditions).

6 IMEX TERMINAL FACILITY

6.1 Structures

6.1.1 Administration Building

The administration building has been designed:

- In accordance with the Building Code and relevant Australian Standards (AS)
- To be suitable to support a peak demand of 30 office staff and 10 field staff
- With a building management system, capable of controlling and regulating air-conditioning and electrical utilities. Fit out of the administration building must be to the Principal's satisfaction and approval.

All IMEX Terminal Facility operations will be controlled from the administration building control room and all utilities will be monitored via the administration building. A model of the administration building is presented in Figure 1. The materials and external finishes are listed in Appendix B.

Figure 1 Administration Building

6.1.2 High Voltage Substation

A new 11 kilovolt (kV) high voltage (HV) power supply will be provided to the Project to service the IMEX Terminal Facility and the future site expansion (MPE Stage 2). From the Endeavour Energy substation outside the Project boundary, one 11 kV feed will connect to a northern HV switchroom constructed and energised initially for manual stage operations. During this manual phase the HV switchroom will contain two HV switchboards including the Main Switchboard North (MSN) and Distribution Switchboard North (DSN).

For the future automated stage, a second southern HV switchroom will be constructed and energised via the second 11kV feed from the Endeavour Energy second switching station. The southern HV switchroom will contain three HV switchboards, Main Switchboard South Distribution Switchboard South and Crane Supply Switchboard South. The configuration of these switchboards will be similar to switchboards in the north switchroom.

Conduit reticulation will be installed around the site, both for HV and low voltage (LV) power. The conduits will be capped initially at the manual phase boundary, then extended during a future contract scope for automated works to power infrastructure within the automated phase boundary. HV conduits will also be installed and capped at the boundary to cater for supply to the future eastern precinct warehouses.

New 11kV power feeds connect to the Anzac Zone substation in Anzac Road, where three existing panels will be made available. From there, three cables will follow the southern verge of Anzac Road and cross Moorebank Ave. A feed will be provided to the future MPW expansion. The cables will continue to run within the western verge of the proposed widened Moorebank Avenue to the existing stormwater culvert. Then, the cables will cross the road and connect to two new Endeavour Energy substations. From there power will be reticulated to the northern HV substation.

The HV switchroom design is presented in Appendix B.

6.1.3 Fire Water Tanks

The fire water supplies to service the IMEX Terminal Facility include provision for fire water storage tanks, two fire hydrant diesel pumps and one jockey pump,.

The fire hydrant system design has adopted the following design criteria:

- Designed to provide coverage for the IMEX Terminal Facility in compliance with the Fire Engineering Report and NSW Fire and Rescue (NSWFR) operational specifications. Fire hydrant pumps have been designed to provide required pressures and flows for the IMEX Terminal Facility in compliance with the AS 2419.1 and AS 2941 requirements and in accordance with Fire Engineering Report and NSWFR operational specifications. They will also provide nominated flows and pressure at the MPE Stage 2 site boundary
- Above ground water storage tanks which provide the water supply will be compliant with AS2419.1 requirements and in accordance with Fire Engineering Report and NSWFR operational specifications (2 x 415 kl tanks)
- Pumps will comply with AS 2941 requirements for automated starting
- IMEX Terminal Facility fire hydrant system flow will be 40 L/s
- IMEX Terminal Facility minimum residual pressure at the most disadvantaged fire hydrant will be 700 kPa
- Trenching methods shall follow AS3500; embedment of pipe shall be Controlled Low Strength Material (CLSM) or concrete encased when subject to utility crossings or reduced cover
- In ground fire hydrant main ring is PE100 PN16 SDR11 DN280 pipe and fittings with electrofusion joints and poly-wrap sleeve
- In ground fire hydrant branches to hydrant shall be PE100 PN16 SDR11 DN180 pipe and fittings with electrofusion joints and poly-wrap sleeve
- Above ground fire hydrant main ring service shall be DN100 roll grooved hot dipped galvanised steel medium pipes, fittings and couplings
- In ground sprinkler service, main pipe shall be PE100 PN16 SDR11 DN315 pipe and fittings with electrofusion joints and poly-wrap sleeve.

A model of the fire water tanks is presented in Figure 2.

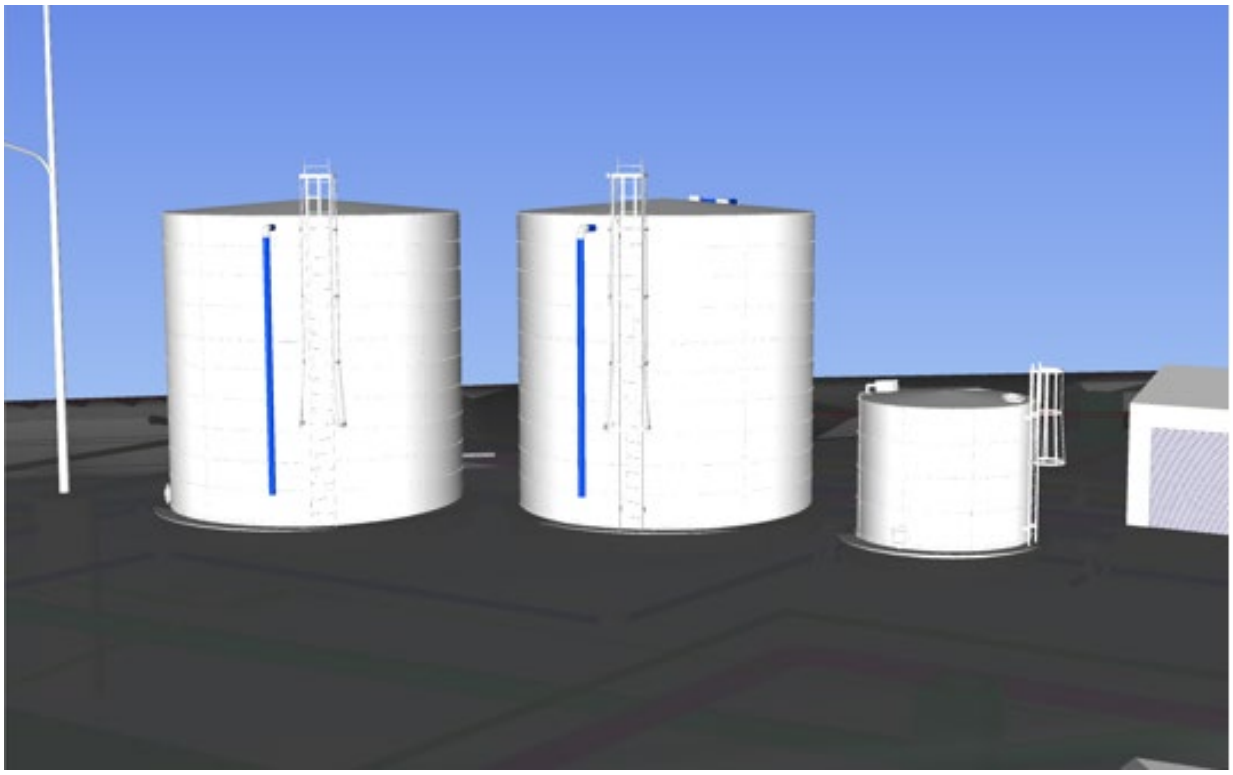

Figure 2 Fire Water Tank Model

6.1.4 Pumphouse

Potable water for the site will be sourced from the DN200 cast iron cement lined (CICL) Sydney Water Corporation water main in Moorebank Avenue, via a proposed new DN200 connection that will supply potable, hydrant and sprinkler water to both the IMEX Terminal Facility and the future SIMTA precinct expansion (MPE Stage 2).

The potable water service on the IMEX Terminal Facility will extend from the connection point on Moorebank Avenue through an authority water meter assembly and via an underground poly welded pipe to a pressure pump set located in the pump house. From there the line is routed to the Administration Building fixtures, with a further extension to the south of the Administration Building for future maintenance use. No other facilities in the IMEX Terminal Facility will require supply of potable water.

The allocations for the future precinct (MPE Stage 2) will include space allowances for both a 50 kL tank and pressure pump set in the pumphouse.

The potable water service will enter the site and feed into the pumphouse and the pressure pump set. From the pumphouse, the potable water service will reticulate around the northern end of the carpark to the Administration Building.

The pumphouse will be constructed using the same cladding as the Administration Building. The external finish materials are provided in Appendix B.

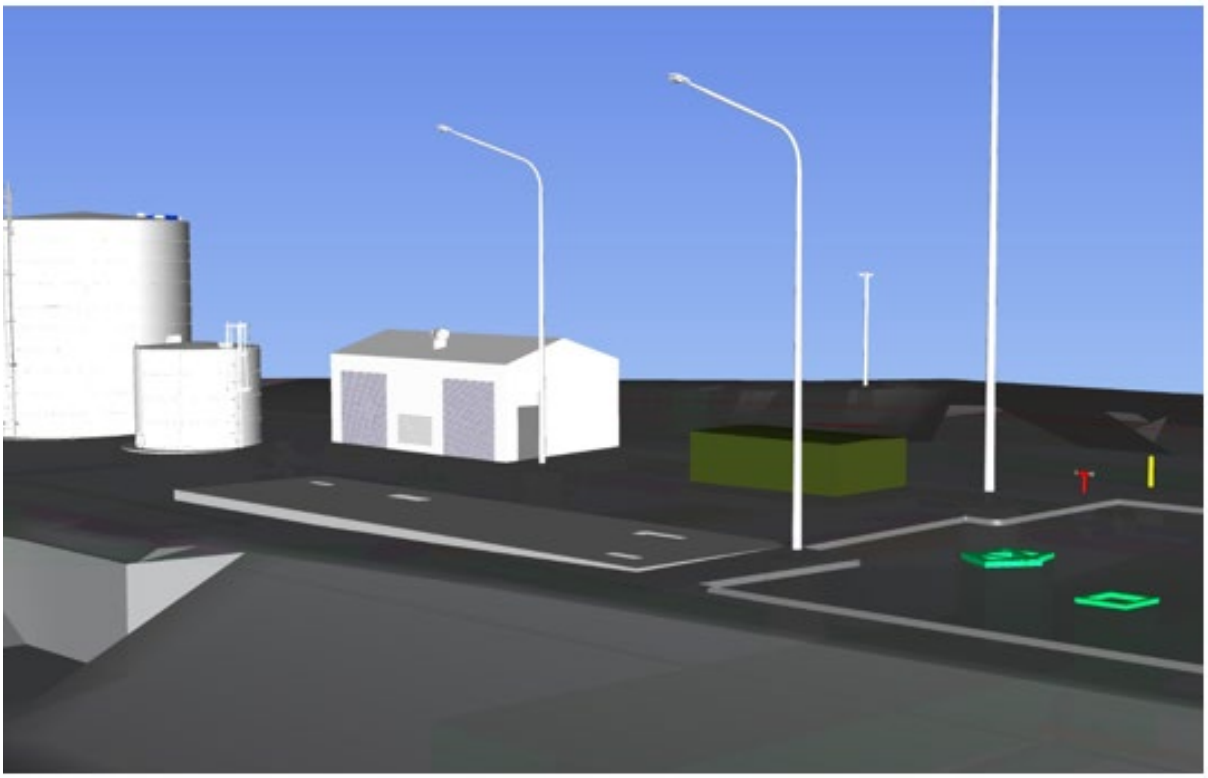

Figure 3 Pumphouse Model

6.1.5 Footpaths, Cycle Paths and Car Parks

There are no pedestrian footpaths or cycle paths within the IMEX Terminal Facility.

There is one car park connected to the administration building which will be accessible by the public. The pavement materials are provided in Appendix E.

6.1.6 Optical Character Recognition (OCR) Portal

The OCR portal provides the capacity for automated inspection, identification and inventory of rail containers entering and exiting the IMEX terminal. The OCR Portal provides a solution for remote visual inspection and automatic identification of containers and railcars.

The OCR employs a sophisticated railcar detection and identification system, which can return the exact position of every container on an identified railcar. The OCR solution supports running trains, stops and shunting without delaying or hindering the operational processes in any way.

The OCR portal consists of a steel gantry structure that straddles the Rail Link just south of the IMEX terminal. The structure sits upon concrete footings and has a variety of cameras and sensors mounted to it (see Figure 4).

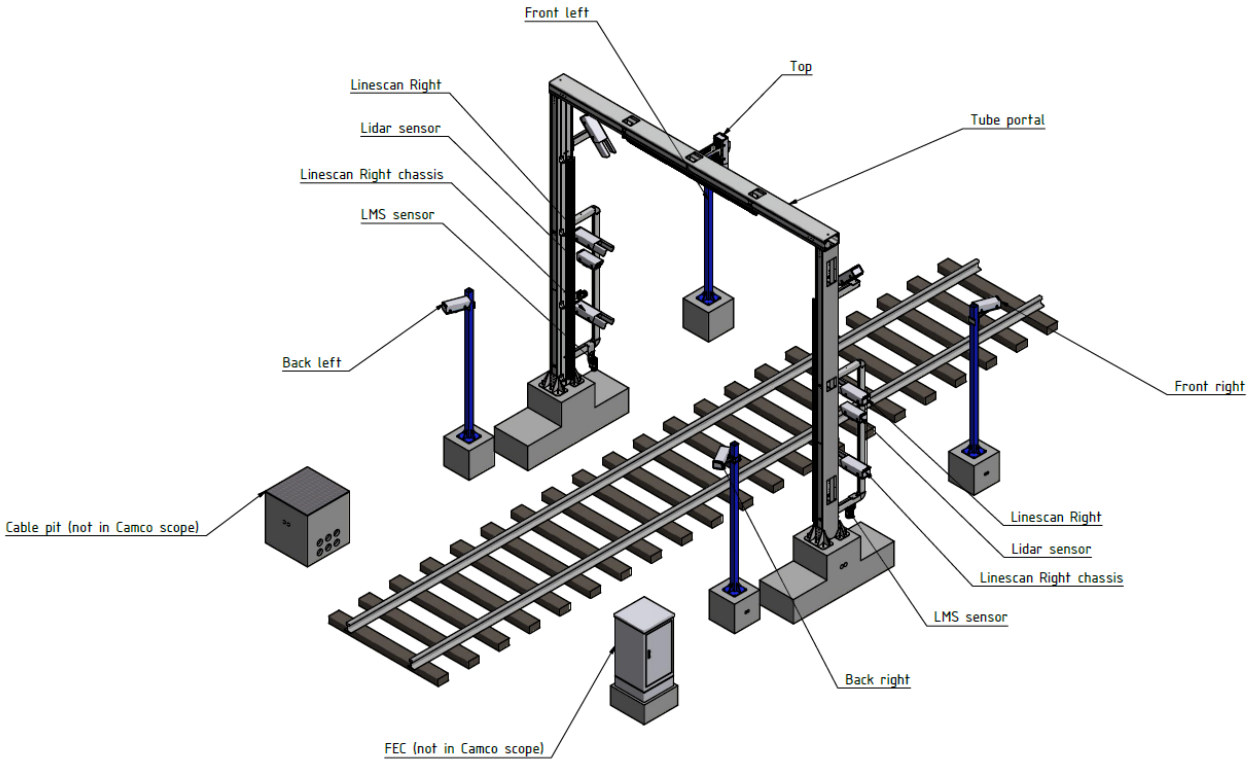

Figure 4 Optical Character Recognition (OCR) portal

6.2 Landscaping

The landscape focus of the Project centres along the 18-metre building set-back buffer alongside Moorebank Avenue frontage which forms a major connection to the Project. This frontage incorporates a vegetated bio-retention channel which follows the length of the Moorebank Avenue frontage (refer to Appendix A). Large native trees and various understorey planting endemic to the local area have been selected within this area to create a buffer and serve in minimising visual impacts from the surrounding urban landscape. The landscape design involves nodal points of visual interest at the entrance points to the precinct.

Given that the Project site is bounded to the south with existing vegetation communities, the landscape design serves to integrate the development with the surrounding environment by using tree, shrub and groundcover species that are local to the area to create habitat opportunities and links to the surrounding context. The tree planting has been designed with the intent of creating a uniform canopy cover throughout the area.

Plant species have been selected for their site-suitability with many species selected from LCC's recommended plant list. Topsoil will be placed in the landscaped areas throughout the Project site. The Landscape Plans for IMEX Terminal Facility have been developed by Ground Ink (refer to Appendix A).

6.2.1 Landscaping timing and design refinements

The upgrade to Moorebank Avenue includes raising the ground level by about two metres, as part of MPE Stage 2, and will require substantial earthworks in the same location of the proposed screening plantings for the IMEX Landscape Plan. The Moorebank Avenue upgrade works will commence in quarter 3 2019 and would require removal of the IMEX landscaped vegetation. As such, this UDLP no longer proposes carrying out these plantings as a part of the IMEX construction. Instead the proposed screening vegetation will be included within the UDLP Area 6 for MPE Stage 2 (SSD 7628 CoC B140 and B141) and implemented as part of MAUW and to meet RMS specifications.

The landscaping design alongside Moorebank Avenue will be prepared in consultation with RMS to ensure it satisfies relevant traffic safety guidelines. Notwithstanding the safety issues, the landscaping design

refinements carried out for traffic safety purposes will, where possible, continue to address the landscape character and visual amenity considerations as discussed in section 6.2 above.

6.3 Fencing, Gates, Barriers and Signage

6.3.1 Fencing and Gates

Fences and gates are detailed in the Approved for Construction Design Report – Fencing, Gate and Signage Package

Fencing shall generally be in accordance with AS1725.1 (2010). Different types of fencing will be designed and include the following (refer to Appendix C):

- A 3 m high security fence inclusive of five strands of barbed wire, with own footings which will be located around the bonded areas
- A 2.1 m high fence with own footings or base plate adaptors for selected paved areas. For concrete block pavements, the fence posts will be carried on separate footings. This fence will be located around culverts, service installations and other internal or interim site boundaries to separate specific use areas.

Fencing will comprise of the following:

- Chain wire mesh, which is hot dip galvanised
- Wire pitch will be 50 mm
- Wire thickness will be 3.15 mm
- Support posts, top and bottom rails, and bracing cable/poles will be installed as per relevant standards.

Where gates are non-standard or specialist, a general performance requirement has been stipulated on plans. This will assist the Construction Contractor in obtaining quotations and installing compliant gates. This requirement is particular to the site entry gate, rail gate as well as other automated gates. All standard gates will comply with AS1725.1 (2010).

Perimeter fencing will be constructed according to the Depot Licence Application Guidelines (refer to Appendix F) and will include the following:

- Base to be secured where practicable and topped with fixed security wire
- No overhanging trees which could facilitate a breach of the perimeter
- To be maintained in good condition.

6.3.2 Barriers

Barriers are used on the Project for multifunctional purposes including providing a fence / security outcome, separating use areas and mitigating potential incidents. The following barriers will be used at the Project:

- Road and Maritime Services (RMS) standard F-Type barrier (including embankment)
- RMS standard W-Beam barrier (including median)
- RMS standard Thriebeam Barrier
- RMS standard Temporary F-Type barrier (modified with drainage slots).

6.3.3 Signage

Signage for the IMEX Facility Terminal is generally in accordance with CoC G4 and Drawing A3001 in Appendix C.

6.4 Erosion and Sediment Control

The erosion and sediment management measures prescribed for the Project are based on the mitigation measures presented in the EIS, Commonwealth Conditions of Approval (CoA), and the Minister's CoC, as well as applicable industry guidelines. Further erosion and sediment control details are outlined in the CSWMP and Progressive ESCP.

The guiding principles for erosion and sediment control that were adopted are as follows:

- Priority should be given to management practices that minimise erosion, rather than to those that capture sediment downslope or at the catchment outlet
- Progressively stabilise and rehabilitate exposed surfaces as soon as practicable
- Minimise the area of soil disturbed and exposed to erosion at any one time
- Divert clean water around the Project or control the flow of clean water at non-erodible velocities through the Project
- Provision of boundary treatments around the perimeter of construction areas to minimise the migration of sediment off the Project
- Permanent or temporary drainage works will be installed as early as practical in the construction program to minimise uncontrolled drainage and associated erosion, including the OSD basins and flood conveyance works
- Stockpiles will be located away from flow paths on appropriate impermeable surfaces, to minimise potential sediment transportation. Where practicable, stockpiles will be stabilised if in place for more than ten days and will be formed with sediment filters in place immediately downslope.
- Existing catchments and sub-catchment boundaries will be maintained as far as practicable
- Site imperviousness and grades should be limited to the extent of existing imperviousness and grades under existing development conditions
- The wheels of all vehicles will be cleaned prior to exiting the construction site where excavation occurs to prevent the tracking of mud. Where this is not practical, or excessive soil transfer occurs onto paved areas, street cleaning will be undertaken when necessary
- Inspection of all permanent and temporary erosion and sedimentation control works prior to and post rainfall events and prior to closure of the Project
- Erosion and sediment control structures to be inspected and maintained, repaired or augmented as required.

6.5 Noise

As per the EIS, no noise mitigation measures that require landscaping will be constructed on the IMEX Terminal Facility.

6.6 Non-Paved Surface Treatment

Non-paved surface treatment will be provided at the following locations for the manual operation phase:

- Along the western boundary, within either side of the OSD channel and setback areas from the channel to internal pavements, facilities areas and the administration building
- Within the batter and tie-in areas along the southern boundary.

The majority of these areas are stormwater conveyance channels, therefore will be treated with various geo-matting to provide initial and longer-term erosion control. A hydroseed grass mix will be applied to these areas to promote medium-long term establishment of vegetation for erosion protection. Areas not designated for stormwater conveyance will be treated with a hydroseed grass mix as minimum to assist in stabilisation of the area.

The automated phase will require the eastern OSD channel to be filled including the removal of surface treatment within the area.

6.7 Lighting

The lighting design for the IMEX Terminal Facility takes into account the eventual transition from manual phase to automatic phase that forms part of the operational strategy of the Project site.

The Basis of Design – Lighting Plan for the IMEX Terminal Facility is provided in Appendix D. AS 4282-1997 *Control of the obtrusive effects of outdoor lighting* was referenced in the lighting design in order to minimise the impacts of lighting spill onto local residents. The report defines how the standard was addressed and included in the current design for the IMEX Terminal Facility. The obtrusive lighting compliance reports against AS 4282 are also provided in Appendix D, which confirm compliance with the standard in all instances. Lighting will be positioned to face downwards to eliminate upward light spill

6.7.1 Lighting Design – Manual Phase

The lighting design features 18 m high mast poles, mounted with high powered light-emitting diode (LED) floodlights, as the main source to illuminate most of the Project.

Within the rail cargo area, 18 m high mast poles have been positioned at less than 50 m spacing along the rail corridor, between the second and third track. Each pole is mounted with four high power LED floodlights, angled 90° apart, with a tilt of 8° to allow wider illumination. The 18 m poles take into consideration the transition phase from manual to automatic operation. Keeping all the high mast poles at no more than 18 m height, the light poles situated within the rail corridor can continue to operate even during the installation of the new crane for automatic phase.

For the remainder of the Project, 18 m high mast poles with one or two high power LED floodlights are used to cover the majority of the drive-in area. A combination of 12 m and 9 m poles is used to provide the additional required lighting in the more restricted areas.

The perimeter fencing is illuminated mainly by the 12 m height pole. These fences are illuminated at a level which allow the perimeter closed circuit television to operate effectively. The local driveways and the carpark are illuminated by a combination of the 18 m high mast poles and the 12 m light poles. The 12 m light poles will be used to illuminate the areas which are difficult to reach from the 18 m high mast poles.

A number of 9 m poles have been allocated near the pedestrian crossing given its higher point vertical illuminance light level requirement as required by AS 1158.

6.7.2 Lighting Design – Automatic Phase

Given that the Project will be transitioned into full automation with no manual labours, SIMTA advised there is little requirement for lighting in the container handling area. Some illumination is anticipated from the automated crane that is to be installed for the automatic phase.

The 18 m high mast poles along the rail corridor will be decommissioned as part of the transition from manual to automated phase. The 12 m light poles provided for the perimeter / security fencing lighting will remain and serve the same purpose as the manual operation phase. Both the eastern and western fence lines will be shifted outward as part of the transition from manual to automatic phase, generating more space within the rail cargo area. As such, the perimeter poles will correspondingly shift with the new fence lines to keep the illuminance the same as manual operation phase.

Additional lighting will be provided around the container transition area, where containers are moved by autonomous carriers onto road transport. This area will have additional lighting for this transition and driver safety.

The local driveway and the carpark will be kept the same as for manual phase. The pedestrian crossing will be removed for the automated phase, but the lighting provided in manual phase will remain applicable for the automated phase. As such, the 9 m poles provided for the pedestrian crossing will be maintained.

7 RAIL LINK

7.1 Structures

Rail Link earthworks detailed design drawings have been provided in Appendix H. These drawings outline the earthworks design, as well as location of the structures associated with the Rail Link (which are further described below).

7.1.1 Georges River Bridge

The Georges River Bridge facilitates the new rail alignment to connect the SSFL to the Project by spanning across Georges River and Tarakan Road. This new structure comprises a six-span structure with an overall length of approximately 178 m, along the deck control line. Span 1 is 23.4 m in length, and the five remaining spans are 31 m long along the deck control line.

The Georges River Bridge has a varying horizontal alignment with the skew angle increasing for each span, reaching a maximum angle of 29° skew to the bridge control line at the Western abutment. The piers and abutments are all parallel, but due to the varying horizontal alignment, the girders in each span have a different end skew. The total width of the rail bridge, perpendicular to the rail, is 10.575 m minimum, and 10.595 m maximum, and accommodates two rail tracks.

There is an existing bridge located immediately upstream of the proposed bridge. The existing bridge soffit level is approximately 13.07 m AHD. The proposed bridge will have a soffit level of 14.1 m AHD to assist with the afflux requirements. A preliminary artist's impression of the Georges River Bridge also showing the existing bridge, is shown in Figure 5.

Figure 5 Artists Impression of Georges River Bridge

Table 5outlines the concrete and reinforcements properties for the Georges River Bridge.

Table 5 Concrete and Reinforcement Properties for the Georges River Bridge

Design Parameter	Value
Concrete Properties	
Cast in-situ Piles	40 MPa
Super-T girders	50 MPa

Design Parameter	Value
Substructure elements	40 MPa
Approach Slabs	40 MPa
Deck Slabs	40 MPa
Mass Concrete	20 MPa
Reinforcement Properties	
Cast in-situ Piles	40 MPa
Super-T girders	50 MPa
Substructure elements	40 MPa
Approach Slabs	40 MPa
Deck Slabs	40 MPa
Mass Concrete	20 MPa

7.1.2 Reinforced Earth Wall

The design of the reinforced earth wall (REW) assumes a coherent gravity block of reinforced earth, retaining and supporting geotechnically specified loads. Reinforced earth is a composite reinforced soil structure formed by the association of granular soil and facing reinforcement products. The reinforced earth wall will also comprise of the following:

- Temporary hydroseeding as outlined in Section 7.2 and Appendix A to prepare the external surface for landfilling activities that will be undertaken by GWS in the future between approximate southbound chainages 40300 and chainage 40050
- Shotcrete walls where soil nails are being utilised between approximate southbound chainages 40050 and chainage 39900
- High Density Poly-Ethylene liner from top of batter to bench along the southern tie-in to SSFL to prepare the external surface for landfilling activities that will be undertaken by GWS in the future.

The coherent gravity block is defined by the facing, the extent of the reinforcement and its associated granular fill. This block acts as a gravity retaining structure whose external stability takes into account the loading of the block and its resistance to sliding, overturning and bearing pressure at the base. The internal stability takes into account the definition of an active and resistant zone whose geometry is determined by the characteristics of the system and its loading.

The method of design complies with the requirements of RMS design specification R57. The design life is 100 years.

A brief description of the reinforced earth wall is provided below in Table 6.

Table 6 Key Reinforced Earth Wall Design Features

Element	Information
Facing Panels	• TerraPlus® Precast Concrete facing panels • 2000 mm (nominal) high x 2000 mm (nominal) wide • Concrete strength - Grade 40 MPa • Minimum cover to reinforcement - 40 mm

Element	Information
Reinforcing Strips	• Galvanised REhas® Strips reinforcement system - ribbed flat steel reinforcing strip designed to Reinforced Earth Pty Limited's specifications to maximise the tensile and adherence capacity of the reinforcement • Size: 50 mm x 4 mm HA nominal section and 45 mm x 5 mm HAR nominal section • Minimum Yield strength - 400 MPa • Minimum Tensile Strength - 520 MPa • Galvanised Coating Mass – 600 g/m² (85 µm equivalent thickness)
Soil Properties	• Granular material meeting the REPL specifications as a minimum and R57 • Comply with the requirement of free draining material, as such, must have a grading limit of not more than 5% passing the 75 µm sieve
Loading Factors	• Designed to support a uniform live load equivalent to 300 LA rail traffic loading along the railway, and the surcharge from trafficable assess road for maintenance vehicles • Considered the effects of Temporary Fresh Water Inundation up to 100 year ARI Flood level RL11.560 m in front of wall REW 1 and partially in front of REW2

7.1.2.1 Drainage

The track formation supported by the reinforced earth vertical wall and and 0.6H to 1.0V Soil Nail Embankments will be drained via half pipe drains at the top of each retaining structure. Flows from these drains are collected via pits and pipes and discharged through the base of the retaining wall towards the Georges River via GPTs and riprap aprons at the outlets.

The track formation south of the earth retaining structures and up to the maintenance access road (at 40.3 km) will be drained by cess drains to the west side of the track, and to the east side of the track the land will be graded out to the existing maintenance access road to allow stormwater to sheet flow off the Rail Link formation towards the Georges River. The cess drains connect to a GPT, riprap apron and level spreader at 40.085 km, before discharging into the Georges River.

7.1.3 Moorebank Avenue Overbridge

The Moorebank Avenue Overbridge facilitates the new rail alignment to connect the SSFL to the Project by spanning over the rail alignment to be constructed under the existing Moorebank Avenue.

The Moorebank Avenue Overbridge consists of a single span of 9.8 m between pile centrelines. The Moorebank Avenue Overbridge carries road traffic on Moorebank Avenue from Anzac Road to Cambridge Avenue, and allows the new rail alignment to pass beneath the bridge deck and through the existing embankment. The span arrangement is set to ensure that the width of the bridge follows the alignment of the railway beneath the deck slab. The bridge deck covering the rail line has an overall length of approximately 38.5 m along the deck control line. The total width of the bridge between traffic barriers to accommodate the road geometry is 11.8 m.

A brief description of the bridge structure is provided below in Table 7.

Table 7 Key Bridge Design Features

Element	Information
Rail	A single rail track is provided. The total width of the bridge deck perpendicular to the rail, is 8.9 m in accordance with ARTC T&C CoP Section 7 Clearance. The track is classified as 80MLF23, Standard Gauge AS60kg Rail with Medium Duty sleepers and Resilient Fasteners. The track alignment is flat, along the length of the bridge longitudinally, and has a transverse fall of 2%. The top of rail levels have been based on the following depths: • Ballast Depth - min. 250 mm • Rail, Pad & Sleeper depth – (min 355 mm) • The minimum ballast depth is measured from the bottom of the (medium duty) concrete sleeper directly under the low rail.

Element	Information
Road	Moorebank Avenue facilitates road traffic between from Anzac Road and Cambridge Avenue. The road is on a horizontal radius of 500 m to the bridge deck control line. Across the bridge medium performance concrete traffic barriers are provided. The existing Moorebank Avenue road will require lifting at the bridge location to accommodate the rail line below and will necessitate tie-in with the existing road.
Superstructure	The superstructure consists of a cast in-situ reinforced concrete deck slab which is integral with the substructure. The reinforced concrete slab is 650 mm thick, and will have a minimum 85 mm thick asphaltic surfacing layer. Due to the high skew of the bridge, squaring up the deck is necessary to provide propping to the abutment walls where the fill height on one abutment is different to the other which produces a global twisting action of the entire structure. Squaring off the bridge ends results in a dead-zone behind the traffic barriers with safety screen on top. A handrail is provided along this squared off edge of the bridge deck. The steel protection angle is required along the leading edges under the deck over the railway corridor.
Substructure	The substructure arrangement comprises reinforced integral abutments supported on 900mm diameter contiguous bored cast in place concrete piles. The piled substructure will be constructed using a top-down construction method. When the deck is complete, the area in front of the piles will be excavated and shotcrete placed between the piles to retain the existing fill behind.
Foundations	Abutment: Reinforced concrete piles are founded onto medium strength siltstone or better.
Articulation	Longitudinal and transverse forces from the deck are transferred to the substructure through the integral connection. The portal frame structure restrains the deck in both directions and these induced deck forces are transferred to the fill behind the abutments. In this instance the soil pressure behind the walls is utilised to resist longitudinal forces induced from both braking and earthquake effects.

7.1.3.1 Drainage

The location of the Moorebank Avenue Overbridge has impacted on the existing drainage regime of the road. Stormwater runoff is allowed to sheet flow over the fill embankment shoulder with no positive drainage provided.

The provision of the bridge will cause run off from the bridge deck to be concentrated and will need to be collected at the downstream end.

7.1.4 Anzac Creek Culvert

The culvert structure at Anzac Creek is approximately 20.1 m long and consists of an eight-cell 2.1 m by 1.8 m (internal dimensions) supported on a cast in-situ reinforced concrete base slab. Concrete apron slabs are provided both upstream and downstream of the culvert and form monolithic extensions to the base slab. These apron slabs provide stability to the wing walls. The roof slab of the culvert supports the rail tracks and ballast.

The cast in-situ base slab is approximately 4.81 m wide and 20.105 m long and cast on a 0.5% grade (falling upstream to downstream). The 450 mm thick base slab is cast on a 50 mm thick blinding layer. The final width and length of the base slab is dependent on the supplier's details of the crown units to be incorporated into the works.

The base slab is to be constructed as a continuous slab without expansion or contraction joints. Early thermal and shrinkage cracks are controlled by reinforcement provided in accordance with AS5100 and CIRIA C660 assuming full restraint conditions. The apron slabs and the base slab are made continuous through the provision of continuity reinforcement across the construction joint.

Pre-cast wing walls are placed on levelling shim pads and made structurally continuous with the apron slabs using a stitch pour. An isolation joint is provided at the interface between the wing walls and the end precast crown units to allow for differential movement. The joint gap is filled with a compressible filler board and sealed at the back to prevent fines from getting through the joint. Based on the results from the flood

modelling, rip rap scour protection is required. This will take the form of a downturn provided at the front of the apron slab. To satisfy environmental requirements, the rip rap has been extended to create a shallow "pool" both upstream and downstream of the apron slab.

The concrete and reinforcement properties for the Anzac Creek Culvert are outlined in Table 8.

Table 8 Concrete and Reinforcement Properties for the Anzac Creek Culvert

Design Parameter	Value
Concrete Properties	
Wing Walls	40 MPa
Base slab and Apron slab	40 MPa
Mass Concrete	20 MPa
Reinforcement Properties	
Deformed Bars – D500N Grade	500 MPa

7.1.4.1 Drainage

The deck has a 0.5% cross fall in the transverse direction and a selected fill material laid on top of the waterproofing membrane over the crown unit will facilitate a 0.5% long fall. The runoff will be collected at the downstream end of the culvert where there is a drainage trench beneath the ballast. At the lower end of the drainage trench there is a 200 mm thick concrete upstand which holds a 250 mm diameter pipe. This allows the runoff collection to be piped along and behind the wing wall to discharge onto the drainage system at the bottom of the embankment.

7.1.5 Signal Bungalow and Location Cases

Two pieces of essential rail utility infrastructure, specifically a signal bungalow and location cases, will be installed adjacent to the rail corridor. The signal bungalow is located near the IMEX Terminal Facility, while the location cases will be in the SME land.

7.1.5.1 Drainage

The signal bungalow comprises a hut measuring 4000 mm by 3100 mm that sits on a concrete slab footing of 5,160 mm by 6,000 mm. The bungalow is designed to comply with the flood levels. The location case is composed of a 2 mm aluminium grade 5052 cabinet that measures 1995 mm by 591 mm by 2065 mm.

No additional impacts to the local drainage regime are expected from these structures, beyond those previously assessed.

7.2 Landscaping

Hydroseeding is nominated for all batters within the Rail Link to maintain a low fuel state. The seed mix nominated will be based upon what is available and where the seeding is to take place on the Project site. The seed mix will be confirmed in consultation with either the Landscape Architect and / or the Project Ecologist but will be based upon the suggested hydroseeding mix outlined in Appendix A.

The Commonwealth specified in the CoA mitigation measures that tall (20 metres at maturity) trees should be planted along the cleared railway alignment, interspersed with medium trees. This objective is not appropriate for safety reasons and because the complete Rail Link corridor is fully occupied by the railway line and associated infrastructure including access tracks. However, hydroseeding will be employed where possible and visual amenity will not be adversely impacted since most of the Rail Link corridor is surrounded by existing vegetation.

7.3 Fencing, Gate and Signage

Fencing, Gate and Signage details can be found in the Approved for Construction Design Report – Fencing, Gate and Signage Package. Indicative fencing, gates, barriers and signage drawings have been provided in Appendix C.

7.3.1 Fencing

A boundary fence will provide security to the 3.8 km rail corridor to ensure access is restricted to authorised personnel only. The fence will be tied into the existing fencing of the SSFL Corridor and runs along both sides of the northern and southern connections from the rail corridor to the SSFL. This fencing continues to the proposed Georges River Bridge where it has been tied into the bridge abutments. East of the Georges River Bridge, the fencing will provide a boundary fence between the eastern abutments of the Georges River Bridge and the Moorebank Avenue Overbridge.

The fence will be chain link fabric 1800 mm in height with a maximum ground clearance of 80 mm. All pipe posts, bracing rails and stays shall be medium quality to AS 1163 Grade C250L0.

The extent of the rail corridor includes all rail assets, combined services route, cut and fill batters, retaining structures, cess and batter drains, access tracks, and all other components, to allow all operational and maintenance activities to be undertaken within the fence lines.

7.3.2 Gates

There are 15 gates allowing access into the rail corridor, including 4 m wide swing gates with signage along the shared access roads which allows for maintenance and emergency vehicle access.

Gates are provided where required to allow access to / from existing maintenance access roads, to drainage infrastructure, access to Georges River Bridge, Moorebank Avenue Overbridge, at Service Crossings, at the GWS detention basin, the GWS triangle of land, Anzac Creek Culvert and RailCorp Maintenance Access Road linking Moorebank Avenue to the East Hills Rail Corridor. Gates will be 4m wide to allow for maintenance and emergency vehicle access. All gate hinges will be constructed to prevent tampering, removal or damage in order to ensure that gates are of equal strength in construction to the remainder of the fencing. Where required, drop bolts, locking chains and padlocks shall be in accordance with the standard drawings showing the details.

7.3.3 Signage

Signage will meet the specifications of ARTC or Sydney Trains, as required. Signage includes:

- Rail Corridor Entry Signs (Pedestrian and Vehicles) – W560
- Network Control Boundary Signs
- Trackside Signage
- Limited Clearance warning signs
- Danger Sign – No Safe Place.

7.4 Erosion and Sediment Control

The overarching principals of erosion and sediment control are detailed within Section 6.4.

7.5 Noise

As per the EIS, no noise mitigation measures that require landscaping will be constructed on for the Project, however, provision for noise walls has been incorporated into the design along the entirety of the Rail Link in accordance with CoC C27.

7.6 Lighting

There are no lighting provisions for the rail corridor.

APPENDIX A LANDSCAPE PLANS

APPENDIX B SITE LAYOUT, ADMINISTRATION BUILDING AND HV SUBSTATION

APPENDIX C EXAMPLE FENCING, GATES, BARRIERS AND SIGNAGE DRAWINGS

APPENDIX D LIGHTING PLAN AND LIGHTING LAYOUTS

APPENDIX E CAR PARK PAVEMENT MATERIALS

APPENDIX F DEPOT LICENCE APPLICATION GUIDELINES

APPENDIX G RAILCORP MAINTENANCE ACCESS ROAD

APPENDIX H RAIL LINK EARTHWORKS DESIGN