Chapter 7
Proposed amendments to the development

7.7 Changes to the operational activities and elements

Chapter 7 – *Project built form and operations* of the EIS provides a description of the proposal concept for the IMT Project including key elements of the built form and operations of the IMEX terminal, warehousing and interstate terminal. The chapter also provides detail of the functions and ultimate capacity of the proposed IMT at Full Build.

Table 7.1 provides a summary of the key operational changes associated with the revised Project by development phase including the forecast capacity of the IMEX and interstate terminals and the warehousing. The key operational changes associated with these revised estimates are associated with train movements, employment numbers and hours of operation.

Table 7.1 Indicative operational elements for the revised Project

Phase	Operational elements				
	Capacity	**Train numbers**	**Vehicle movements**	**Employment numbers (Full-time equivalent (FTE)**	**Hours of operation**
Phase B	250,000 TEU IMEX 250,000 TEU Interstate 100,000 sq. m of warehousing	IMEX: 68.2 train movements per week Interstate: 12 train movements per week	IMEX: 820 daily vehicle movements 58 peak vehicle movements Interstate: 972 daily vehicle movements 70 peak vehicle movements Warehousing: 2090 daily vehicle movements 54 peak vehicle movements	IMEX: *Administration:* 9 FTE *Operational:* 26 FTE (per shift with 3 shifts per day) *Maintenance:* 2.5 FTE (per shift with 3 shifts per day) 93.5 FTE operational staff on site each day Interstate: *Administration:* 17.5 FTE *Operational:* 39 FTE (per shift with 3 shifts per day) *Maintenance:* 3.5 FTE (per shift with 3 shifts per day) 145 FTE operational staff on site each day Warehousing: *Administration:* 7.5 FTE *Operational:* 82.5 FTE (per shift with 3 shifts per day)	24 hours a day, 7 days a week Heavy vehicles to access for 16 hours a day, 5.5 days a week.

Phase	Operational elements				
	Capacity	**Train numbers**	**Vehicle movements**	**Employment numbers (Full-time equivalent (FTE)**	**Hours of operation**
				Maintenance: 82.5 FTE (per shift with 3 shifts per day) 503 FTE operational staff on site each day	
Phase C	500,000 TEU IMEX 250,000 TEU Interstate 100,000 sq. m	IMEX: 137 train movements per week Interstate: 12 train movements per week	IMEX: 1639 daily vehicle movements 116 peak vehicle movements Interstate: 972 daily vehicle movements 70 peak vehicle movements Warehousing: 2362 daily vehicle movements 76 peak vehicle movements	IMEX: *Administration:* 17.5 FTE *Operational:* 52 FTE (per shift with 3 shifts per day) *Maintenance:* 4.5 FTE (per shift with 3 shifts per day) 187 FTE operational staff on site each day Interstate: *Administration:* 17.5 FTE *Operational:* 39 FTE (per shift with 3 shifts per day) *Maintenance:* 3.5 FTE (per shift with 3 shifts per day) 145 FTE operational staff on site each day Warehousing: *Administration:* 7.5 FTE *Operational:* 82.5 FTE (per shift with 3 shifts per day) *Maintenance:* 82.5 FTE (per shift with 3 shifts per day) 503 FTE operational staff on site each day	24 hours a day, 7 days a week Heavy vehicles to access for 24 hours a day, 7 days a week.

Phase	**Operational elements**				
	Capacity	**Train numbers**	**Vehicle movements**	**Employment numbers (Full-time equivalent (FTE)**	**Hours of operation**
Full Build	1.05 m TEU IMEX 500,000 TEU Interstate 300,000 m^2	IMEX: 137 trains (or 273 train movements) a week. Up to137 IMEX trains could be processed concurrently onsite. Interstate: 12 interstate trains (or 24 train movements) a week Up to four interstate trains could be processed concurrently on site.	IMEX: 3400 daily vehicle movements 245 peak vehicle movements Interstate: 2074 daily vehicle movements 120 peak vehicle movements Warehousing: 5380 daily vehicle movements 146 peak vehicle movements	IMEX: *Administration:* 35 FTE *Operational:* 1.4 FTE (per shift with 3 shifts per day) *Maintenance:* 9 FTE (per shift with 3 shifts per day) 374 FTE operational staff on site each day Interstate: *Administration:* 35 FTE *Operational:* 78 FTE (per shift with 3 shifts per day) *Maintenance:* 7 FTE (per shift with 3 shifts per day) 290 FTE operational staff on site each day Warehousing: *Administration:* 22 FTE *Operational:* 248 FTE (per shift with 3 shifts per day) *Maintenance:* 248 FTE (per shift with 3 shifts per day) 1,509 FTE operational staff on site each day.	24 hours a day, 7 days a week Heavy vehicles to access site for 24 hours a day, 7 days a week.

7.8 Changes to the construction activities and elements

Description of the EIS construction activities

Section 8.4 to section 8.7 in Chapter 8 – *Project development phasing and construction* of the EIS describes the key construction activities and operational elements for each development phase and include reference to the activities associated with the northern and central rail access options.

The existing construction footprint, access and haulage details are described in section 8.8 and illustrated in Figures 8.13 to 8.15 in Chapter 8 of the EIS.

Description of the revised construction activities

The key construction activities and operational elements of the revised Project are described below. Table 7.2 to Table 7.4 also describes the likely construction activities for each phase. These details are indicative only and will be subject to confirmation during the next stage of approval under the NSW EP&A Act (i.e. Stage 2 SSD applications).

The activities proposed in the Early Works phase, presented in section 8.3 in Chapter 8 of the EIS, will not change; however, as discussed in section 7.5 the Early Work phase will now include the site Rehabilitation Works, for the purpose of obtaining approval as part of the Stage 1 SSD approval. Activities associated with the northern and central rail access options have not been considered further.

Phase A:

A significant amount of construction activity would occur during Phase A of the Project.

Construction of the initial IMEX freight terminal facilities for a capacity of 250,000 TEU per annum and 100,000 sq. m of warehousing within the IMT site will commence in 2016. During this time, ancillary facilities including IMEX administration, the plant and equipment maintenance and repair building, and the main Moorebank IMT gate would also be constructed.

The Project involves the construction of a rail access from the SSFL to the IMT site. This access would be constructed across the southern end of the site as outlined in detail in section 7.5 of Chapter 7 - *Project built form and operations* of the EIS. The northbound and southbound rail connections to the SSFL would be constructed in Phase A and would facilitate train movements to and from Port Botany for the IMEX facility.

The southern rail access has only one bridge structure, which would allow for both IMEX and interstate train entry and exit to the SSFL. To avoid the need for bridge works in subsequent Project development phases, the bridge structure over the Georges River will accommodate both IMEX and interstate train entry and exit. Details of the construction footprint and proposed construction approach for southern rail access are provided in section 8.8, Chapter 8 – *Project development phasing and construction* of the EIS.

All utilities, including power, gas, water, sewer and stormwater trunks, would ideally be installed during Phase A. These utilities would be capable of supplying both the IMEX and the warehousing precinct at their full capacity; however, during Phase A, only connections to the IMEX and the initial warehousing (100,000 sq. m) would be made. Stub connections would be provided for future extensions to additional IMEX and warehousing and the interstate terminal. Internal roads would be developed as part of Phase A to serve initial IMEX and warehouse operations, while allowing for expansion in subsequent stages.

Table 7.2 identifies the key construction elements likely to occur during Phase A. These details are indicative only and would be subject to confirmation during the next stage of approval under the NSW EP&A Act (i.e. Stage 2 SSD applications).

Table 7.2 Key construction elements during Phase A

Project Stage	Key construction elements
Phase A	• Geotechnical works to determine the requirement for piles and other supporting structures for the Georges River bridge. • Vegetation clearing within the footprint of construction footprint of Phase A to enable construction works. • Upgrading of Moorebank Avenue and construction works to the new Moorebank Avenue and Anzac Road intersection (Moorebank Avenue would remain open during the construction and operation period). No upgrade of Moorebank Avenue to the south of the new Moorebank Avenue/Anzac Road intersection required. • Bulk earthworks for the construction footprint of Phase A (initial IMEX). • Construction of IMEX terminal buildings (for a capacity of 250,000 TEU a year) including separate rail maintenance facilities and a terminal operating plant and equipment facility. • Construction of IMEX rail infrastructure (including RMG lines). • Retaining wall construction (where required). • Construction of the southern rail access (both northbound and southbound rail spurs) and associated bridge structure over Georges River to service the IMEX facility. • Construction of the initial 100,000 sq. m of warehouse buildings, hardstand and car parking. • Installation and commissioning of a utilities duct (for water, gas, electricity and sewerage) and substation for IMEX terminal and initial warehousing precinct, with stub connections provided for future extensions. • Installation of major drainage infrastructure and lighting. • Construction of the dedicated access road. • Construction of hardstand pavements. • Installation of noise attenuation infrastructure (as required). • Construction of onsite detention ponds. • Landscaping. • Construction of ancillary services (such as the service centre and truck stop).

Phase B:

Phase B will commence in 2019 and include the construction of the interstate terminal (with a capacity of 250,000 TEU per year), and an additional IMEX terminal capacity by 250,000 TEU (to 500,000 TEU a year), constructed in 2020.

Table 7.3 identifies the likely construction elements during Project Phase B. These indicative elements will be confirmed during the Stage 2 SSD development approval process.

Table 7.3 Key construction elements during Phase B

Project Stage	Key construction elements
Phase B	• Vegetation removal, site preparation and bulk earthworks for footprint for Phase B. • Site preparation, including bulk earthworks and remediation of Phase B area. • Geotechnical works for the development of the interstate terminal area. • Construction of rail infrastructure for interstate terminal, including RMG lines. • Construction of interstate terminal buildings and associated facilities including maintenance facility, administration, car parking and fuel storage; for 250,000 TEU a year capacity. • Construction of interstate hardstand pavements. • Construction of retaining walls. • Installation of noise attenuation infrastructure (as required). • Construction of IMEX terminal buildings and facilities for an additional 250,000 TEU a year capacity (providing for a total capacity of 500,000 TEU a year). • Utility connections (to connect to major utilities installed during Phase A). • Lighting. • Landscaping.

Phase C:

Phase C construction activities include the provision of additional IMEX terminal capacity by 250,000 TEU, and additional warehousing capacity of 150,000 sq. m within the IMT site. These will be constructed between 2022 and 2023.

In 2027, an additional capacity of 255,000 TEU per annum will be constructed for the IMEX terminal.

Between 2029 and 2030, an additional capacity of 250,000 TEU per annum will be constructed for the interstate facility, together with a further 50,000 sq. m of warehousing.

Table 7.4 summarises the likely key construction elements during Phase C. These are indicative only and will be subject to the next stage of approval (i.e. Stage 2 SSD development approval).

Table 7.4 Key construction elements during Phase C

Project Stage	Key construction elements
Phase C (2023)	• Vegetation clearing within the construction footprint for Phase C. • Site preparation, including bulk earthworks and remediation of Phase C area. • Utility connections and additional minor drainage works for the connection to major utilities and drainage installed during Phase A and Phase B. • Construction of 150,000 sq. m of warehousing buildings, hardstand areas and car parking. • Construction of IMEX terminal buildings and facilities for an additional 250,000 TEU a year capacity (providing for a total capacity of 1.05 million TEU a year). • Landscaping. • Lighting.

Full Build (2030):

By 2030 the Moorebank IMT would reach capacity, and as such the Full Build scenario is intended to represent the developed terminal as it would operate on an ongoing basis. There would be no further construction activity on the Project site.

7.8.1 Bulk earthworks

Description of the EIS bulk earthwork volumes

As described in section 8.8.3 in Chapter 8 – *Project development phasing and construction* of the EIS, the Project site has a very flat gradient (0.1%) from north to south and is tiered from west to east between the main portion of the Project site and the area adjacent to the Georges River.

The EIS design sought to establish a level across the Project site and a minimal north–south gradient that is suitable for the efficient operation of rail infrastructure and RMGs, which have specific requirements related to changes in surface level.

The EIS design also focused on optimising a cut and fill balance across the IMT site to minimise the requirement for fill to be imported or excess spoil to be exported. The design also attempted to minimise elevation of the Project site from its current natural surface level as much as practicable, in order to minimise costs and visual impacts and also to avoiding flooding of surrounding areas. There would be no change to the levels or elevation of the proposed conservation area.

The indicative staging of the earthworks sought to progressively clear the Project site in line with the development phasing.

Table 8.6 in Chapter 8 – *Project development phasing and construction* of the EIS shows the indicative bulk earthworks estimates.

Description of the revised bulk earthworks volumes

The objectives for clearing and developing the Project site, as presented above and in section 8.8.3 in Chapter 8 – *Project development phasing and construction* of the EIS, are still relevant for the revised design, however, the bulk earthwork volumes have been revised to reflect the revised IMT layout, the change in Project development phasing and confirmation that the southern rail access option will be developed.

To generate the bulk earthwork volumes, the percentage of construction works for each development phase was calculated and resulted in:

- Phase A (2015–2016): 36%;
- Phase B (2016-2019): 35.3%;
- Phase C (2019-2030): 28.7%; and
- Full build (2030): 0%.

Table 7.5 below provides an estimate of the bulk earthwork estimates for the revised Project, including the development of the southern rail access, and development phasing. There will be no bulk works associated with the Full Build development phase as the Project site will be fully operational.

Table 7.5 Revised bulk earth works estimates

Item (at 30% bulking and settlement)	Revised layout cumulative		
	Phase A	Phase B	Phase C
Total excavated cut (m^3)	559,827	598,191	431,490
Acceptable reuse (m^3)	335,896	358,915	258,894
Total export (m^3)	427,129	468,499	320,914
Total pavement volume (m^3)	327,467	322,073	261,707
Total fill required (m^3) = (fill + soft spot container + rail earthworks)	312,468	405,456	197.000
Total cut reuse and spoil from previous stage	335,896	382,343	258,894
Import required (m^3) = (fill required – acceptable)	-23,429	23,113	-61,894
Spoil	23,429	0	61,894
	Total Import m^3		23,113
	Total Spoil Remaining m^3		61,894

7.8.2 Construction workforce numbers

Description of the EIS construction workforce numbers

Table 8.8 in section 8.8.6 in Chapter 8 – *Project development phasing and construction* of the EIS provides an estimate of construction workforce numbers associated with construction activities for each development phase.

The EIS assumed that construction workers and staff would peak at an estimated 1,236 during Phase B, as presented in Table 7.6 below.

Table 7.6 Indicative daily construction workforce presented in the EIS

Project Stage	Typical daily workforce (FTE)	Peak daily workforce (FTE)
Early Works	150	300
Phase A	662	1,146
Phase B	435	1,236
Phase C	275	474

Description of the revised construction workforce numbers

Table 7.7 below shows the indicative daily construction workforce which has been updated for the revised Project. This shows the construction workforce and staff would peak at an estimated 850 during Phase A.

Table 7.7 Indicative daily construction workforce for the revised Project

Project Stage	Typical daily workforce (FTE)	Peak daily workforce (FTE)
Early Works	150	300
Phase A (2016)	490	850
Phase B (2019)	200	550
Phase C1 (2023)	190	770
Phase C2 (2028)	200	780

7.8.3 Construction traffic and access

Description of the EIS construction traffic and access

Construction traffic volumes entering and exiting the Project site would vary over the duration of the Project construction. Indicative volumes, as presented in section 8.8.8 in Chapter 8 – *Project development phasing and construction* of the EIS, and in Table 7.8 below, are based on the bulk earthworks and materials estimates.

For the EIS design, construction vehicle traffic was expected to be greatest during the main earthworks and civil construction in Phase A, with traffic comprising vehicles transporting equipment, materials and spoil, and construction workers accessing the work site.

Table 7.8 Indicative construction traffic volumes presented in the EIS

Project Phase	Daily one way movements		Peak hourly two way movements	
	Cars	HV	Cars	HV
Early Works	405	32	54	10
Phase A	1453	965	194	210
Phase B	1669	972	222	212
Phase C	640	197	85	42

The EIS design assumed that access to the Project site would predominantly be via the M5 Motorway and Moorebank Avenue. For the construction of the southern rail access option, the haulage route was assumed to be from Cambridge Avenue via Moorebank Avenue or Glenfield Road.

It was also assumed that all required car parking would be provided on site and that access to the neighbouring ABB site would be maintained throughout the Project construction.

Impacts on traffic and access, including proposed works on Moorebank Avenue were described in Chapter 11 – *Traffic, transport and access* of the EIS. This identified that some partial and full road closures were required during construction and that the existing site access points would be used before the upgrade of Moorebank Avenue and during the Early Works development phase and part of Phase A.

Description of the revised construction traffic and access

Table 7.9 below provides the construction traffic volumes for the revised Project. These volumes are based on the revised bulk earthwork volumes presented in Table 7.5 of this chapter.

Table 7.9 Indicative construction traffic volumes for the revised Project

Stage	Daily vehicle movements		Peak hourly vehicle movements	
	Cars	HV	Cars	HV
Early Works (2015)	810	64	54	10
Scenario 1 (2016)	2295	1390	153	152
Scenario 2a (2019)	1485	260	99	28
Scenario 2b (2023)	2080	360	139	40

The changed site access (i.e. access from Moorebank Avenue and Anzac Road intersection) means there will be no road closures south of this intersection. Construction access to the main site will be via the Moorebank Avenue/Anzac Road intersection. For construction of the southern rail access, access requirements are unchanged to that presented in the EIS.

7.8.4 Construction plant and equipment

Description of the EIS construction plant and equipment

Table 8.10, section 8.8.9 in Chapter 8 – *Project development phasing and construction* of the EIS provides an indicative list of the major equipment to be used during the three construction phases. The main types of construction machinery used during the construction phasing, and presented in the EIS includes:

- piling plant - piling rigs, sheet piling and grout pump;
- excavation plant – backhoe, grader, 7–30 t excavator, bobcat, D6 dozer and D8 dozer;
- compaction plant – compactor, 13 t roller, 14,000 L water truck, multi wheel roller, padfoot roller, smooth drum roller, loader (950), 28 m^3 scraper, 9–13 m^3 self-elevating scraper, 300–450 mm trencher asphalt spreaders;
- plant (other) – street sweeper, 30 m boom concrete pump, dewatering equipment, manitou, disc harrow tractor;
- trucks – tipper, 20 m^3 truck and trailer, crane truck (semi), 17.7 m^3 dump truck, semitrailer, concrete truck, rock saws and truck-mounted drills;
- lifting plant – scissor lift, 10 m boom lift, 10 t franna crane, and 80 t crane;
- miscellaneous – kerb machine, drifters, air compressors, shotcrete guns, post tensioning equipment, and scaffolding;
- asphaltic plant – spreader, bitumen rucks and multi drum roller;
- rail plant – hi-rail dumper, hi-rail crane, rail tampers, ballast regulator, rail grinder, roller, skid steer crane, rail saw, thermit welding equipment, rail threader and ballast box; and

- barges – on Georges River (one for services and one for construction).

Description of the revised construction plant and equipment

Table 7.10 below provides an updated equipment list for the revised Project according to the development phase. The quantity and types of equipment have not significantly changed from those outlined in the EIS. The actual quantity and types would depend on availability and the Project contractor's preferred working method. There will be no construction activity associated with the Full Build development phase as the Project site will be fully operational.

Table 7.10 Indicative construction equipment list for the revised Project

Early Works	Phase A	Phase B	Phase C
	Piling plant *Including piling rigs, sheet piling and grout pump*	Piling plant *Including piling rigs, sheet piling and grout pump*	Piling plant *Including piling rigs, sheet piling and grout pump*
Plant – excavation *Including backhoe, grader, 7–30 t excavator, bobcat, D6 and D8 dozer, fuel truck, service truck and 2 water carts*	Plant – excavation *Including backhoe, grader, 7–30 t excavator, bobcat, D6 dozer and D8 dozer*	Plant – excavation *Including backhoe, grader, 7–30 t excavator, bobcat, D6 and D8 dozer*	Plant – excavation *Including backhoe, grader, 7–30 t excavator, bobcat, D6 and D8 dozer*
Plant – compaction *Including compactor and 2 front end loaders*	Plant – compaction *Including compactor, 13 t roller, 14,000 L water truck, multi wheel roller, padfoot roller, smooth drum roller, loader (950), 28 m^3 scraper, 9–13 m^3 self-elevating scraper, 300–450 mm trencher asphalt spreaders*	Plant – compaction *Including compactor, 13 t roller, 14,000 L water truck, multi wheel roller, padfoot roller, smooth drum roller, loader (950), 28 m^3 scraper, 9–13 m^3 self-elevating scraper, 300–450 mm trencher*	Plant – compaction *Including compactor, 13 t roller, 14,000 L water truck, multi wheel roller, padfoot roller, smooth drum roller, loader (950), 28 m^3 scraper, 9–13 m^3 self-elevating scraper, 300–400 mm trencher*
Plant – other *Street sweeper, post hole borer, one tracker*	Plant – other *Including street sweeper, 30 m boom concrete pump, dewatering equipment, manitou, disc harrow tractor*	Plant – other *Including street sweeper, 30 m boom concrete pump, dewatering equipment, manitou, disc harrow tractor*	Plant – other Including street sweeper, 30 m boom concrete pump, dewatering equipment, manitou, disc harrow tractor
Trucks *Including 20 m^3 truck and trailers, site vehicles for personnel and plant material transport*	Trucks *Including tipper, 20 m^3 truck and trailer, crane truck (semi), 17.7 m^3 dump truck, semitrailer, concrete truck, rock saws and truck-mounted drills*	Trucks *Including tipper, 20 m^3 truck and trailer, crane truck (semi), 17.7 m^3 dump truck, semitrailer, concrete truck,. rock saws and truck-mounted drills*	Trucks *Including tipper, 20 m^3 truck and trailer, crane truck (semi), 17.7 m^3 dump truck, semitrailer, concrete truck, rock saws and truck-mounted drills*
Plant – lifting *Including scissor lift, 10 m boom lift, 10 t franna crane, and 30 t crane*	Plant – lifting *Including scissor lift, 10 m boom lift, 10 t franna crane, and 80 t crane*	Plant – lifting *Including scissor lift, 10 m boom lift, 10 t franna crane, and 80 t crane*	Plant – lifting *Including scissor lift, 10 m boom lift, 25 t franna crane, and 80 t crane*

Early Works	Phase A	Phase B	Phase C
	Miscellaneous *Including kerb machine, drifters, air compressors, shotcrete guns, post tensioning equipment, and scaffolding*	Miscellaneous *Including kerb machine, drifters, air compressors, shotcrete guns, post tensioning equipment, and scaffolding*	Miscellaneous *Including kerb machine, drifters, air compressors, shotcrete guns, post tensioning equipment, and scaffolding*
	Asphaltic plant *Including spreader, bitumen rucks and multi drum roller*	Asphaltic plant *Including spreader, bitumen rucks and multi drum roller*	Asphaltic plant *Including spreader, bitumen rucks and multi drum roller*
	Rail plant *Including hi-rail dumper, hi-rail crane, rail tampers, ballast regulator, rail grinder, roller, skid steer crane, rail saw, thermit welding equipment, rail threader and ballast box*	Rail plant *Including hi-rail dumper, hi-rail crane, rail tampers, ballast regulator, rail grinder, roller, skid steer crane, rail saw, thermit welding equipment, rail threader and ballast box*	
	Barges *Barges on Georges River (one for services and one for construction)*	Barges *Barges on Georges River (one for services and one for construction) (for the central rail access option)*	

Notes: t = tonne, mm = millimetre

Source: Based on information in the Noise and Vibration Assessment (Volume 3)

7.8.5 Early Works incorporating Rehabilitation Works

The remedial and rehabilitation work to be included in the Early Works phase of the project includes:

Decontamination and demolition of asbestos-contaminated buildings

Eight buildings on the site are currently contaminated with asbestos and will be dismantled or demolished and removed. These building are identified on Figure 7.4 as buildings; B001, B032, B035, B039, B040, B041, B042, S128. Clean and contaminated material will be kept separate throughout the process to allow the clean material to be stockpiled for future use.

Asbestos removal would be undertaken by a licensed asbestos removal contractor. Dependent on the state of the asbestos, a friable or bonded asbestos removal license will be obtained prior to commencement of works. All asbestos removal would be carried out in accordance with the Code of Practice for the Safe Removal of Asbestos [NOHSC: 2002 (2005)] and the NSW OHS Regulation 2001 made under NSW OHS Act 2000 (or relevant national regulations). Handling and disposal of asbestos waste material would be carried out in accordance with NSW DECCW Waste Classification Guidelines: Classifying Waste (April 2008).

Remediation of contamination hotspots associated with underground hydrocarbon storage tanks

Localised contamination management is proposed through the removal of underground hydrocarbon storage tanks and localised ground remediation as identified in the Remediation Action Plan presented in Volume 5 of the EIS (as Appendix F to the Environmental Site Assessment (Phase 2)). The works would be undertaken in accordance with the *Australian Standard (AS4976) Removal and disposal of underground petroleum storage tanks.* The locations of the USTs for removal are shown on Figure 7.4.

The estimated excavation footprint associated with each tank is presented in Table 7.11.

Table 7.11 Estimated excavation footprint for USTs

Tank ID	Estimated excavation footprint m^2	Contents
0367/B_UST_001	18	Unknown
3767S_UST_006	77	Unknown
44467	173	Diesel
3767S_UST_003	79	Waste oil
3767S_UST_004	25	Waste oil
SWSS0285	30	Waste oil
3767S_UST_005	70	Waste oil
367S_UST_008	45	Unknown

Waste material will be tested and characterised on site before being transported by licensed carriers and disposed to facilities licensed to receive contaminated waste.

Approximately 1135 m^3 of contaminated waste material (soil and concrete) could be excavated during the work. This would equate to some 45 truckloads of material, resulting in 90 vehicle movements to and from the site. Table 7.12 below presents a summary of the estimated quantity of clean fill material required allowing for settlement. Approximately 1414 m^3 would be required, equating to 114 vehicle movements.

Site stabilisation and establishment of the proposed conservation area on the site of the plant and equipment operator training area

An area of approximately 7.2 ha used for plant and equipment operator training (in the area known as 'the dust bowl') will be stabilised and established for the conservation zone. The work includes the demolition of a viewing grandstand and works to stabilise and rehabilitate (landscape) this area for future planting. This would include use of a geotextile membrane, import of clean topsoil, and landscaping earthworks to re-establish suitable vegetation in this area.

Table 7.12 presents an estimate of the quantities of clean material to be imported to the site. Based on the need for 500 mm of topsoil material, approximately 44,720 m^3 would be required, equating to 3578 vehicle movements associated with these works. A maximum of 40 truck movements a day would be generated over a four-month period.

Table 7.12: Estimates of quantities of clean fill to be imported for the proposed action

Element of proposed action	Estimated quantity of fill required (m^3)	Approximate number of truck deliveries to the site[1]
Backfill of UST voids	1414	57
Import of suitable planting fill for driver training arena	44720	1789

Notes: [1] based on 30 tonne truck and dog carrying 20–25m^3 of soil and sand and 40m^3 mulch (lighter fill) (http://www.amazonsoils.com.au/company/amazon_booklet.pdf)

Construction of secure perimeter fencing

The existing site perimeter fencing would be inspected and replaced or reinforced to ensure site security following the vacation of the site by Defence. Secure temporary site fencing will also be erected within the site along the eastern boundary. The fence alignment would be determined on site to ensure that no vegetation or areas containing heritage values are disturbed.

Fencing works will involve the construction of a shallow trench (up to 500 mm deep), installation of fence straining posts and stringing of an appropriate gauge chain mesh and straining wires. Once the fence mesh has been hung to the required tension, the trench would be backfilled with the original excavated material.

Establishment of site facilities

The site would be accessed via a single access point from Moorebank Avenue. Areas of existing hardstand near this access point would be adapted for use during the works. This would include site offices, hygiene facilities (including units for decontamination and routine use), kitchen and rest facilities and construction plant storage.

Where appropriate existing buildings on the site would be considered for reuse (for example, as offices and rest facilities). It would also be necessary for purpose-specific demountable units to be used for decontamination of personnel working on the site.

A designated 'clean' area would be identified for staff parking. A wheel wash would be located on the exit route from the site. All site vehicles would be required to use this prior to leaving the site.

7.9 Impact assessment of the revised Project

7.9.1 Approach to the impact assessment in the EIS summary

The EIS included comprehensive and detailed assessment of the full range of impacts associated with the construction and operation of the Project, in accordance with the NSW SEARs and the Commonwealth EIS guidelines. This included assessment of several scenarios at key points in the Project's development (from Early Works through to operation of the 'Full Build' terminal), assessment of three alternate rail alignments and cumulative impact assessment of the development of both the Moorebank and SIMTA IMT sites. Chapter 10 – *Impact Assessment Approach* of the EIS provides detailed information on the assessment approach undertaken.

In the EIS, the traffic and transport, noise and vibration, local air quality and human health impacts were identified as the most significant for the Project, and heavily influenced by Project phasing. It was therefore considered appropriate to assess the environmental impacts during the successive Project development phases, including points in time where concurrent construction and operational activities were planned.

The Full Build terminal was assessed to demonstrate the worst case scenario for the other environmental issues presented in the EIS summary.

7.9.2 Approach to the impact assessment of the revised Project

For the revised Project, the focus of the assessments is on the *changes to the impact* relative to that predicted in the EIS. Adopting this approach it was identified that a number of impacts remain largely unchanged relative to the EIS assessments and that any minor changes of impact could be addressed during the subsequent stages of the SSD process.

The project Full Build footprint (i.e. the extent of physical development) remains largely unchanged relative to the EIS (see Figure 7.2). As such, impacts such as heritage, contaminated land, greenhouse gas, property and infrastructure, waste management and hydrology are largely unchanged as a result of the revised Project.

The other key difference is that the revised Project seeks approval for a southern rail alignment only, so impacts, associated with the northern and central rail alignments are excluded from this report. In terms of comparison between the impacts predicted in the EIS and the impacts presented for the revised Project, comparisons are made for the southern rail option only.

The assessment of the revised Project and development phasing, where remodelling has been undertaken (noise and vibration, transport and access, local air quality and human health), follows the same approach as the EIS, with an assessment of the southern rail access only. This approach allows for assessment of potential worst case impacts, by considering the cumulative impacts of simultaneous construction and operational activities.

Where remodelling has been conducted, the assessment considered four scenarios. These scenarios have been selected to represent the worst case at a given point in time throughout the progressive development of the Project to give visibility of the likely impacts:

- Scenario 1 – (Phase A) 2016 (construction only);
- Scenario 2a – (Phase B) 2019 (construction and operation);
- Scenario 2b – (Phase C) 2023 (construction and operation); and
- Scenario 3 – (Full Build) 2030 (operation only).

Figure 7.10 shows the relationship between the Project development phases and the scenarios.

The impact assessment approach also considers the inclusion of the Rehabilitation Works into the Early Works phase of the Project.

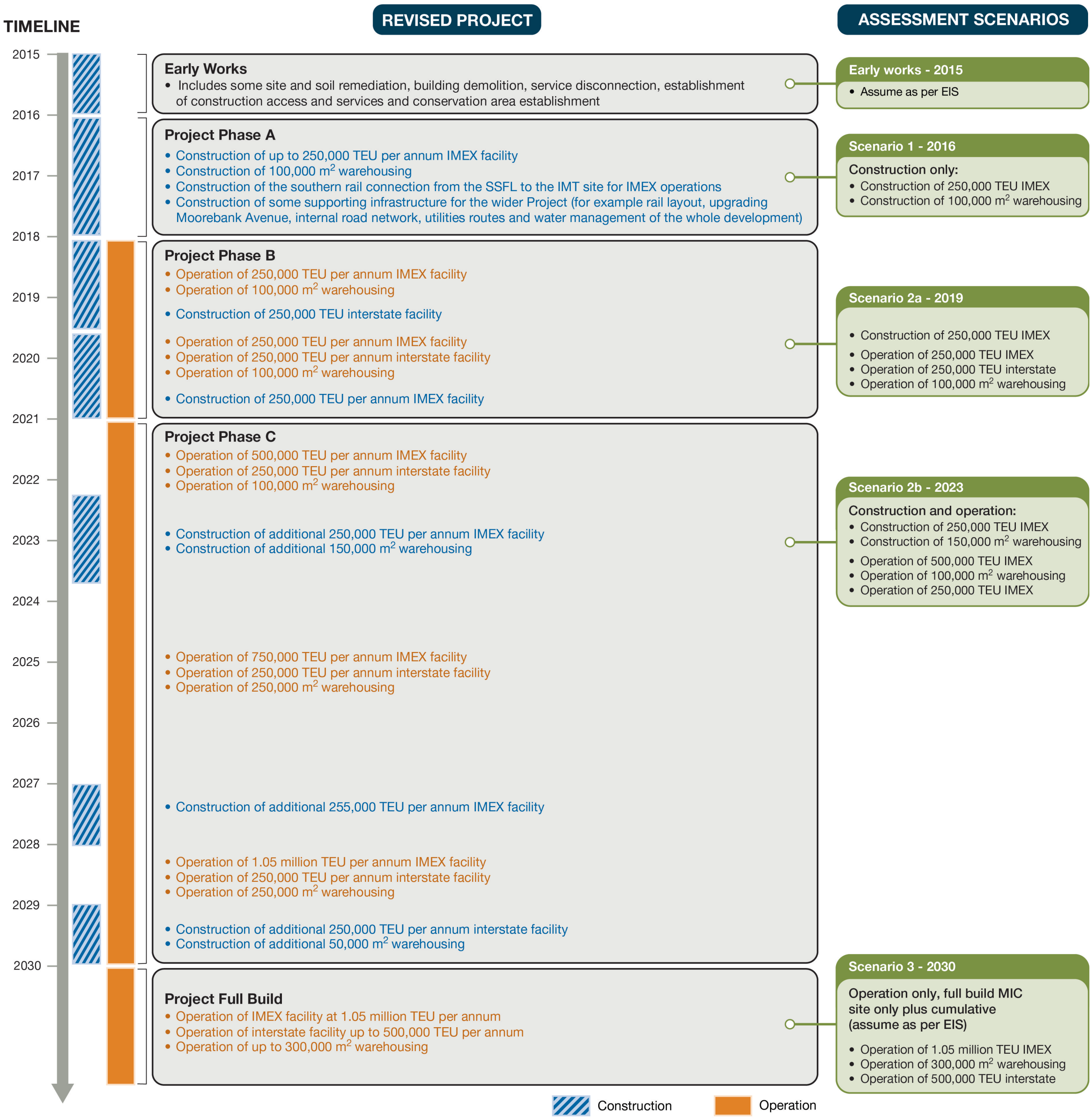

Figure 7.10 Relationship between the Project development phasing and assessment scenarios

7.9.3 Scoping of impact assessments

To determine the potential changes to the impacts assessments for all impacts assessed in the EIS, a scoping exercise was undertaken to review the key changes of the revised Project (presented in Table 7.11) against the findings and conclusions of the impact assessment presented in the EIS. This qualitative exercise has determined the relative level of change in impacts and associated requirements for re-assessment or re-modelling.

Table 7.11 Scoping impact assessment

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
Traffic, transport and access (Chapter 11 and Technical Paper 1 – *Traffic, Transport and Accessibility Impact Assessment* in the EIS)	<u>Assessment approach</u> • Assessment comprised two main components: > Development of strategic transport model to assess impacts of articulated truck movements on the Sydney greater metropolitan area (GMA) network. Forecasts for 2031. > Intersection performance modelling to assess performance of intersections in the local and wider road network in 2030 (without and with the Project). <u>Key findings</u> • Construction impacts: > Traffic expected to be greatest during the main earthworks and civil construction in Phase A (2016). > Temporary increase in congestion at existing intersections along Moorebank Avenue. Once Moorebank Avenue is upgraded in Phase A, the upgraded intersections would operate better than the existing road network. > Some partial and full road closures may be required during construction (most likely at night). > Impact of construction traffic on the operation of the M5 Motorway is expected to be negligible. > Existing accesses, public transport and pedestrian facilities would be retained. > Construction traffic (around 25 heavy vehicles a day) would need to access the northern and central rail access bridge construction area through Casula on the western bank of the Georges River. For the southern rail access option, haulage routes would be via Moorebank Avenue or Glenfield Road. • Construction of the rail access connection to the operating SSFL would cause some temporary disruption to the operation of this freight corridor during rail closedown (possession) periods. • Operational impacts: > 2030 AM peak hour – approximately 84 cars and 169 trucks would travel into the IMT and 169 trucks would travel from the IMT. > Truck movements from the IMEX and interstate operations are not new trips. These movements would already be on the highway network - to and from Port Botany. > Project would save on road-based freight trips by transferring freight movements	The revised Project will not result in a change in impact to the road network at Full Build (from 2030) as the land uses of the developed Project remain largely unchanged. However additional analysis undertaken since EIS exhibition has demonstrated that the traffic generation rates associated with the proposed on site activities have changed. These revised assumptions have been taken into consideration in this assessment. Remodelling and reassessment of traffic impacts is required associated with the: • changes to the construction of the first phase, resulting in modified construction traffic generation rates; • changes to the phasing of development, resulting in modified 'ramp up' of traffic generation; • changes to the proposed upgrading of Moorebank Avenue (including modified entry and exit points), resulting in changes to traffic impacts on Moorebank Avenue; and • changes to the warehouse traffic generation. For the Rehabilitation Works the main access to the site will be via a single access point from Moorebank Avenue. The works will generate 4500 heavy vehicle movements to and from the site,	The revised Project will result in changes to the impact on traffic and transport and therefore re-modelling and re-assessment has been undertaken. Refer to section 7.9.3 in this Report for a summary of the detailed impact assessment. Refer to Appendix E of this Report for the detailed Traffic and Transport Assessment.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	to the Project site by rail. Regional network would experience reductions of approximately 56,125 truck vehicle kilometres travelled (VKT) a day and 1265 truck vehicle hours travelled a day. This is also expected to contribute to reducing heavy vehicle-related crashes. > Additional heavy and light vehicle trips generated primarily along Moorebank Avenue, the M5 Motorway and local road intersections, slightly intensifying existing congestion along the M5 during peak hours. Impact negligible as contribution less than 3% of the total M5 Motorway traffic volume during the 2030 AM and PM peak hours. > Upgrade of Moorebank Avenue between the M5 Motorway and the southernmost IMT access would significantly improve intersection performance on this road section improving congestion when compared with the no upgrade. > Operational traffic in 2030 not predicted to have a significant impact on most of the intersections in the vicinity of Moorebank. Any congestion increase offset by the significant wider network benefits from the diversion of container traffic from the roads in this area. > For the EIS summary layout configuration, the SSFL has capacity constraints that may impact on the Projected train movements. Further analysis to be undertaken as part of the Stage 2 SSD approval process, to determine likely demand distribution and capacity across the rail freight network.	which is equivalent to 60 heavy vehicle movements per day during the peak of the works (over a two month period). This traffic would travel to and from the site via the M5 Motorway and would not utilise the local road network. The majority of the movements would be outside the morning and afternoon peak. Given the low numbers of vehicle movements associated with the works, there is unlikely to be any significant impact to the road network or intersection performance. The addition of 60 vehicle movements per day will increase traffic flows by less than 0.5%.	
Noise and Vibration (Chapter 12 and Technical Paper 2 – *Noise and Vibration Impact Assessment* in Volume 3 in the EIS)	Assessment approach • Assessment of a number of scenarios including Early Works (2015), Phase A (2018), Phase B (2025), Phase C (2030) and Full Build (2030). Key findings • Construction: > Noise levels for the majority of daytime construction works (including all daytime Early Works) are predicted to comply with the noise management (NML)s at all receptors and would be expected to be undertaken without the requirement for noise mitigation. > At Casula, Wattle Grove and Glenfield temporary exceedance of NMLs during piling and rail access connection works at certain times and under worst case conditions and would trigger the need for reasonable/feasible noise mitigation measures. Noise levels would be sufficiently controlled if all proposed mitigation was implemented. > Potential ground vibration levels should be within the human comfort criteria and nearby buildings are unlikely to suffer cosmetic damage as equipment is expected to be operated within the recommended safe working distances for construction ground vibration.	The revised Project will result in the relocation of noise sources within the IMT site boundary, with the most significant change for noise emission sources being: • the IMEX and Interstate working tracks and terminal facilities located along the eastern boundary of the Project Site in proximity to Moorebank Avenue; and • the warehouse precincts being moved to the western boundary of the Project site in closer proximity to Casula. In addition, revised Project will result in changes to the noise sources over the progressive development of the Project and operational elements of equipment	The revised Project will result in changes to the impact assessment and therefore re-modelling and re-assessment has been undertaken. Refer to section 7.9.4 for a summary of the detailed noise and vibration assessment and Appendix F for the detailed noise and vibration assessment. A supplementary Noise and Vibration Impact Assessment is provided in Appendix F.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	• Operation (without mitigation): > Full Build (2030), unmitigated operations under neutral metrological conditions for all three layouts predicted to occasionally exceed assessment criteria at receivers in Casula and Wattle Grove. Operations under neutral metrological conditions predicted to comply with the assessment criteria for receivers in Glenfield. Early morning and night-time in winter months, potential adverse meteorological conditions may occasionally enhance the propagation of noise by 1 to 3 dB(A) above the levels predicted for neutral meteorological conditions. > Full Build (2030) – unmitigated rail operations on the northern rail access connection exceed amenity noise criteria by up to 17 dB(A) (daytime, evening and night-time) at nearest receivers in Casula. No noise level exceedances predicted for rail noise on the central and southern rail access connections. > Sleep disturbance – operations predicted to comply with objectives at the nearest receptors in Casula, Wattle Grove and Glenfield. Train movements on the central and southern rail access predicted to comply with objectives. Unmitigated noise levels on the northern rail access predicted to exceed objectives in some locations in Casula. > Noise levels at all non-residential receptors were predicted to comply with the amenity noise criteria for all layout and rail access connection options. > Potential ground vibration predicted to comply with the relevant vibration criteria for human comfort and cosmetic structural damage.	(e.g. automation of ITVs for IMEX terminal. These key changes has resulted in a requirement for a detailed re-assessment and modelling to determine noise impacts. Noise impacts of Rehabilitation Works are likely to be associated with vehicle movement to and from the site and construction vehicle movement within the site. Given the low numbers of vehicle movements associated with the works, there is unlikely to be any significant noise or vibration impacts associated with the works. The works would be undertaken within standard construction periods. Current noise monitoring would be maintained during the Rehabilitation Works to monitor noise impacts.	
Ecological impact assessment (Chapter 13 and Technical Paper 3 – *Ecological Impact Assessment* in Volume 4 of the EIS)	<u>Assessment approach</u> • Assessment considered the Full Build at 2030 (worst case). <u>Key findings</u> • Loss or disturbance of vegetation including threatened flora and fauna species. • Loss or disturbance of EPBC listed flora species. • Impacts to threatened fauna species included noise and light disturbance, and potential for direct mortality. • Impact to EPBC listed fauna species included potential loss of habitat and breeding resources, noise and light disturbance, and potential for direct mortality. • Removal of hollow-bearing trees.	The revised Project and reconfiguration of the IMT layout has resulted in slight decrease in the overall extent of the clearing of the operational area of the Project site and an increase in the footprint of the Conservation Area to the west of the dedicated access road. These changes have resulted in a change in the requirement for vegetation clearance along the riparian corridor of Georges River, and a need to review and re-calculate the offsets requirements and overall impact assessment presented in the Offsets Strategy of the EIS. No vegetation clearance will take place during the Rehabilitation	Refer to section.7.9.1 of this Report for a summary of the re-assessment of biodiversity impacts as a result of the revised Project. Refer to section 8.1 for a summary of the results of the re-calculation of the biodiversity offset requirements associated with the revised Project. Refer to Appendix C for the revised Biodiversity Offset Strategy.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
		Works.	
Hazard and risks (Chapter 14 of the EIS)	<u>Assessment approach</u> • Assessment included a risk assessment process to identify the possible hazardous incidents arising from the sources of risks relevant to the Project for all development phases. <u>Key findings</u> The following risks were identified for the Project: • Potential bushfire risks exacerbated by the Project (e.g. flammable substances such as fuels). • Potential hazards arising from loss of containment of flammable/combustible or corrosive liquids. • Vehicle accident during the transport of a potentially hazardous materials to the Project site. • Flooding as a result of extreme weather. • Inappropriate waste disposal. • Bushfire threat to the Project. • Potentials hazards arising from gas leaks (natural gas, liquefied natural gas (LNG), liquefied petroleum gas (LPG). • Overall, the Preliminary Risk Assessment (PRA) concluded that there would be no significant increase in risk to the public and a result of the Project and, with the mitigation measures described above, the residual hazards and risks of the Project would be managed to an acceptable level.	The revised Project will not result in a change associated with the hazards and risks identified in the EIS as the key project components and land-use remain largely unchanged.	No further assessment proposed.
Contamination and soils (Chapter 15 and Technical Paper 5 – *Environmental Site Assessment (Phase 2)* in Volumes 5A and 5B of the EIS)	<u>Assessment approach</u> • Assessment considered the Early Works and Full Build at 2030 (worst case). • Assessment undertaken for this Project focused only on the contamination issues that would exist following completion of the site rehabilitation works. <u>Key findings</u> • Early Works and construction activities have the potential to release existing sources of contamination into the surrounding environment. • Construction activities, including earthworks, vegetation clearing, ground penetration and storage and usage of fuels, have the potential to result in liberation of existing sources of contamination, or generation of new contamination. • Limited potential for contamination within the northern and the central rail access	The revised Project will not result in any changes to the findings of the contamination and soils assessment presented in the EIS as the key project components and land-uses remain largely unchanged. The Rehabilitation Works will involve the remediation of contaminated soils and hence will improve the contamination status on the site.	No further assessment proposed.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	connection alignments. • High potential for contamination to exist in the southern rail access connection option alignment, including contaminated fill, soils, groundwater, leachate and generation of landfill gases from Glenfield Landfill. • Potential activities that may give rise to contamination or opportunities for contamination during operation include minor earthworks, storage and use of fuels, and maintenance of underground utilities.		
Hydrology, groundwater and water quality (Chapter 16 and Technical Paper 6 – *Surface Water Assessment* in Volume 6 of the EIS)	Assessment approach • Assessment considered Early Works and Full Build at 2030 (worst case). • Assessed potential changes in hydrologic regime (flooding or stormwater runoff quantity) and potential impacts on surface water quality (sedimentation and erosion, stormwater quality and stormwater pollution (including accidental spills). • Desktop assessment of existing groundwater environment undertaken for the surrounding area. Key findings • Significant increase in impervious surfaces, with subsequent risks for hydrology (flooding) and water quality. • None of the three bridge options would increase the flood risk to upstream properties during a 1% Annual exceedance probability (AEP) event and no significant increase in flood extent predicted. Changes in flow velocities in the Georges River unlikely. • Climate change is an additional consideration that may exacerbate flooding risks. • Construction activities have the potential to affect stormwater quality and downstream waterbodies including the potential mobilisation and erosion of soils due to land disturbance. • Piling activities in the Georges River for the construction of the rail access bridges have the potential to mobilise sediment on the river bed and expose potential acid sulphate soils. • Accidental spills of chemicals and other hazardous construction materials, and uncontrolled discharge have the potential to adversely impact on water quality. • Overall water quality benefits for the Georges River through treatment of stormwater prior to discharge - in line with the objectives of the Australian and New Zealand Environmental Conservation Council (ANZECC) environmental values. • Potential groundwater impacts resulting in lowering of the water table and contamination of groundwater.	The hydrology, groundwater and water quality assessment presented in the EIS assessed the Early Works and Full Build (worst case) development phases. The revised Project will not change the findings of the hydrology, groundwater and water quality impacts as the key components and land-uses associated with the Early Works and Full Build development phases remain largely unchanged. The Rehabilitation Works will avoid construction within the flood prone land (1 in 20 year flood zone of Georges River). The works associated with the rehabilitation of the 'dust bowl' have the potential to impact on water quality in the Georges River through the release of contamination and sedimentation. However this impact would be managed through good construction environmental practice to ensure the appropriate management of site operations and run off to avoid adverse impacts on water quality. To ensure against any deterioration of water quality, existing water quality monitoring upstream and downstream within the Georges River would be continued during the Rehabilitation Works.	No further assessment proposed.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	• Drainage strategy was been developed to manage issues.		
Local air quality (Chapter 17 and Technical Paper 7 – *Local air quality impact assessment* in Volume 6 of the EIS)	<u>Assessment approach</u> • Assessment of a number of scenarios including Early Works (2015), Phase A (2018), Phase B (2025), Phase C (2030) and Full Build (2030). <u>Key findings</u> • Early Works – local air quality impacts predicted to be negligible, given the expected low magnitude of the earthworks and the short-term nature of construction activities. • Phases A, B and C – potential air quality impacts would be localised and would occur over defined periods between 2015 and 2030. Emissions of particulate matter (PM_{10}, $PM_{2.5}$, TSP and deposited dust) and pollutants associated with combustion engines and plant machinery represent greatest potential for air quality impacts. • During operation of the Project, combustion engine emissions (i.e. NOx, CO, SO2, $PM_{2.5}$, PM_{10}, volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs)) from locomotives, mobile LNG equipment and heavy vehicles represent greatest potential for air quality impacts. • Incremental (Project-only) air pollutant concentrations and dust deposition rates associated with all modelled scenarios were predicted to be within NSW EPA criteria and National Environment Protection Measure (NEPM) advisory reporting goals. • When existing elevated background airborne PM concentrations were considered (including extensive bushfire activity in late 2013), the maximum cumulative 24-hour average PM_{10} and $PM_{2.5}$ concentrations exceed the applicable NSW EPA criteria and NEPM advisory reporting goals at one receptor (R33), located adjacent to the Project site on Moorebank Avenue. However, the peak ambient concentrations were already above the goals due to the influence of this bushfire activity. Importantly, the assessment predicted that no additional exceedance events would occur as a result of construction or operational emissions at the Project site. • Overall, low likelihood of adverse local air quality impacts in the surrounding environment arising from the construction and operation of the Project.	The revised Project will result in the relocation of terminal infrastructure within the IMT site boundary and the associated changes in traffic generation, with the most significant change for air quality emission sources being: • changes to the phasing of project development and associated changes to traffic generation assumptions; and • changes to the impact on local receptors due to modification to the layout of onsite activities. Air quality impacts during Rehabilitation Works would be associated with vehicle movement to and from the site and construction vehicle movement within the site. Where possible all vehicles would utilise sealed roads. Dust generation associated with the stabilisation and landscaping works in the 'dust bowl' would be minimised by implementing a dust management plan which would detail dust control measures in line with good environmental practice. Air quality monitoring would continue during the Rehabilitation Works to ensure the effective implementation of the management and mitigation measures. Asbestos fibre air monitoring would be undertaken during asbestos removal works by a competent person specialised in asbestos management in accordance with National Occupational Health and	Refer to section 7.9.5 of this Report for a summary of the detailed assessment of the likely changes associated with local air quality impacts. Refer to Appendix H for the detailed local air quality impact assessment.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
		Safety Commission (NOHSC) (2005), Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003(2005)], NOHSC, Canberra, Australia.	
Regional air impact quality (Chapter 18 and Technical Paper 8 – *Regional Air Quality Assessment* in Volume 6 of this EIS)	Assessment approach • Assessment included complex regional-scale dispersion modelling for the Full Build in 2030 with and without the Project to identify any changes in regional air quality in the Sydney metropolitan region. Key findings • Assessment concluded that the impacts of the Project on regional air quality in the Sydney basin would be insignificant. • All predictions were well within the applicable air quality criteria for the modelled pollutants. • Project is predicted to slightly increase some concentrations of air pollutants along roads near Moorebank and the western part of the rail corridor from Port Botany to Moorebank. • Changes in emissions on a regional level were predicted to be small, and unlikely to be discernible relative to pollutant levels that would occur with or without the Project.	The regional air quality assessment presented in the EIS assessed impacts associated with the Full Build development scenario. As the key project components and land-uses associated with the Project at Full Build will remain largely unchanged and the EIS concluded that the regional air quality impacts will be insignificant, the revised Project is unlikely to result in any change to the findings of the impact assessment.	No further assessment proposed.
Greenhouse gas assessment (Chapter 19 and Technical Paper 9 – *Greenhouse Gas Assessment* in Volume 6 of the EIS)	Assessment approach • Assessment considered the impacts of each of the EIS Project construction phases (Phases A, B and C) separately and the operational impacts of the EIS Project during Phases B, C and Full Build (worse case). Key findings • Main emission sources during the construction phase - stationary energy (fuel use for equipment fleet and diesel power generation) and transport (light and heavy vehicles). • Main emissions sources during the operational phases - stationary energy (purchased electricity use) as well as stationary energy (fuel use for equipment fleet). • Development phase of the Project is likely to have negligible impacts in terms of greenhouse (GHG) emissions. • When fully operational in 2030, the annual GHG emissions would represent only a very small proportion of national (approximately 0.02%) and NSW (approximately 0.09%) emissions.	The main emission sources associated with the revised Project will not change as the key components and land-uses of the Project remain largely unchanged. The impact assessment presented in the EIS also concluded negligible impacts in terms of GHG emissions.	No further assessment proposed.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	• Project as a whole would result in reductions in freight transport emissions, as a result of the mode shift from trucks to trains for IMEX freight travelling between Port Botany and the Project site.		
Aboriginal heritage (Chapter 20 and Technical Paper 10 – *Aboriginal Heritage Impact Assessment* in Volume 7 of the EIS).	Assessment approach • Assessment considered the Full Build at 2030 (worst case). Key findings • Moderate to high Aboriginal heritage significance (local and regional level) along the riparian corridor along the Georges River. However, the Project's main construction footprint is outside the boundary of this corridor. • Project's main construction footprint (including for Early Works) initially considered to be of low Aboriginal archaeological potential, and subsequently assessed to be of no Aboriginal heritage significance. • Aboriginal recordings of highest sensitivity in the Project footprint largely conserved. • Less than a quarter of the Tertiary terraces identified as archaeologically sensitive affected. • Project would directly affect between six and ten Aboriginal sites dependant on rail access option. All three options would also directly affect parts of the Georges River corridor west bank due to work for the proposed rail access connection to the SSFL. • Impacts to Aboriginal sites would occur from direct ground disturbance, indirect ground disturbance (e.g. vehicle movements) and removal of trees – and would mainly occur during Project Phase B and the Early Works.	The Aboriginal heritage assessment presented in the EIS assessed the Project at Full Build (worse case). As the land-uses and development footprint associated with the revised Project at Full Build remain largely unchanged. The removal of the northern and central rail access options has reduced the potential impact the Project may have on these locations. The Aboriginal impacts of the Project will remain the same (albeit slightly improved with the selection of the southern rail access option through the disturbed lands on the Glenfield waste site). While there is a minor reduction in impacted area on the western boundary of the development footprint (which could lead to a slight improvement in aboriginal heritage impacts) this is not considered to be significant, and will be investigated further as part of the Stage 2 SSD. There are no heritage impacts associated with the Rehabilitation Works.	No future assessment proposed. Refer to Chapter 8 – *Additional technical assessments since EIS*, section 8.2 of this Report for a summary of the additional information and assessment associated with sub-surface testing of site MA14 and two scarred trees (MA6 and MA7) since the EIS were prepared. These additional assessments have not resulted in a change to the overall conclusions of the Aboriginal impact assessment. Refer to Appendix I for the detailed Aboriginal impact assessment and Appendix J for the Cultural Heritage Report.
European heritage (Chapter 21 of the EIS and Technical Assessment X)	Assessment approach • Assessment considered the Full Build at 2030 (worst case). Key findings • Majority of existing heritage items would be relocated from the current SME site prior to construction of the Project as part of the Moorebank Unit Relocation (MUR) Project. • Anticipated impacts within the residual landscape and its elements would include	The European heritage assessment presented in the EIS assessed the Project at Full Build (worst case). As the land-uses and development Project footprint associated with the revised Project at Full Build/worst case remain largely unchanged the European heritage	No future assessment proposed. Refer to Chapter 8 – *Additional technical assessments since EIS*, section 8.2 of this Report for a summary of the information associated with archival recording of existing land-uses within the current SME site.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	building, garden and memorial demolition, disturbance of archaeological deposits, destruction of the landscape setting and vistas, loss of and/or reduced historical associations, loss of existing internal street layouts and associated names, and loss of access to these items. • All remaining heritage items would be directly impacted by the Project, along with all remaining intangible heritage values. • Any indirect impacts of the Project on adjacent European heritage items (i.e. impacts on the visual context and landscape setting) are considered to be negligible.	impacts of the Project will remain the same. There are no heritage impacts associated with the Rehabilitation Works (no buildings with heritage value would be demolished as part of the Rehabilitation Works).	Refer to Appendix K for the detailed Cultural Heritage Archival Recordings report. The additional information does not result in a change to the conclusions of the European heritage assessment.
Visual and urban design (Chapter 22 and Technical Paper 12 – Visual Impact Assessment in Volume 8, Technical Paper 13 – Light Spill Assessment in Volume 9 of the EIS)	<u>Assessment approach</u> • Assessment considered Early works (2015), Phase A (2018), Phase B (2025), Phase C (2030) and Full Build (2030). • For Phases A to C, impacts were examined in relation to parts of the Project that would already be operational at the conclusion of each phase. The Full Build scenario represents the long-term visual impact of the Project and is essentially the 'worst case' scenario in terms of operational impacts. <u>Key findings</u> • Early Works: > Impacts considered to be moderate/low, with one negligible rating. > Retained conservation area and existing riparian vegetation would screen a substantial amount of activities for viewpoints to the west of the Georges River. > Where works are required outside of standard construction hours, potentially affected residents and relevant authorities would be notified in advance. • Construction: > Impacts predicated to range from negligible to moderate/high for different receptors. > Moderate/high impacts due to the impact of tall construction equipment visible above tree-line, earthworks, clearing and vegetation removal and construction of the warehousing. Localised visual impacts along Moorebank Avenue from construction fencing and the warehousing development area would be highly visible. > Impacts similar for the three rail access options, with the exception of receptors within the Georges River Casula Parklands, St Andrews Park and the residential properties surrounding St Andrews Park. These receptors would experience greater visual impact associated with the northern rail access connection, relative to the central and southern rail access options, as these receptors would	The visual and urban design assessment presented in the EIS assessed the Project at each of the development phases. There are a number of changes associated with visual and urban design assessment as a result of the revised Project layout and reconfiguration of key Project components. These changes will impact on the views into the Project and include: • views from Casula will be onto the warehousing precinct (where previously the intermodal infrastructure was the most prominent aspect of the development) • views along Moorebank Avenue will be of the IMEX and interstate terminals (where the visual impact assessment was of warehousing along Moorebank Avenue) • views south of Bapaume Road, impacts associated with the upgrade of Moorebank Avenue (as anticipated by the EIS) would not occur.	The revised Project will result in minor changes to the visual impact assessment associated with the reconfiguration of the IMT layout. Refer to section 7.9.2 of this report for a summary of the assessment of the visual and urban design impacts associated with the revised Project. Refer to Appendix D for the detailed Visual and Urban Design Assessment which includes photomontages of the revised design.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	have a clear view of the northern rail access. > The majority of activities would occur during standard daytime construction hours and would not require lighting; however, some out of hours construction work may be required. Lighting would be contained and positioned to avoid light spill to surrounding areas. • During operation: > Impacts predicted to range from negligible to moderate/high for different receptors. > The greatest visual impact of the Full Build development would be on public park and residential receptors on the elevated areas to the west of the Georges River and residential properties backing onto the SSFL. > For some residential locations that overlook the Project site, these receptors would also experience a noticeable change in the brightness of the area on clear nights. > The warehousing development would front Moorebank Avenue and would dominate views towards the Project site from the east. The visual impacts would reduce as landscaping is established. > Trains leaving the Project site via the northern and the central rail access options would directly face some residents in Casula, and the use of headlights could affect local residents. Impacts could be mitigated by avoiding the use of high beams lights on trains until they are running on the SSFL.	Due to the changes in the site layout and reconfiguration of key Project components it is also anticipated there will be changes in the impacts associated with light spill. There are minimal visual impacts associated with the Rehabilitation Works.	

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
Property and infrastructure (Chapter 23	Assessment approach • Assessment of impacts on affected properties and land uses, including impacts related to land use, future development potential, and property acquisition. Key findings • Change of land use from the current Defence facility to an IMT. • Construction of the Project would permanently affect some small areas of Liverpool City Council (LCC) land. In addition, depending on the rail access option selected, some LCC-owned, Sydney Trains-owned, NSW Roads and Maritime Services (RMS), and privately owned land (Glenfield Landfill site) would be temporarily and permanently impacted. • Visitors to the Casula Powerhouse Arts Centre may experience some amenity impacts during construction of the northern or the central rail access options. In addition, the northern and central rail access options would necessitate the realignment of Powerhouse Road, which provides access to the Casula Powerhouse Arts Centre. However, it is not likely that an extended closure of Powerhouse Road would be required, and access to the Casula Powerhouse Arts Centre would therefore be maintained. • Potential for temporary recreational and amenity impacts associated with the construction of the rail access bridge across Georges River. • The Project would result in the need for upgrades to or augmentation of some infrastructure and services (including energy, water, wastewater, stormwater). • During construction, some utilities assets may be affected; however impacts would be reduced by confirming their location during detailed design and avoid conflicts where possible. • The Project would potentially have temporary impacts on the SSFL while the rail turnout connection is made to the SSFL. • No major infrastructure or utility impacts are predicted, other than disruptions to local roads such as Moorebank Avenue, which would be upgraded, and Bapaume Road, which would be reconfigured.	The revised Project will not result in any change to the impacts on land use, future development potential, or property acquisition as the footprint and key project components remain largely unchanged. The impacts associated with the northern and central rail access options presented in the EIS will not occur as the southern rail access has been identified as the preferred option.	No further assessment proposed.
Waste and resource management (Chapter 26 of the EIS)	Assessment approach • Assessment focused on typical waste streams generated during construction and operation and provided a broad overview of resource requirements including energy, materials and water resources. Key findings • Waste generated throughout all phase of the Project and would be similar for the northern, central and southern rail access options and associated IMT site layouts.	The typical waste streams generated will not change as a result of the revised Project as the key components and land-uses remain largely unchanged.	No further assessment proposed.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	• Waste generated can be broken down into two main streams: > Solid waste (i.e. demolition waste, green waste, hazardous waste and sewage, litter, paper and genera recyclable waste); and > Effluent, sewage, wastewater and trade waste.		
Social and economic impact assessment (Chapter 24 and Technical Paper 14 – Social Impact Assessment in Volume 9 of the EIS)	<u>Assessment approach</u> • Social impact assessment and economic impact assessment assessed potential impacts on the social and cultural environment during construction and operation. <u>Key findings</u> • Socio-economic impacts associated with the Early Works anticipated to be relatively minor and would include minor adverse impacts related to traffic and amenity values, and positive impacts on job generation. • Project anticipated to generate employment opportunities during construction and operation – many of which would suit the local skills base. Employment opportunities would be associated with wider socio-economic benefits, including financial security, and improvements in health and wellbeing. • No substantial shift expected in the local demographics or population during construction or operation. Potential increase in the demand for rental properties and social infrastructure/services in the Liverpool LGA during peak periods of construction; however no substantial impact on social and community infrastructure is expected. • Minor recreation impacts are expected, including closure of the RAE Golf Club and potential disruption during construction to activities by the NSW Barefoot Water Ski Club on the Georges River (northern rail access option only). Potential for the northern rail access connection to increase the visual severance between the Casula Powerhouse Arts Centre and the surrounding environment. • No direct impacts on local businesses are predicted. Some in the area may experience temporary disruptions from vehicle access to the Project and other amenity impacts. On the whole, businesses are likely to benefit from construction demand and the influx of workers to the area.	The social and economic impacts of the Project will not change as the capacity, key components and land-uses of the revised Project remain largely unchanged. Although the development phasing has changed, the overall timing of the Project remains the same.	No further assessment proposed.
Human health risks and impacts (Chapter 25 and Technical Paper 16 – *Health Impact Assessment* in Volume 9 of the EIS	<u>Assessment approach</u> • Assessment of one 'typical' construction scenario and the Project at Full Build 2030 (worse-case). <u>Key findings</u> • The Health impact assessment (HIA) screening assessment determined that three of the potential aspects relating to health issues and opportunities required a detailed HIA: traffic, transport and access; noise; and air quality.	The revised Project has resulted in changes to the Project layout and development phasing and timing of the Project with associated changes to the traffic generation, noise impacts and local air quality impacts.	The revised Project will result in changes the assessment of human health risks and impacts. See section 7.9.6 of this Response to Submissions Report for a summary of the detailed assessment of the human health risks and impacts.

EIS studies	Assessment approach and summary of key findings of the EIS impact assessment	Implications of the revised Project on the impact assessment	Assessment approach
	• Traffic congestion has the potential to contribute to health impacts such as stress and anxiety affecting users of Moorebank Avenue during construction; however, once proposed mitigation measures are implemented, the Project is anticipated to have net positive health outcomes in relation to traffic congestion. • The upgrade of Moorebank Avenue and a reduction in heavy vehicle traffic on roads within the wider network are anticipated to improve road safety. • Noise can have a range of health impacts such as sleep disturbance and cardiovascular health problems. Without mitigation, construction and operation of the Project would potentially lead to health concerns; however, provided that the proposed mitigation measures are implemented, then the noise levels should remain within the acceptable levels, with the likelihood of any health impact being negligible. • During both construction and operation, levels of oxides of nitrogen, sulphur dioxide, carbon monoxide, VOCs and PAHs were all estimated to be low and acceptable. • Larger particulates (PM_{10}) are anticipated to dominate PM emissions during early construction (e.g. earthworks), while smaller particles (PM2.5) would increase as the use of diesel combustion sources increases over the Project's life. Exposure to PM is linked to various health impacts, such as respiratory illnesses and changes in cardiovascular risk factors. However, the HIA found that the Project's potential health risks or impacts are low. • Impacts on human health during Early Works would be negligible.	As a result, a re-assessment is required of the human health risk and impacts associated with the revised Project. There are no negative human health impacts associated with the Rehabilitation Works. The removal of USTs and other contamination will provide an overall benefit to human health.	Refer to Appendix H for the detailed Human Health Impact Assessment.

7.9.4 Scoping assessment for Early Works

Based on the assessment of impacts presented in Table 7.11 above, no additional technical work was considered necessary for assessing the impacts associated with the Rehabilitation Works. The assessment of impacts associated with Early Works conducted for the EIS (and presented in Chapters 11 to 27 of the EIS) is appropriate for the Rehabilitation Works.

7.10 Assessment of project amendments

7.10.1 Biodiversity

Introduction

Chapter 13 – *Biodiversity* of the EIS and Technical Paper 3 – *Ecological Impact Assessment* in Volume 4 of the EIS provided an assessment of the impacts of the Project. A detailed Ecological Impact Assessment was prepared by Parsons Brinckerhoff (2014) and is included in Technical Paper 3 – *Ecological Impact Assessment* in Volume 4 of the EIS. The assessment addressed the relevant Commonwealth Department of the Environment (DoE)'s EIS Guidelines and the NSW SEARs.

Table 7.11 in section 7.8.3 of this Report summarises the assessment approach and key finding of the EIS biodiversity impact assessment. In summary, the assessment identified that the Project and each of the three Full build options would have residual impacts on biodiversity and as such would require the development of a Biodiversity Offset strategy (BOS) developed in accordance with the NSW Framework Biodiversity Assessment (FBA).

Implications of the revised Project on the impact assessment

Due to the following minor Project changes the biodiversity assessment has been revised:

- a narrowing of the proposed southern access rail corridor in the vicinity of the Georges river from 60 m to 30 m;
- a modified rail alignment utilising more of the existing disturbed lands associated with cleared lands, existing rails corridor and waste facility;
- a reduction in the impact to the Riparian and Alluvial vegetation presented in the EIS southern access option by approximately 4 ha; and
- the revised site layout has increased the width of the onsite Moorebank conservation area, extending east of the 1% flood line and therefore increasing the future Conservation and riparian corridor.

In addition, the revised biodiversity assessment has taken account of changes to the biodiversity offset requirements, under the FBA, and issues raised by the NSW Office of Environment and Heritage (OEH) during exhibition of the EIS.

A summary of the revised assessment addressing these changes is provided below with further detail on the BOS provided in Chapter 8 - *Additional technical assessments since EIS* and the BOS (refer to Appendix C).

Biodiversity assessment

Minor Changes to Project footprint

When compared to the EIS, the development of the revised southern rail access corridor reduces the Projects impacts on biodiversity slightly by utilising more of the existing disturbed rail corridor associated with the East Hills Railway Line and Tarakan Road crossing of the Georges River.

Table 7.12 provides a summary of the changes in residual impacts on vegetation and habitat between the Full Build (2030) southern rail access development scenario presented in the EIS and the Full Build (2030) development scenario assessed for the revised Project.

Table 7.12 Comparison of the residual impacts on vegetation and habitat between the EIS and revised Project at Full Build (2030)

Vegetation community/habitat/ threatened species	Approx. extent (ha) within Project site	Full Build (2030) clearing (ha)	Full Build (2030) clearing (ha)
		EIS (southern rail access option)	Revised Project
	Vegetation		
Castlereagh Swamp Woodland1	0.9	0.9	0.9
Castlereagh Scribbly Gum Woodland2	16.1	16.1	16.1
Riparian Forest (River-Flat Eucalypt Forest)1	16.2	5.3	3.6
Alluvial Woodland (River-Flat Eucalypt Forest)1	35.6	30.4	28.1
Total River-Flat Eucalypt Forest3	51.8	35.7	31.7
Total vegetation	**68.8**	**52.7**	**48.7**

Changes to the offset requirements under the FBA

The proposed changes associated with the revised Project footprint, specifically the alignment and width of the southern rail access corridor, required a revised assessment of the Projects residual impacts on biodiversity and BOS prepared in accordance with the FBA.

The revised assessment also includes some minor changes in the quantification of credits generated from the credit calculator, as a result of changes to the credit calculator relative to that used in the Technical Paper 3 – *Ecological Impact Assessment* in Volume 4 of the EIS. This is a result of discussions with OEH regarding how to apply the calculator in accordance with the *NSW biodiversity Offset Policy for Major Projects 2014* (Offset Policy 2014).

The FBA requires Projects to quantify the residual impacts on biodiversity using the FBA Credit Calculator Version 4.0 (Office of Environment and Heritage 2014a). This assessment tool converts the residual impact areas identified in Table 7.12 into a calculation of the number and class of biodiversity credits required to offset and to ensure maintenance or improvement in biodiversity (refer to Appendix A of the BOS in Appendix C of this Response to Submissions Report).

The maximum offset requirements of the Project under the Offset Policy 2014 has been quantified using FBA calculator as up to **1,409** ecosystem credits or approximately 140 ha and **1,004** species credits.

Additional assessment issues raised by OEH

The revised assessment and BOS have also incorporated changes in the application of the FBA assessment methodology to further consider submissions from OEH. In particular, the revised BOS has incorporated:

- further assessment of the measures are taken to avoid and minimise the direct and indirect impacts of a development proposal on biodiversity values as required by section 8 of the Framework for Biodiversity Assessment (FBA) and NSW Offset Policy 2014; and
- assessment of matter requiring further consideration under the FBA.

A detailed assessment of the measures taken to avoid and minimise the direct and indirect impacts of a development in accordance with the FBA is provided in section 2 of the revised BOS.

Summary

The current concept design for the full build will clear approximately 48.7 ha of vegetation, including Endangered Ecological Communities, plant community types (PCTs) that contain threatened species and habitats and riparian areas.

The revised Project has demonstrated further avoidance in the development of the revised southern rail access utilising more of the existing disturbed rail corridor crossing of the Georges River and minimising impacts on the corridor in general.

The revised BOS also outlines appropriate mitigation and management measures identified for the revised Projects direct and indirect impacts in accordance with section 8.3.1.3 of the FBA. These mitigation and management measures incorporate Industry best practices and standards and are presented in section 6 of the Ecological Assessment and Table 9.1 of this report.

7.10.2 Visual impact assessment

Introduction

Chapter 22 – *Visual and urban design* of the EIS describes the potential visual impacts of the Project, including light spill, and the urban design principles underpinning the Project. A detailed visual impact assessment was prepared by Cloustons Associates (Technical Paper 12 – *Visual Impact Assessment* in Volume 8 of the EIS), and a detailed light spill assessment was prepared by AECOM (Technical Paper 13 – *Light Spill Assessment* in Volume 9 of the EIS). These documents address the relevant Commonwealth Department of the Environment (DoE)'s EIS Guidelines and the NSW SEARS.

Table 7.11 in section 7.8.3 of this Response to Submissions report summarises the assessment approach and key findings of the EIS impact assessment.

Cloustons Associates prepared an updated *Visual and Urban Design Assessment* (refer to Appendix D) which considers the changes to the landscape and visual impacts associated with the Project. The assessment considered all five proposed development stages and uses the same impact assessment approach and methodology documented in section 22.1.1 of Chapter 22 – *Visual and urban design* of the EIS.

Implications of the revised Project on the impact assessment

The changes associated with the revised Project, including the IMT layout and the reconfiguration of key components, a revised visual and urban design impact assessment was undertaken to assess impacts on the landscape character and visual amenity of the surrounding area. In particular the following changes were considered:

- views from Casula will now be onto the warehousing precinct (where previously the intermodal infrastructure was the most prominent aspect of the development);
- views along Moorebank Avenue will now be of the IMEX and interstate terminals (where the visual impact assessment was of warehousing along Moorebank Avenue); and
- views south of Bapaume Road, impacts associated with the upgrade of Moorebank Avenue (as anticipated by the EIS) would not occur.

Landscape character assessment

As shown in Table 7.13, which provides a summary of the landscape character impacts and compares the findings of the EIS against the revised Project, there will be no changes to the key findings presented in the EIS.

Table 7.13 Comparison of the EIS and revised Project landscape character impacts

	Zone 1 - Fragmented vegetation		Zone 2 - Riparian Corridor		Zone 3 - Residential development		Zone 4 - Commercial/ light industrial	
	EIS	Revised Project	EIS	Revised Project	EIS	Revised Project	EIS	Revised Project
Sensitivity	Moderate/ High	Moderate/ High	Moderate/ Low	Moderate/ Low	Moderate	Moderate	Low	Low
Magnitude	High	High	Moderate/ Low	Moderate/ Low	Moderate	Moderate	Moderate/ Low	Moderate/ Low
Overall Rating	High	High	Moderate/ Low	Moderate/ Low	Moderate	Moderate	Moderate/ Low	Moderate/ Low

The revised Project is shown to have the greatest impact on fragmented vegetation due to expected requirements for removal, with a lesser impact on the surrounding residential areas due to the presence of screening vegetation and topography. A moderate/low impact rating is recorded on the riparian corridor along the Georges River and surrounding industrial/commercial zones due to the limited magnitude of the changes within these areas. The revised Project fits within a wider context of commercial and industrial built form present within the locality.

The southern rail alignment crosses the Glenfield landfill site. This area is zoned as Public Recreation within the Liverpool LEP 2008. Currently the site has a low sensitivity to change due to its degraded landscape character, although overtime it is likely to be re-vegetated and may become an area of public open space with high amenity value. The presence of existing rail infrastructure to the east and south of the landfill site will assist in reducing the magnitude of any landscape character impacts associated with the new southern access rail spur in the future.

Visual Impact Assessment

As described in section 22.2.2 in Chapter 22 – *Visual and urban design* of the EIS, the visual assessment considered eight key viewpoints which were representative of visual receptors surrounding the Project site. The viewpoints and locations for the assessment of the revised Project remain unchanged.

Table 7.14 provides a summary of the combined visual impact assessment ratings for each viewpoint and compares the findings with the EIS.

Table 7.14 Comparison of the EIS and the revised Project combined visual impact assessment ratings

Viewpoint/ receptor type	Early Works		Development phases (A, B, C)		Full Build	
	EIS	Revised Project	EIS (southern rail access option)	Revised Project	EIS (southern rail access option)	Revised Project
1	Moderate/ Low	Moderate/ Low	Moderate	Moderate	Moderate	Moderate
2	Moderate/ Low	Moderate/ Low	Moderate/High	Moderate/ High	Moderate/High	Moderate/ High
3	Moderate/ Low	Moderate/ Low	Moderate/High	Moderate/ High	Moderate/High	Moderate/ High
4	Moderate/ Low	Moderate/ Low	Moderate/ Low	Moderate/ Low	Moderate/Low	Moderate/ Low
5	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
6	Moderate/ Low	Moderate/ Low	Moderate/ Low	Moderate/ Low	Moderate/Low	Moderate/ Low
7	Moderate/ Low	Moderate/Low	Moderate/High	Moderate/High	Moderate	Moderate
8	Moderate/ Low	Moderate/ Low	Moderate/High	Moderate/ High	Moderate	Moderate

When compared to the EIS, the combined impact rating for the visual impact assessment at each of the viewpoints remains unchanged for the revised Project.

The visual assessment of the revised Project suggests there will be moderate to high potential impact to a limited number of residential properties based in Casula who overlook the site. The greatest visual impact will be on the public parks and associated residential properties that are situated on the elevated land west of Georges River. Direct views of the development will be possible from properties directly adjacent to Leacock Park and Carroll Park. The most prominent views of the revised Project will be at localised boundaries and public parks overlooking the site.

In order to show representative views of the revised Project from key viewpoints, photomontages have been prepared from viewpoints 1, (see Photomontage 1), viewpoint 3 (see photomontage 2), viewpoint 7 see photomontage 5), viewpoint 8 (photomontage 6). These photomontages are shown in the V*isual and Urban Design Assessment* (Clouston Associates, 2015) in Appendix D.

Table 7.15 summarises the suggested mitigation measures documented in the EIS and additional measures associated the revised Project.

Table 7.15 Visual and urban design mitigation measures for the Project

Mitigation measures	
Avoidance	The proposed terminal is of state and national importance and its location is central to its functionality, so avoidance measures have not been considered appropriate
Reduction	Align and locate car parks to minimise visual impacts from the public domain or residents. Building and car park siting to permit and equate tree planting, especially along road fronts. Refinements to building siting and alignment of infrastructure locations to assist in retaining significant existing vegetation such as individual tree specimens or groups of trees. Maximising the integration of terminal facilities and warehousing precincts by providing screening, breakout space for public and staff, and visual relief, as well as aiding way-finding throughout the site. Where possible retain existing native trees along Moorebank Avenue to mitigate visual impact as well as providing additional native trees to the carpark areas to maximise the opportunity for shade and to provide a landscape frontage that is scaled to complement the new development. Landscaping along Moorebank Avenue is of particular importance and must provide visual relief from the industrial appearance of the rail infrastructure. The detailed landscape strategy should provide a layered approach along the streetscape. Consider the use of lower, more frequent light poles where possible to mitigate light spill effects and ambient light impacts. Integration of car parking, planting and signage to present as one cohesive address. Consider localised earth mounding and provide native canopy trees to internal landscape areas on the western side of the new buildings to mitigate visual impacts from the residential area.
Alleviation	Choice of finishes and materials based on limiting the amount of contrast with the surrounding landscape with the preferred use of muted colours. On site planting of suitable vegetation species at a range of heights. Utilise opportunities to commence early rehabilitation and supplementary planting of endemic species to the conservation zone on the western boundary and to commence early screen planting at the junction of Moorebank Avenue and M5 Motorway to mitigate visual impact.
Lighting	Placement of lighting columns and the specification of suitable lighting levels that would ensure minimal light spillage to surrounding residential areas. An assessment should be made (potentially in consultation with affected residents at a stage when detailed impact assessment has been completed) to establish whether selected street trees could assist in mitigating the impacts of floodlighting from the site

Summary

The major landscape character impacts of the revised Project will comprise scale, height and bulk of the proposed buildings, especially light towers and an increase in the scale of Moorebank Avenue to a four lane road.

The greatest visual impact of the revised Project will be on the public parks and associated residential properties that are situated on the elevated topography sloping west from the Georges River. These will have clear views over the site and the taller project elements such as lighting towers and gantries.

Although the combined impact ratings for the visual impact assessments have not changed since the EIS, it is acknowledged that the views into the site will change in relation to the re-configuration of the Project layout and components. Mitigation measures to manage the changes in these views should be considered during the detailed design.

7.10.3 Traffic and transport

Introduction

Chapter 11 – Traffic and Transport of the EIS provides an assessment of the traffic generation as a result of the construction and operation of the Project and presents the impact of the Project on the road network. Detailed analysis was presented in Technical Paper 1 – *Traffic, Transport and Accessibility Impact,* which was included in Volume 3 of the EIS.

Chapter 11 *Traffic and Transport* and its supporting technical paper established the current road network conditions (at 2014) and predicted conditions at future years to 2030 (the Project in its fully developed state), taking into account published background traffic growth rates, to show the functioning of the Project in future years 'without project'.

The report also described the traffic generation associated with the Project at each stage (associated with construction traffic, IMEX, interstate and warehousing) and, based on demand analysis undertaken by Deloitte, provided information on the distribution of generated traffic to the road network. An assessment of impacts was then undertaken including impacts on Moorebank Avenue (including an assessment of the effectiveness of the upgrades proposed for Moorebank Avenue), impacts on the M5 Motorway and impacts on the functioning of a number of intersections in the immediate vicinity and the wider road network.

As a separate exercise, a cumulative impact assessment was undertaken based on two assumed development scenarios for SIMTA (presented in Chapter 27 – *Cumulative impacts* of the EIS) that identified the impact on the road network due to development of the Moorebank IMT and SIMTA IMT sites (i.e. the Moorebank precinct).

Since the exhibition of the EIS, a number of project amendments have occurred as described in section 7.4 to 7.6 of this report, a number of these amendments will have an impact on the predicted traffic impacts associated with the Project. In summary these changes are:

- Amended site layouts resulting in a change to the vehicle entry points from Moorebank Avenue removing the multiple entry points assessed in the EIS and replaced with a single vehicular access location at the intersection of Moorebank Avenue and Anzac Road.
- the upgrade of Moorebank Avenue north of Anzac Road to the M5 Motorway and the associated upgrading of the Moorebank Avenue and Anzac Road intersection.
- This assessment assumes that no truck traffic generated by the Moorebank IMT will use Moorebank Avenue south of this intersection.
- The revised project phasing will influence the level of traffic generated over time leading to the full-build development at 2030.
- Changes to the constructability planning (largely associated with changes to project phasing) have resulted in changes to the Project earthworks and associated construction traffic volumes.
- Changes to the assumptions about development on the SIMTA site have resulted in changes to the cumulative impact assessment results (discussed in section 7.10.2).

Further research into intermodal operations has resulted in modifications to some of the underlying assumptions about the rates of traffic generation. As a result, although the components of the development at 2030 are consistent with those in the EIS, the level of traffic generation has changed, for example the peak generation has increased slightly, but overall daily traffic generation has reduced. These modifications to assumptions are discussed further below.

The EIS presented impacts of the Project at all phases of development (Early Works through to full build) for all proposed intersections on Moorebank Avenue between the East Hills railway line and the M5 Motorway. However, for the wider road network the assessment presented results for 2030 (full build) only. The assessment did not prescribe solutions for those intersections on the network that were operating below and acceptable level of service (LoS) in future (either with or without the Project). The assessment of the modified project takes a different approach whereby it:

- Presents results of SIDRA analysis for the entire affected road network – a total of 16 intersections including the modified Moorebank Avenue/Anzac Road intersection for all assessment scenarios to 2030. While this section of the report provides information for the 2030 (full build) year only, the assessment results for all scenarios are presented in Chapter 9 of the revised traffic impact assessment presented in Appendix E. The analysis of interim years was considered critical to understanding the timing of required road network upgrades.
- Prescribes intersection treatments to achieve an acceptable LoS for those intersections that are identified as underperforming, including the timing of when these upgrades would be required. These are reported in chapter 9 of the revised traffic report in Appendix E.
- Assesses the impact of traffic on the M5 Motorway including the impact of the Project on the 'weave' between Moorebank Avenue and the Hume Highway.
- Undertakes a mid-block analysis (the effectiveness of traffic flow on a stretch of road between intersections) at a number of key locations.

The SIDRA analysis used the SIDRA 6 program, which was considered to provide an appropriate level of assessment for the project given it is at a concept approval stage. More detailed intersection analysis is possible using mesoscopic modelling, and it is proposed that AISUM mesoscopic modelling software is used at the next stage of the development application process when more detailed information about future intersection design is known.

The intersections assessed for this project comprise:

- I-01 – Hume Highway/Orange Grove Road
- I-02 – Hume Highway/Elizabeth Drive
- I-03 – Hume Highway/Memorial Avenue
- I-04 – Hume Highway/Hoxton Park Road/Macquarie Street
- I-05 – Hume Highway/Reilly Street
- I-06 – Newbridge Road/Moorebank Avenue
- I-07 – Heathcote Road/Moorebank Avenue
- I-08 – Moorebank Avenue/Industrial Park Access
- I-09 – Moorebank Avenue/Church Road

- I-10 – Heathcote Road/Nuwarra Road
- I-11 – Newbridge Road/Nuwarra Road
- I-12 – Newbridge Road/Brickmans Drive/Governor Macquarie Drive
- I-13 – Moorebank Avenue/M5 Motorway
- I-14 – Hume Highway/M5 Motorway
- I-15 – Cambridge Avenue/Canterbury Road
- I-0A – Moorebank Avenue/Anzac Road
- I-0B – Moorebank Avenue/New DNSDC Access/SIMTA Northern Access
- I-0C – Moorebank Avenue/SIMTA Central Access.

The analysis contained in this document presents a summary of information contained in the *Moorebank Intermodal Terminal – Traffic and Transport Impact Assessment* (February 2015), attached as Appendix E and hereafter referred to as the 'revised TIA'.

Moorebank Avenue upgrade

As described in section 7.4.4, the proposed upgrade of Moorebank Avenue has changed significantly since EIS exhibition.

Where the EIS design proposed an upgrade for Moorebank Avenue (including duelling and signalisation) between the M5 Motorway and East Hills rail line, as well as numerous entry and egress points from the Project site onto Moorebank Avenue, the modified project consists of a single entry point only – at the intersection of Moorebank Avenue and Anzac Road (refer Figure 7.11). The modified design provides for the upgrading of Moorebank Avenue to a four-lane carriageway from the M5 Motorway to that entry point, with no further upgrade to the south, on the basis that no truck traffic generated by the Project will travel to and from the south of Anzac Road along Moorebank Avenue.

In addition to the upgrade of the Anzac Road intersection, relocation and upgrade of Bapaume Road and its intersection with Moorebank Avenue will be undertaken (to be determined as part of the detailed design).

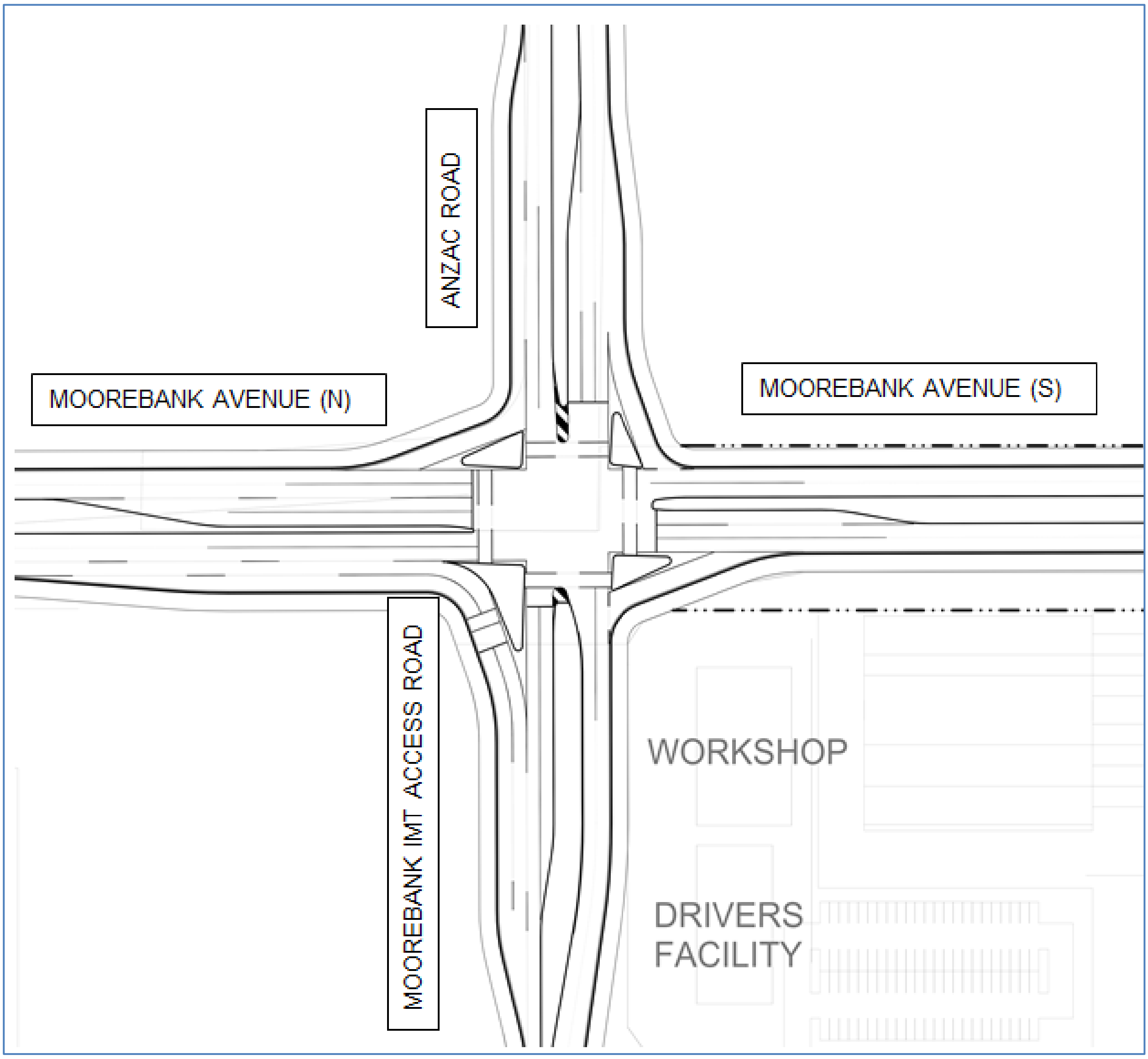

Figure 7.11 Proposed Moorebank Avenue, Anzac Road and Moorebank IMT Access intersection

Design for these upgrades will be undertaken as part of the detailed design phase of the Project.

Traffic generation

Construction traffic

While the underlying assumptions about traffic generation during construction remain unchanged and are presented in Chapter 11 – *Traffic, transport and access,* section 11.4.1 of the EIS, construction traffic generation has changed overall as a result of modifications to earthworks volumes and phasing plans associated with construction. The construction traffic volumes associated with the modified Project are detailed in Tables 7.16 to 7.18 below for all scenarios where construction is occurring.

Operation

While the Project at full build consists of the same elements as that presented in the EIS, some of the underlying assumptions – in particular the conversion factors between site activity/land uses and traffic generation have changed as a result of further analysis of IMT generation rates.

Summary of traffic generation rates

A summary of the total traffic generated by the Project development during the construction and operation phase is shown in Table 7.16 for the different years of analysis. Table 7.17 and Table 7.18 show the weekday AM peak and PM peak volumes for these phases for the different years. Detailed information on traffic generation is contained in Chapter 6 of the revised TIA, contained in Appendix E.

Table 7.16 shows one-way weekday trips. For example 50 trips would involve 25 trips in and 25 trips out.

Table 7.16 Summary of total daily weekday trips generated by Moorebank IMT

	Early Works 2015		Scenario 1 2016		Scenario 2a 2019		Scenario 2b 2023		Scenario 3 2030	
	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
Construction	810	64	2,295	1,390	1,485	260	2,080	360	0	0
IMEX	0	0	0	0	168	652	337	1,302	674	2,726
Interstate	0	0	0	0	262	710	262	710	522	1,152
Warehouse	0	0	0	0	1,510	580	1,510	852	4,528	1,644
Total trips	810	64	2,295	1,390	3,425	2,202	4,189	3,224	5,724	5,522

Table 7.17 summary of total weekday AM peak hour traffic movements

		Early Works 2015		Scenario 1 2016		Scenario 2a 2019		Scenario 2b 2023		Scenario 3 2030	
		LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
Construction	Inbound	54	5	153	76	99	14	139	20	0	0
	Outbound	0	5	0	76	0	14	0	20	0	0
IMEX	Inbound	0	0	0	0	8	25	16	50	32	105
	Outbound	0	0	0	0	0	25	0	50	0	105
Interstate	Inbound	0	0	0	0	16	27	16	27	32	44
	Outbound	0	0	0	0	0	27	0	27	0	44
Warehouse	Inbound	0	0	0	0	10	22	10	33	20	63
	Outbound	0	0	0	0	0	22	0	33	0	63
Total trips	**Inbound**	**54**	**5**	**153**	**76**	**133**	**88**	**181**	**130**	**84**	**212**
	Outbound	0	5	0	76	0	88	0	130	0	212

Table 7.18 Summary of total weekday PM peak hour traffic movements

		Early Works 2015		Scenario 1 2016		Scenario 2a 2019		Scenario 2b 2023		Scenario 3 2030	
		LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
Construction	Inbound	0	5	0	76	0	14	0	20	0	0
	Outbound	54	5	153	76	99	14	139	20	0	0
IMEX	Inbound	0	0	0	0	0	30	0	61	0	127
	Outbound	0	0	0	0	8	30	16	61	32	127
Interstate	Inbound	0	0	0	0	0	33	0	33	0	54
	Outbound	0	0	0	0	16	33	16	33	32	54
Warehouse	Inbound	0	0	0	0	0	27	0	40	0	76
	Outbound	0	0	0	0	10	27	10	40	20	76
Total trips	**Inbound**	**0**	**5**	**0**	**76**	**0**	**104**	**0**	**154**	**0**	**257**
	Outbound	54	5	153	76	133	104	181	154	84	257

Traffic distribution

Operational traffic distribution (in terms of the proportionate split across the road network in the vicinity of the site) is unchanged since the EIS, and is described in Chapter 11 – *Traffic, transport and access* in section 11.4.2. For the purposes of the assessment, construction traffic was assumed to be apportioned to the road network in the same manner as the operational traffic. Further assessment of construction traffic distribution will be required as part of the Stage 2 development application process, once details such as construction spoil disposal and worksite locations are known.

Traffic impact assessment

Intersection analysis

The impacts of the Project on the key intersections are outlined below. The tables show, for each intersection:

- The performance of the intersection during the AM and PM peak.
- The performance now (assumed 2015 base) without project and at 2030 with and without the Project.

A more detailed analysis, including presentation of the results for all scenarios (2016, 2019 and 2023) is contained in section 9.1 of the revised TIA in Appendix E of this report.

Critical to the assessment of the future performance of the intersections is the establishment of background traffic growth rates as they apply to intersections affected by the Project. Assumptions regarding background traffic growth are unchanged since the EIS exhibition, and are detailed in Chapter 7 of the revised TIA in Appendix E of this report.

The results in Table 7.19 below demonstrate there are a number of intersections that deteriorate below an acceptable level of service by 2030. Detailed analysis in section 7.3 of the revised TIA was undertaken for all scenarios and identifies the point in time that specific mitigation works are required.

Table 7.20 below provides a detailed outline of the intersection treatments required for those intersections that will deteriorate to a LoS of E or below without mitigation, in order to maintain the intersection at an acceptable LoS for the long term development of the Project. Approval and funding of those works is subject to ongoing discussions between MIC (on behalf of the Commonwealth) and NSW Government.

Table 7.19 indicates the resulting LoS that will be achieved if these works are implemented.

Table 7.19 Intersection performance results at 2030

Intersection	Scenario	AM peak				PM peak			
		DoS	Delay	LoS	Queue	DoS	Delay	LoS	Queue
I01 Hume Highway/Orange Grove Road	2015 Base	0.88	31	C	224	0.96	45	D	271
	2030 Base	0.94	35	C	288	1.04	63	E	372
	2030 with Project	1.07	44	D	375	1.11	76	F	488
	2030 with upgrade[1]	1.07	44	D	378	1.00	62	E	448
I02 – Hume Highway/Elizabeth Drive	2015 Base	1.11	59	E	318	0.99	47	D	239
	2030 Base	1.27	100	F	515	1.16	59	E	286
	2030 with Project	1.17	98	F	555	1.07	62	E	356
	2030 with upgrade[1]	1.13	98	F	555	0.98	59	E	356
I03 – Hume Highway/Memorial Avenue	2015 Base	1.01	52	D	319	1.19	45	D	266
	2030 Base	1.18	92	F	504	1.24	57	E	422
	2030 with Project	1.26	102	F	583	1.23	60	E	523
	2030 with upgrade[1]	1.26	86	F	457	1.06	44	D	288
I04 – Hume Highway/Hoxton Park Road/ Macquarie Street	2015 Base	0.95	49	D	272	1.19	47	D	300
	2030 Base	1.27	110	F	485	1.41	81	F	507
	2030 with Project	1.26	117	F	503	1.41	87	F	629
	2030 with upgrade1	1.13	115	F	503	1.41	84	F	761
05 – Hume Highway/Reilly Street	2015 Base	0.90	17	B	274	0.94	16	B	296
	2030 Base	1.06	27	B	462	1.06	42	C	941
	2030 with Project	1.03	31	C	572	1.12	43	D	974
	2030 with upgrade[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
I06 – Newbridge Road/Moorebank Avenue	2015 Base	0.93	28	B	200	0.92	32	C	200
	2030 Base	1.58	134	F	650	1.19	99	F	520
	2030 with Project	1.70	151	F	759	1.21	127	F	688
	2030 with upgrade[1]	1.60	139	F	706	1.29	123	F	643

Intersection	Scenario	AM peak				PM peak			
		DoS	Delay	LoS	Queue	DoS	Delay	LoS	Queue
I07 – Heathcote Road/Moorebank Avenue	2015 Base	1.00	36	C	311	0.91	16	B	189
	2030 Base	1.39	207	F	706	1.42	107	F	690
	2030 with Project	1.45	205	F	785	1.42	115	F	692
	2030 with upgrade[1]	1.30	206	F	473	1.28	85	F	364
I-08 – Moorebank Avenue/Industrial Park Access	2015 Base	0.49	4	A	95	0.43	8	A	84
	2030 Base	1.22	187	F	1144	0.52	7	A	75
	2030 with Project	1.28	226	F	1335	0.52	7	A	77
	2030 with Project with upgrade1	1.22	189	F	1241	0.52	7	A	78
I-09 – Moorebank Avenue/Church Road	2015 Base	0.71	78	F	60	0.93	98	F	192
	2030 Base	0.95	845	F	83	1.29	374	F	567
	2030 with Project	1.00	768	F	97	1.45	736	F	729
	2030 with Project with upgrade1	1.00	32	C	13	1.45	457	F	728
I-10 – Heathcote Road/Nuwarra Road	2015 Base	1.05	51	D	270	0.99	56	D	343
	2030 Base	1.44	178	F	1182	1.32	144	F	854
	2030 with Project	1.44	178	F	1183	1.34	146	F	855
	2030 with Project with upgrade1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
I-11 – Newbridge Road/Nuwarra Road	2015 Base	1.02	53	D	352	0.97	27	B	182
	2030 Base	1.25	168	F	1038	1.08	38	C	298
	2030 with Project	1.25	178	F	1143	1.1	39	C	315
	2030 with Project with upgrade1	1.28	172	F	1079	N/A	N/A	N/A	N/A
I-12 – Newbridge Road/Brickmans Drive/ Governor Macquarie Drive	2015 Base	1.00	52	D	440	1.04	41	C	270
	2030 Base	1.24	161	F	1180	1.15	62	E	389
	2030 with Project	1.24	170	F	1278	1.62	81	F	660
	2030 with Project with upgrade1	1.24	159	F	1278	1.09	69	E	548

Intersection	Scenario	AM peak				PM peak			
		DoS	Delay	LoS	Queue	DoS	Delay	LoS	Queue
I-13 – Moorebank Avenue/M5 Motorway	2015 Base	0.85	19	B	74	0.89	29	C	218
	2030 Base	0.99	21	B	90	0.93	32	C	264
	2030 with Project	0.98	24	B	142	1.09	56	D	342
	2030 with Project with upgrade1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
I-14 – Hume Highway/M5 Motorway	2015 Base	1.03	30	C	279	0.90	30	C	297
	2030 Base	1.21	81	F	1101	1.15	79	F	641
	2030 with Project	1.32	95	F	1109	1.29	95	F	646
	2030 with Project with upgrade1	1.32	92	F	1109	1.23	88	F	646
I-15 – Cambridge Avenue/Canterbury Road	2015 Base	0.63	18	B	35	0.48	12	A	15
	2030 Base	1.14	114	F*	287	0.59	14	A	28
	2030 with Project	1.19	135	F*	336	0.60	14	A	28
	2030 with Project with upgrades	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
I-0A – Moorebank Avenue/Anzac Road	2015 Base#	0.73	19	B	188	0.85	28	B	296
	2030 Base#	1.04	56	D	752	1.21	59	E	577
	2030 with Project	0.88	39	C	198	1.00	48	D	385
	2030 with Project with intersection upgrades / modifications	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1 – upgrades to achieve this level of service are outlined in section 7.1.6 below

- this is based on the existing signalised T junction layout

Intersection upgrades required to maintain adequate level of service

Table 7.19 identifies that by 2030 numerous intersections will be operating at a reduced LoS when compared to the existing (2015 base) conditions. The deterioration of intersections is generally a result of both background traffic growth and the Project. According to RMS guidelines, intersections operating at LoS D or above are considered to be acceptable, while E or below are below an acceptable standard.

Assessment was undertaken to determine intersection functioning at a number of points in time leading to full development to determine the required timing of infrastructure upgrades. Additional analysis was undertaken at 2025 and 2028, to provide a comprehensive understanding of the point of failure of key intersections.

Table 7.20 below identifies the treatments that would be required, and by what date, for affected intersections. Mitigation treatments would only be applied if an intersection is operating at level of Service (LoS) E or worse as a result of the Project traffic above the background growth and cumulative impacts by others. Treatments would not be recommended where the resulting LoS of D or above is achieved, even where performance has deteriorated as a result of the Project.

Indicative timing of these upgrades is provided in Table 7.20, based on current projections for background traffic growth and anticipated increases in container throughput (or 'ramp up') over time for the IMT. However, in recognition of the uncertainties over actual throughput increases (due to factors such as future economic growth rates), any funding contribution of the IMT towards these upgrades would be based on the following circumstances:

- That certain throughput levels at the terminal had been achieved. These throughputs are outlined in column 1 of Table 7.20.
- That it can be further demonstrated (as part of any subsequent planning approval stage) that the intersection performance would have deteriorated to a level of service E or worse (where previously operating at a LoS D or above) were it not for the implementation of the upgrades outlined in Table 7.20.

Concept layouts of the proposed intersections are shown in section 7.1 of the revised TIA (Appendix E). The upgrades are required as a result of a combination of background traffic growth and traffic generated by the Project. They are presented as potential road network solutions but are not nominated for delivery by this project.

Table 7.20 Intersection upgrade and timing requirements

Throughputs triggering IMT contributions to upgrades	Upgrade description	Intersections	Indicative upgrade year
Construction of Phase A (no operational throughput)	Signal timing changes, change bus lane on Heathcote Road to general traffic lane (combined left and right turn lane) and second lane to right turn lane.	I-07 – Heathcote Road/ Moorebank Avenue	2016
	Ban right turn on Church Road	I-09 – Moorebank Avenue/ Church Road	
	Signal timing changes	I-12 – Newbridge Road/ Governor Macquarie Drive	

Throughputs triggering IMT contributions to upgrades	Upgrade description	Intersections	Indicative upgrade year
Operation of 250,000 TEU	Signal timing changes	I-08 – Moorebank Avenue/ Industrial Access	2019
Operation of 750,000 TEU	Signal timing changes	I-01 – Hume Highway/ Orange Grove Road I-06 – Newbridge Road/ Moorebank Avenue I-11 – Newbridge Road/Nuwarra Road	2023
	Signal timing changes, extend short right turn lane on M5 East to 230 m in length.	I-14 – Hume Highway/M5 Motorway	
Operation of 1 million TEU	Signal timing changes, changed layout on Governor Macquarie Drive to include a combined through and right turn lane, and dedicated right turn lane of 200 m lengths.	I-12 – Newbridge Road/ Governor Macquarie Drive	2025
	Provide a left, through and right lane and dedicated right turn lane on Canterbury Road.	I-15 – Cambridge Avenue/ Canterbury Road	
Operation of 1.3 million TEU	Signal timing changes.	I-13 – Moorebank Avenue/M5 Motorway	2028
Operation of 1.55 million TEU	Signal timing changes, 60 m approach and 60 m departure lanes on Hume Highway in the northbound direction.	I-01 – Hume Highway/Orange Grove Road	2030
	Signal timing changes, additional 60 m right turn lane on the Hume Highway in the northbound direction.	I-03 – Hume Highway/Memorial Avenue	
	Signal timing changes.	I-04 – Hume Highway/Hoxton Park Road	

Mid-block capacity analysis

Mid-block capacity assessment has been determined to analyse the link capacity on wider road network based on Austroads *Guide to Traffic Management part 3: Traffic Studies and Analysis, Table 5.1*. The typical mid-block capacities for various types of urban road with interrupted flow, with unflared major intersections and with interruptions form cross and turning traffic at minor intersections are shown in Table 7.21.

Table 7.21 Typical mid-block capacities for urban roads with interrupted flow

Type of lane	One-way mid-block capacity (pc/hr)
Median or inner lane	
Divided road	1,000
Undivided road	900
Middle lane (of a three lane carriageway)	
Divided road	900
Undivided road	1,000

Type of lane	One-way mid-block capacity (pc/hr)
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicle	600
Clearway conditions	900

Source: Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis, section 5.2.1, Table 5.1

The modelled traffic volumes were compared with the following nominal lane capacity of the subject road:

- divided three lane road (e.g. Hume Highway and Newbridge Road): 2,800 vehicles/three lanes/hr;
- divided two lane road (e.g. Heathcote Road, south of Nuwarra Road): 1,900 vehicles/two lanes/hr;
- undivided two lane road (e.g. Moorebank Avenue): 1,800 vehicles/two lanes/hr;
- divided one lane road (e.g. Nuwarra Road): 1,000 vehicles/lane/hr; and
- undivided one lane road (e.g. Cambridge Road): 900 vehicles/lane/hr.

The peak hour directional traffic flows for the key mid-block sections on the wider road network and the results of volume-to-capacity (V/C) ratios assessments are presented in Table 7.22. A V/C ratio greater than 1.00 indicates the section of roadway is over capacity and will not operate efficiently.

Table 7.22 shows there are several mid-block road sections that are currently performing near capacity (V/C between 0.90 and 1.00) or over capacity (V/C greater than 1.00). Much of the road network is or will be experiencing congestion without the Project and the addition of Project traffic would have a small (less than 6%) contribution to that congestion.

Table 7.22 Mid-block capacity analysis on the wider road network

Road section	Peak hour	Available capacity (veh/hr)	2014 Existing				2030 Background				2030 with Moorebank IMT				(%) Difference with Moorebank IMT	
			Peak hour traffic volume (veh/hr)		V/C		Peak hour traffic volume (veh/hr)		V/C		Peak hour traffic volume (veh/hr)		V/C			
			NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB
Hume Highway, east of Orange Grove Road	AM	2800	2338	1169	0.84	0.42	2651	1275	0.95	0.46	2649	1278	0.95	0.46	-0.08%	0.27%
	PM	2800	1325	2241	0.47	0.80	1402	2449	0.50	0.87	1409	2454	0.50	0.88	0.47%	0.20%
Hume Highway, south of Orange Grove Road	AM	2800	2902	1938	1.04	0.69	3267	2151	1.17	0.77	3300	2191	1.18	0.78	1.01%	1.85%
	PM	2800	2126	2714	0.76	0.97	2245	2964	0.80	1.06	2293	3010	0.82	1.08	2.15%	1.56%
Hume Highway, north of Elizabeth Drive	AM	2800	2606	1861	0.93	0.66	2979	2042	1.06	0.73	3016	2082	1.08	0.74	1.24%	1.95%
	PM	2800	1779	3007	0.64	1.07	1895	3298	0.68	1.18	1942	3344	0.69	1.19	2.50%	1.40%
Hume Highway, south of Elizabeth Drive	AM	2800	2073	1945	0.74	0.69	2364	2152	0.84	0.77	2402	2196	0.86	0.78	1.60%	2.03%
	PM	2800	1620	2512	0.58	0.90	1721	2739	0.61	0.98	1776	2784	0.63	0.99	3.21%	1.65%
Hume Highway, north of Memorial Avenue	AM	2800	1962	1647	0.70	0.59	2240	1840	0.80	0.66	2278	1887	0.81	0.67	1.69%	2.54%
	PM	2800	1684	2881	0.60	1.03	1803	3133	0.64	1.12	1851	3172	0.66	1.13	2.67%	1.25%
Hume Highway, north of Hoxton Park Road	AM	2800	2075	1603	0.74	0.57	2341	1816	0.84	0.65	2380	1860	0.85	0.66	1.66%	2.43%
	PM	2800	1644	2753	0.59	0.98	1710	3038	0.61	1.09	1768	3079	0.63	1.10	3.37%	1.36%
Hume Highway, south of Hoxton Park Road	AM	2800	2887	1840	1.03	0.66	3269	2065	1.17	0.74	3309	2116	1.18	0.76	1.21%	2.49%
	PM	2800	1967	3432	0.70	1.23	2084	3779	0.74	1.35	2145	3832	0.77	1.37	2.94%	1.40%
Hume Highway, south of Reilly Street	AM	2800	2772	1805	0.99	0.64	3077	1989	1.10	0.71	3113	2041	1.11	0.73	1.16%	2.62%
	PM	2800	2085	3453	0.74	1.23	2139	3771	0.76	1.35	2201	3821	0.79	1.36	2.89%	1.32%
Newbridge Road, west of Moorebank Avenue	AM	1800	1608	1798	0.89	1.00	2324	2376	1.29	1.32	2332	2375	1.30	1.32	0.36%	-0.05%
	PM	1800	1772	1740	0.98	0.97	2133	2253	1.19	1.25	2137	2255	1.19	1.25	0.19%	0.11%
Newbridge Road, east of Moorebank Avenue	AM	2800	2072	1086	0.74	0.39	2797	1571	1.00	0.56	2843	1594	1.02	0.57	1.65%	1.45%
	PM	2800	1534	2071	0.55	0.74	1976	2483	0.71	0.89	1999	2528	0.71	0.90	1.16%	1.83%
Moorebank Avenue, south of Newbridge Road	AM	3800	2149	973	0.57	0.35	2755	1477	0.73	0.53	2799	1507	0.74	0.54	1.59%	2.03%
	PM	2800	1327	1896	0.35	0.68	1856	2243	0.49	0.80	1877	2288	0.49	0.82	1.15%	2.02%
Moorebank Avenue, south of Heathcote Road	AM	1800	1467	534	0.82	0.30	1847	772	1.03	0.43	1884	806	1.05	0.45	2.00%	4.38%
	PM	1800	851	1234	0.47	0.69	1151	1453	0.64	0.81	1180	1496	0.66	0.83	2.55%	2.99%
Moorebank Avenue, north of Church Road	AM	1800	1625	537	0.90	0.30	2003	716	1.11	0.40	2043	757	1.14	0.42	2.00%	5.75%
	PM	1800	873	1355	0.49	0.75	1119	1616	0.62	0.90	1142	1663	0.63	0.92	2.05%	2.92%
Moorebank Avenue, south of Church Road	AM	1800	1836	673	1.02	0.37	2264	871	1.26	0.48	2307	917	1.28	0.51	1.91%	5.24%
	PM	1800	952	1687	0.53	0.94	1221	2006	0.68	1.11	1248	2058	0.69	1.14	2.22%	2.57%
Heathcote Road, north of Nuwarra Road	AM	1900	1182	2149	0.62	1.13	1461	3060	0.77	1.61	1456	3059	0.77	1.61	-0.37%	-0.02%
	PM	1900	1810	1726	0.95	0.91	2305	2078	1.21	1.09	2306	2083	1.21	1.10	0.02%	0.23%
Heathcote Road, south of Nuwarra Road	AM	1900	1316	1990	0.69	1.05	1640	2822	0.86	1.49	1637	2825	0.86	1.49	-0.21%	0.11%
	PM	1900	1986	1687	1.05	0.89	2567	2031	1.35	1.07	2573	2031	1.35	1.07	0.24%	-0.01%
Nuwarra Road, north of Heathcote Road	AM	1000	1095	868	1.10	0.87	1373	1112	1.37	1.11	1372	1117	1.37	1.12	-0.07%	0.45%
	PM	1000	838	1445	0.84	1.45	1000	1724	1.00	1.72	1005	1732	1.00	1.73	0.50%	0.46%
Newbridge Road, west of Nuwarra Road	AM	2800	1807	954	0.65	0.34	2461	1386	0.88	0.50	2491	1401	0.89	0.50	1.21%	1.05%
	PM	2800	1285	1961	0.46	0.70	1687	2369	0.60	0.85	1709	2393	0.61	0.85	1.28%	1.00%
Newbridge Road, west of Governor Macquarie Drive	AM	2800	2240	1094	0.80	0.39	2971	1576	1.06	0.56	2999	1585	1.07	0.57	0.93%	0.56%
	PM	2800	1646	2360	0.59	0.84	2133	2853	0.76	1.02	2138	2942	0.76	1.05	0.22%	3.11%

Road section	Peak hour	Available capacity (veh/hr)	2014 Existing				2030 Background				2030 with Moorebank IMT				(%) Difference with Moorebank IMT	
			Peak hour traffic volume (veh/hr)		V/C		Peak hour traffic volume (veh/hr)		V/C		Peak hour traffic volume (veh/hr)		V/C			
			NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB	NB or EB	SB or WB
Newbridge Road, east of Governor Macquarie Drive	AM	2800	3252	1681	1.16	0.60	4258	2268	1.52	0.81	4279	2282	1.53	0.81	0.49%	0.60%
	PM	2800	2157	3317	0.77	1.18	2775	3982	0.99	1.42	2807	4001	1.00	1.43	1.16%	0.48%
Cambridge Avenue, west of Moorebank Avenue	AM	900	1110	323	1.23	0.36	1442	420	1.60	0.47	1463	420	1.63	0.47	1.45%	0.00%
	PM	900	340	1293	0.38	1.44	487	1638	0.54	1.82	487	1663	0.54	1.85	0.00%	1.52%
Orange Grove Road, north of Hume Highway	AM	1900	1399	1604	0.74	0.57	1559	1819	0.82	0.65	1593	1854	0.84	0.66	2.18%	1.94%
	PM	2800	1864	1536	0.98	0.55	1989	1661	1.05	0.59	2031	1702	1.07	0.61	2.10%	2.49%
Elizabeth Drive, west of Hume Highway	AM	2800	1814	791	0.65	0.28	2119	943	0.76	0.34	2121	942	0.76	0.34	0.09%	-0.11%
	PM	2800	1033	1977	0.37	0.71	1111	2242	0.40	0.80	1106	2247	0.40	0.80	-0.45%	0.22%
Hoxton Park Road, west of Hume Highway	AM	1800	1509	617	0.84	0.34	1981	850	1.10	0.47	2002	857	1.11	0.48	1.07%	0.78%
	PM	1800	1091	932	0.61	0.52	1277	1127	0.71	0.63	1292	1131	0.72	0.63	1.14%	0.32%
Heathcote Road, east of Moorebank Avenue	AM	1800	719	506	0.40	0.28	933	777	0.52	0.43	932	777	0.52	0.43	-0.11%	0.00%
	PM	1800	578	758	0.32	0.42	842	885	0.47	0.49	843	886	0.47	0.49	0.12%	0.11%

V/C ratio greater than 1.00
V/C ration between 0.90 and 1.00
V/C ratio less than 0.90

M5 Motorway

To assess the impact of the Project on the M5 Motorway, the following was undertaken:

- Observed traffic volumes from the 2010 counts were factored to future year values based on growth rates taken from the RMS Strategic Traffic Model (STM).
- Comparison of the traffic generated by the Project to calculate the percentage increase. The traffic generated by the IMEX and interstate terminals would already be present on the road network as it would have been mostly generated at Port Botany, therefore some of the additional traffic is double counted using this approach. These percentage increases are therefore likely to represent a slight over estimate of the increase. The percentage increase is provided in Table 7.23.

Table 7.23 Moorebank IMT percentage increase on M5 during 2030 peak periods

	Direction	2030		
		LV	HV	ALL
AM peak hour				
M5 Motorway west of Moorebank Avenue	EB	0.47%	17.09%	2.26%
	WB	0.00%	24.63%	2.63%
M5 Motorway east of Moorebank Avenue	EB	0.00%	2.23%	0.27%
	WB	0.20%	6.51%	0.82%
PM peak hour				
M5 Motorway west of Moorebank Avenue	EB	0.00%	57.72%	3.31%
	WB	0.42%	21.82%	2.35%
M5 Motorway east of Moorebank Avenue	EB	0.23%	16.19%	1.30%
	WB	0.00%	9.79%	0.48%

EB – Eastbound, WB – Westbound

LV – Light vehicle, HV – Heavy vehicle, ALL – All vehicles

The percentage increase from the traffic generated by Project on the M5 Motorway is under 3.3% of total M5 Motorway traffic during the 2030 AM and PM peak hours. The increase in the heavy vehicle proportion is an overestimate as no allowance has been made for heavy vehicles that would have been on the network anyway.

Traffic weaving on the M5 Motorway

The Hume Highway and Moorebank Avenue Interchanges are located near the M5 Motorway crossing of the Georges River. The proximity of the interchanges results in the easterly oriented ramps of the Hume Highway interchange to be close to the westerly oriented ramps from the Moorebank Avenue interchange.

In the westbound direction, traffic from the M5 Motorway destined for the Hume Highway must weave over a distance of 453 m through the traffic coming from Moorebank Avenue destined for the M5 Motorway. Similarly, in the eastbound direction, traffic from the Hume Highway and destined for the M5 Motorway, must weave over a distance of 361 m through traffic from the M5 Motorway destined for Moorebank Avenue. This section of M5 Motorway must also cater for through traffic on the main carriageways and traffic moving directly between the entry and exit ramps.

Due to the proximity of the two interchanges the resultant traffic weaving tends to control operation during the peak hours rather than the individual exits and entries.

To establish the expected levels of service and hence the spare capacity available for Moorebank IMT traffic, a weaving analysis was undertaken using the HCM 2010 Highway Capacity Manual – Transportation Research Board. Traffic data for the design years was extracted from the Strategic Travel Model (STM, information provided by the Bureau of Transport Statistics). This model presented the projected background traffic and did not include any Moorebank IMT or Sydney Intermodal Terminal Alliance (SIMTA) related background traffic. Details of the input data for the assessment are provided in the revised TIA (Appendix E).

The analysis indicates that the M5 Motorway at this location will be at and/or nearing capacity in future years as a result of the weaving manoeuvres between the two interchanges. The weaving assessment results from the HCS program are shown in the Table 7.24.

Table 7.24 Expected Levels of Service for Weaving at the M5 Motorway Georges River Crossing in 2030 with and without Moorebank IMT

Scenario	Density (pcu/mi/ln) (LoS)	
	2030 AM peak	2031 PM peak
Eastbound		
Base	LoS F	31.4 (LoS D)
With Project	LoS F	31.8 (LoS D)
Westbound		
Base	26.3 (LoS C)	45.9 (LoS E)
With Project	26.7 (LoS C)	46.1 (LoS E)

The assessment indicates the section of the M5 Motorway between Moorebank Avenue and Hume Highway in both east and west bound directions will operate with only minimal increase in density due to the inclusion of the Moorebank IMT. As a result, the LoS with Moorebank IMT does not deviate from the respective base scenario for both AM and PM peak periods.

However, besides the westbound AM peak scenario, all other scenarios produce undesirable LoS with 2030 traffic volumes, with the eastbound AM peak scenario operating at a poor LoS of F.

The volume to capacity ratios for the weaving segment is provided in Table 7.25.

Table 7.25 Expected volume to capacity Ratios at the M5 Georges River Crossing in 2030 with and without Moorebank IMT

Scenario	Volume to Capacity Ratio	
	2030 AM peak	2030 PM peak
Eastbound		
Base	1.515	0.889
With Project	1.516	0.913
Westbound		
Base	0.651	0.988
With Project	0.659	0.991

The analysis indicates the eastbound 2030 AM peak for both base and with Project will be over capacity. For the 2030 PM peak, both eastbound and westbound will operate nearing capacity with only westbound AM peak operating within capacity.

By 2030 the background traffic growth would have resumed all spare capacity on M5 Motorway in both directions in the PM peak and all spare capacity in the eastbound direction in the AM peak. Consequently any Moorebank IMT traffic would experience considerable congestion during these times.

The introduction of Project traffic would result in a minimal change in the volume of the M5 Motorway between Moorebank Avenue and Hume Highway in both directions. For both the weekday AM and PM peak periods, the densities determined with the addition of the Moorebank IMT closely mimic those of the base case for each time scenario. As such, LoS classifications are unchanged for all scenarios.

It is recognised that Moorebank IMT traffic will add to the weaving traffic on the M5 Motorway and the potential contribution of Moorebank IMT traffic to the weaving impact will be analysed in more detail at the next stage of more detailed planning including microsimulation modelling.

Summary of potential road network capacity issues in 2030

Capacity issues are reflected through the presence of congestion during peak periods. The analysis of the traffic generated by Moorebank IMT compared to the congestion forecast to be present on the road infrastructure is summarised in Table 7.26.

Table 7.26 The impact of Moorebank IMT traffic on road infrastructure congestion

Road Infrastructure	Peak hour congestion in 2030	Contribution of Moorebank IMT traffic to congestion issue	Mitigation Measure and Impact
Moorebank Avenue (Anzac Road to M5 Motorway)	Some	Significant adverse impact	Project includes widening of Moorebank Avenue to four lanes and provision of new intersections which reduces congestion to 2015 levels
Moorebank Avenue north of M5 Motorway	Yes	Minor adverse impact	Minor Intersection modifications may be required
Cambridge Avenue	Yes	Insignificant impact	None required
M5 Motorway westbound between Moorebank Avenue and Hume Highway	Yes	The M5 Motorway is heavily congested without Moorebank IMT traffic	TfNSW to explore how to resolve congestion issue on M5 Motorway caused by inadequate weave distance as this is not a direct Project impact.
M5 Motorway eastbound between Moorebank Avenue and Hume Highway	Yes	The M5 Motorway is heavily congested without Moorebank IMT traffic	TfNSW to explore how to resolve congestion issue on M5 Motorway caused by inadequate weave distance as this is not a direct Project impact.
Hume Highway north of M5 Motorway	Yes	Insignificant impact	None required
M7 Motorway	Yes	Insignificant impact	None required
M2 Motorway	Yes	Insignificant impact	None required
M1 Pacific Motorway	Yes	Insignificant impact	None required

Summary

Since exhibition of the EIS, a number of project amendments have occurred resulting in changed traffic impacts, including:

- A requirement to upgrade Moorebank Avenue north of Anzac Road, and the upgrading of the Anzac Road intersection to a major signalised intersection.
- While the traffic impacts at 2030 have slightly improved relative the predictions made in the EIS, the analysis continues to show that by 2030, all intersections will have experienced a reduced LoS as a result of background traffic growth. A number of intersections will have deteriorated to an unacceptable LoS without mitigation.
- Mitigation measures in the form of intersection treatments are prescribed to ensure that for intersections operating at below LoS D, the 'with Moorebank' performance at 2030 is maintained at or below the 'without Moorebank' LoS.
- The impact of traffic from the Project represents less than 3.3% of the total traffic already on the M5 Motorway, the Project would therefore not have a substantial impact on the motorway operation.

The influence of the Project traffic on the surrounding road network can be further mitigated by managing arrival and departure of trucks through the terminal gate during peak periods of congestion.

The localised impact on congestion around Moorebank is offset by the broader network benefits:

- a saving of 56,125 truck vehicle kilometres travelled (VKT) per day; and
- a saving of 1,265 truck vehicle hours travelled (VHT) per day.

The potential contribution of Moorebank IMT traffic to the congestion around Moorebank and at a regional level will be revisited as part of the next stage (Stage 2 SSD) development application process.

7.10.4 Noise and vibration

Introduction

Chapter 12 – *Noise and Vibration* of the EIS provides an assessment of the potential noise and vibration impacts associated with the construction and operation of the Project. A detailed noise and vibration assessment was prepared by SLR Consulting (Technical Paper 2 – *Noise and Vibration Impact Assessment*, Volume 3 of the EIS) which addresses the relevant Commonwealth DoE's EIS Guidelines and the NSW SEARs.

Section 7.8.3 summarises the approach and key findings of the noise and vibration impact assessment from the EIS. The noise and vibration assessment for the revised Project follows the same assessment approach and assesses all development scenarios.

An updated *Noise and Vibration Impact Assessment* report has been prepared by SLR Consulting (2015) which details the assessment of potential noise and vibration levels associated with the proposed construction and operation of the revised Project (refer to Appendix F).

The assessment of noise levels in this report represents an 'unmitigated' conceptual layout. To demonstrate the potential noise levels during the operation of the revised Project can achieve the noise assessment criteria, a concept design with reasonable and feasible noise mitigation was also assessed.

Implications of the revised Project on the assessment

The following changes associated with the revised Project have had implications for the noise and vibration impact assessment:

- The key sources of noise at the IMEX terminal will be operated with the electric powered mobile and fixed plant. The proposed electric plant and equipment with the IMEX terminal have lower source noise emissions than the diesel or hybrid plant assumed in the EIS.
- The container handling area at the IMEX terminal will be an automated process that will not require staff to be within the container handling area and the RMGs will thus not require audible alarms or beepers. Measured noise levels provided by the manufacturer of the RMGs are 10 dBA less when operated without the audible warning alarms.
- Revised locations of the key noise sources at the interstate rail tracks, container handling areas, internal site traffic routes and container storage areas. This has changed the distance between the receptors and the noise sources.
- The warehousing for the IMEX and interstate terminals is located on the western portion of the main IMT site which will assist in screening noise emissions at the suburb of Casula.
- The selection of the southern rail access between the site and the SSFL will result in better noise outcomes for Casula residents compared to the northern and central alignments.
- The revised Project has removed the need for a rail loop to manage entry and departure of trains within the site, which by removing the curved track will reduce the likelihood for train wheel squeal.

Noise and vibration impact assessment (unmitigated)

Scenario 1 – 2016 (construction only)

Table 7.27 shows the predicted construction noise levels at the nearest residential receptors for development Scenario 1.

Table 7.27 Predicted construction noise levels - Scenario 1 of the revised Project

Construction activity	Predicted Noise Level at Residential Receptors (dBA, $L_{Aeq,\ 15min}$)			
	Casula NML = 49 dBA	Wattle Grove NML = 45 dBA	Glenfield NML = 45 dBA	Liverpool NML = 49 dBA
Piling works	41–**55**	**48–57**	43–**48**	47–**50**
Excavation	38–**52**	**46–51**	41–45	45–47
Compaction	38–**52**	**46–51**	41–45	45–47
Heavy vehicles within main IMT site	30–44	38–43	32–37	36–38
Concreting	35–49	43–**48**	37–42	42–45
SSFL rail access and on-site track	38–**52**	38–40	42–**46**	34–36

Note: The predicted noise levels highlighted in bold denotes levels above the daytime noise management level.

The key findings of the noise assessment for the construction activities during Scenario 1 include:

- Where piling, excavation and compaction works are undertaken adjacent to the nearest residential receptors the predicted worst case noise levels trigger the requirement for construction noise mitigation to reduce potential levels by up to 12 dBA.
- For concreting works, predicted noise levels trigger the daytime NML by 3 dBA at nearest receptors in Wattle Grove.
- Potential noise levels from heavy vehicles operating within the onsite haul roads are within the daytime NMLs and would not require specific noise mitigation to reduce the predicted noise levels.
- At all non-residential noise sensitive receptors, the predicted noise levels were within the relevant NMLs and would not trigger the requirement for noise mitigation.
- During standard daytime construction hours the predicted noise levels for the construction of the rail access connection to the SSFL exceed the NMLs at nearest residences at the west of Casula and north of Glenfield by up to 3 dBA.
- There is potential for rail construction works to be required outside of the standard daytime construction hours. Based on NMLs of 37 dBA for Wattle Grove and 38 dBA at all other suburbs, the predicted noise levels of up to 52 dBA would trigger the requirement for specific noise mitigation to control potential sleep disturbance impacts at Casula, Wattle Grove and Glenfield.

Scenario 2a – 2019 (operation and construction):

Table 7.28 shows the predicted construction noise levels at the nearest residential receptors for Scenario 2a of the revised Project.

Table 7.28 Predicted construction noise levels – Scenario 2a of the revised Project

Construction activity	Predicted Noise Level at Residential Receptors (dBA, $L_{Aeq, 15min}$)			
	Casula NML = 49 dBA	Wattle Grove NML = 45 dBA	Glenfield NML = 45 dBA	Liverpool NML = 49 dBA
Piling works	41–**51**	43–**49**	41–45	48–**50**
Excavation	38–49	41–**46**	39–42	45–47
Compaction	38–49	40–**46**	39–42	45–47
Heavy vehicles within main IMT site	30–40	32–38	30–34	37–39
Concreting	35–46	37–43	35–39	42–45

Note: The predicted noise levels highlighted in bold denotes levels above the daytime noise management level.

The key findings of the noise assessment for construction activities during Scenario 2a include:

- Predicted worst case noise levels at the nearest residential receptors for piling, excavation and compaction works would trigger the requirement for construction noise mitigation to reduce potential noise levels by up to 4 dBA at Casula, Wattle Grove and Liverpool.
- Predicted noise levels for heavy vehicles within the main IMT site and concreting works are within the NMLs and would not require specific noise mitigation measures to be implemented.

- At all non-residential noise sensitive receptors, the predicted noise levels were within the relevant NMLs and would not trigger the requirement for noise mitigation.

Table 7.29 provides the predicted unmitigated noise levels during the operation of Scenario 2a.

Table 7.29 Predicted unmitigated noise levels during operation of development Scenario 2a

Receptor/Location		Conservative Noise Criteria, $L_{Aeq(15min)}$ dBA	$L_{Aeq(15min)}$ dBA Noise level	
			Neutral	Adverse
R1	Lakewood Crescent, Casula	38	35	38
R2	St Andrews Boulevard, Casula	38	37	**40 (+2)**
R3	Buckland Road, Casula	38	**39 (+1)**	**41 (+3)**
R4	Dunmore Crescent, Casula	38	**39 (+1)**	**41 (+3)**
R5	Leacocks Lane, Casula	38	32	34
R6	Leacocks Lane, Casula	38	33	35
R7	Slessor Road, Casula	38	30	31
R8	Canterbury Road, Glenfield	38	27	27
R9	Ferguson Street, Glenfield	38	30	30
R10	Goodenough Street, Glenfield	38	30	31
R11	Wallcliffe Court, Wattle Grove	37	33	37
R12	Corryton Court, Wattle Grove	37	35	**39 (+2)**
R13	Martindale Court, Wattle Grove	37	34	**39 (+2)**
R14	Anzac Road, Wattle Grove	37	37	**42 (+5)**
R15	Cambridge Avenue, Glenfield	38	30	30
R16	Guise Public School	42	23	23
R17	Yallum Court, Wattle Grove	37	35	**39 (+2)**
R18	Church Road, Liverpool	38	30	35
R19	Glenwood Public School, Glenfield	42	27	28
R20	Glenfield Public School, Glenfield	42	24	25
R21	Hurlstone Agricultural School	42	23	24
R22	Wattle Grove Public School	42	32	37
R23	St Marks Coptic College, Wattle Grove	42	28	33
R24	Maple Grove Retirement Village, Casula	38	24	26
R25	All Saints Catholic College	42	34	36
R26	Casula High School	42	23	25
R27	Casula Primary School, Casula	42	32	35
R28	Lurnea High School	42	22	25
R29	St Francis Xaviers Catholic Church	47	19	24
R30	Impact Church Liverpool	47	24	29
R31	Liverpool West Public School	42	19	24
R32	Liverpool Public School/TAFE NSW	42	21	26
R33	DNSDC1 Site up to end 2014	70	62	63
R34	Glenfield Rise Development, Glenfield	38	28	28
R35	DNSDC1 Site after end 2014	70	37	41

Receptor/Location		Conservative Noise Criteria, $L_{Aeq(15min)}$ dBA	$L_{Aeq(15min)}$ dBA Noise level	
			Neutral	Adverse
R36	Playground Learning Centre Glenfield	42	25	26
R37	Wattle Grove Long Day Care Centre	42	29	34
R38	Casula Powerhouse Arts Centre	50	40	42

Note Bold highlight denotes predicted noise level exceeds the Project specific noise level criteria.

* Receptor R33 will not be occupied at the time of Phase B operations.

The key findings of the noise assessment for the operational components of Scenario 2a include:

- Predicted noise levels during neutral weather conditions comply with the daytime, evening and night-time noise criteria at all assessed receptors. Noise levels comply with the night-time noise criteria at all receptors in Wattle Grove, Liverpool and Glenfield. At the northern extent of Casula, noise levels marginally exceed the 38 dBA night-time noise criteria by 1 dBA.
- Predicted noise levels during adverse weather conditions comply with the daytime and evening noise criteria at all assessed receptors, with the exception of the western extent of Anzac Road where marginal 1 to 2 dBA exceedances of the noise criteria was predicted.
- During the night-time (for adverse weather conditions), predicted noise levels comply with the noise criteria at the majority of receptors, but exceed the noise criteria by 2 to 3 dBA at nearest receptors at the northern extent of Casula and by 2 dbA at nearest receptors at Wattle Grove. At the western extent of Anzac Road noise levels exceed the night-time noise criteria by up to 5 dBA.

Scenario 2b – 2023 (operation and construction)

Table 7.30 shows the predicted construction noise levels at the nearest residential receptors for development scenario 2b of the revised Project.

Table 7.30 Predicted noise levels during construction – Scenario 2b

Construction activity	Predicted Noise Level at Residential Receptors (dBA, $L_{Aeq, 15min}$)			
	Casula NML = 49 dBA	Wattle Grove NML = 45 dBA	Glenfield NML = 45 dBA	Liverpool NML = 49 dBA
Piling works	41–**53**	43–**49**	41–45	47–49
Excavation	38–**50**	40–**47**	39–42	44–46
Compaction	38–**50**	40–**47**	39–42	44–46
Heavy vehicles within main IMT site	30–42	32–39	30–42	36–38
Concreting	35–47	37–44	35–**47**	41–43

Note The predicted noise levels highlighted in bold denotes levels above the daytime noise management level.

The key findings of the noise assessment for the construction activities during Scenario 2b include:

- Predicted worst case noise levels for piling, excavation, compaction and concreting works would trigger the requirement for construction noise mitigation to reduce potential noise levels by up to 4 dBA at Casula and Wattle Grove.

- Predicted noise levels for heavy vehicles within the main IMT site are within the NMLs and would not require specific noise mitigation measures to be implemented. At all non-residential noise sensitive receptors, the predicted noise levels are within the relevant NMLs and would not trigger the requirement for noise mitigation.

Table 7.31 provides the predicted noise levels for the operation of development scenario 2b of the revised Project.

Table 7.31 Predicted unmitigated noise levels during operation of development Scenario 2b

Receptor/Location		Conservative Noise Criteria, $L_{Aeq(15min)}$ dBA	$L_{Aeq(15min)}$ dBA Noise level	
			Neutral	Adverse
R1	Lakewood Crescent, Casula	38	36	**39 (+1)**
R2	St Andrews Boulevard, Casula	38	**39 (+1)**	**41 (+3)**
R3	Buckland Road, Casula	38	**40 (+2)**	**42 (+4)**
R4	Dunmore Crescent, Casula	38	**39 (+1)**	**41 (+3)**
R5	Leacocks Lane, Casula	38	33	35
R6	Leacocks Lane, Casula	38	34	35
R7	Slessor Road, Casula	38	31	32
R8	Canterbury Road, Glenfield	38	28	28
R9	Ferguson Street, Glenfield	38	31	31
R10	Goodenough Street, Glenfield	38	31	31
R11	Wallcliffe Court, Wattle Grove	37	34	37
R12	Corryton Court, Wattle Grove	37	34	**38 (+1)**
R13	Martindale Court, Wattle Grove	37	34	**38 (+1)**
R14	Anzac Road, Wattle Grove	37	37	**42 (+4)**
R15	Cambridge Avenue, Glenfield	38	31	31
R16	Guise Public School	42	24	25
R17	Yallum Court, Wattle Grove	37	35	**39 (+2)**
R18	Church Road, Liverpool	38	30	35
R19	Glenwood Public School, Glenfield	42	29	29
R20	Glenfield Public School, Glenfield	42	25	26
R21	Hurlstone Agricultural School	42	25	25
R22	Wattle Grove Public School	42	32	37
R23	St Marks Coptic College, Wattle Grove	42	28	33
R24	Maple Grove Retirement Village, Casula	38	25	27
R25	All Saints Catholic College	42	35	36
R26	Casula High School	42	24	26
R27	Casula Primary School, Casula	42	32	35
R28	Lurnea High School	42	22	25
R29	St Francis Xaviers Catholic Church	47	20	25
R30	Impact Church Liverpool	47	25	31
R31	Liverpool West Public School	42	20	25
R32	Liverpool Public School/TAFE NSW	42	22	27
R33	DNSDC1 Site up to end 2014	70	62	63

Receptor/Location		Conservative Noise Criteria, $L_{Aeq(15min)}$ dBA	$L_{Aeq(15min)}$ dBA Noise level	
			Neutral	Adverse
R34	Glenfield Rise Development, Glenfield	38	29	30
R35	DNSDC1 Site after end 2014	70	36	41
R36	Playground Learning Centre Glenfield	42	27	27
R37	Wattle Grove Long Day Care Centre	42	29	34
R38	Casula Powerhouse Arts Centre	50	41	43

Note Bold highlight denotes predicted noise level exceeds the Project specific noise level criteria.
* Receptor R33 will not be occupied at the time of Phase B operations.

The key findings of the noise assessment for the operational components of Scenario 2b include:

- Predicted noise levels during neutral weather conditions comply with the daytime, evening and night-time noise criteria at all assessed receptors, with the exception of nearest receptors at the northern extent of Casula where predicted noise levels marginally exceed the night-time noise criteria by up to 2 dBA.
- Predicted noise levels during adverse weather conditions comply with the daytime and evening noise criteria at all assessed receptors with the exception of the western extent of Anzac Road where a marginal 1 to 2 dBA exceedance was predicted. During the night-time, predicted noise levels exceed the noise criteria by up to 4 dBA at the northern extent of Casula and the nearest receptors in Wattle Grove. Noise levels comply with the night-time noise criteria at all other assessed receptors.

Scenario 3 – Full Build – 2030 (operation)

To evaluate the potential changes in received noise levels during the operation of the revised Project, the predicted noise levels for the unmitigated concept design at Full Build 2030 (Scenario 3) have been compared between the EIS and revised Project Table 7.32 summarises the predicted noise levels.

Table 7.32 Comparison of the EIS and revised Project Noise Levels for Scenario 3 – Full Build

Receptor/Location		L_{Aeq} Noise level, dBA		Change in Noise Level, dBA
		EIS	Revised Project	
R1	Lakewood Crescent, Casula	45	41	-4
R2	St Andrews Boulevard, Casula	48	43	-5
R3	Buckland Road, Casula	51	44	-7
R4	Dunmore Crescent, Casula	50	43	-7
R5	Leacocks Lane, Casula	40	37	-3
R6	Leacocks Lane, Casula	41	37	-4
R7	Slessor Road, Casula	33	34	1
R8	Canterbury Road, Glenfield	28	30	2
R9	Ferguson Street, Glenfield	29	33	4
R10	Goodenough Street, Glenfield	31	33	2
R11	Wallcliffe Court, Wattle Grove	41	39	-2
R12	Corryton Court, Wattle Grove	41	40	-1

Receptor/Location		L_{Aeq} Noise level, dBA		Change in Noise Level, dBA
		EIS	Revised Project	
R13	Martindale Court, Wattle Grove	41	40	-1
R14	Anzac Road, Wattle Grove	44	43	-1
R15	Cambridge Avenue, Glenfield	31	33	2
R16	Guise Public School	18	26	8
R17	Yallum Court, Wattle Grove	42	41	-1
R18	Church Road, Liverpool	38	37	-1
R19	Glenwood Public School, Glenfield	25	30	5
R20	Glenfield Public School, Glenfield	24	27	3
R21	Hurlstone Agricultural School	22	27	5
R22	Wattle Grove Public School	40	38	-2
R23	St Marks Coptic College, Wattle Grove	36	35	-1
R24	Maple Grove Retirement Village, Casula	29	29	0
R25	All Saints Catholic College	43	39	-4
R26	Casula High School	29	28	-1
R27	Casula Primary School, Casula	42	37	-5
R28	Lurnea High School	30	27	-3
R29	St Francis Xaviers Catholic Church	29	26	-3
R30	Impact Church Liverpool	35	33	-2
R31	Liverpool West Public School	30	27	-3
R32	Liverpool Public School/TAFE NSW	31	30	-1
R33	DNSDC1 Site up to end 2014	58	64	6
R34	Glenfield Rise Development, Glenfield	30	31	1
R35	DNSDC1 Site after end 2014	43	42	-1
R36	Playground Learning Centre Glenfield	37	29	-8
R37	Wattle Grove Long Day Care Centre	25	35	10
R38	Casula Powerhouse Arts Centre	52	44	-8

The key findings of the noise assessment of the revised Project at Full Build (Scenario 3) when compared to the EIS Full Build development scenario include:

- Noise levels are generally lower with the revised Project with the change in predicted noise levels at each suburb. At all receptor communities the changes are due to a combination of the updated IMEX terminal operations, the revised location of noise sources within the main IMT site and the relocation of warehousing to the west of the main IMT site.

- Predicted noise levels at the majority of residential receptors in Casula are up to 7 dBA lower with the revised Project with only a marginal increase of 1 dBA predicated at Slessor Road.

- At the assessed residences in Wattle Grove and in Liverpool, noise levels have been predicted to be up to 2 dBA lower with the revised Project.

- At the assessed residences in Glenfield the predicted noise levels are up to 4 dBA higher with the revised Project. Nonetheless, the predicted noise levels comply with the noise assessment criteria, which is consistent with the EIS.
- At some of the assessed non-residential receptors predicted noise levels are up to 8 dBA lower with the revised Project. However, noise levels at other non-residential receptors have been predicted to increase by up to 10 dBA. Notwithstanding, the predicted noise levels at all non-residential receptors in the EIS and with the revised Project comply with the noise assessment criteria.

Rail noise levels

Rail freight for the revised Project will operate on the SSFL with IMEX and interstate trains accessing the site via the SSFL on the purpose built rail access. The SSFL officially opened in January 2013 and the initial operation of the Project will be within the capacity of the SSFL.

Analysis of future demand on the SSFL undertaken for the EIS determined a likely need to upgrade the SSFL in the future and this need for capacity increase is foreshadowed by the Australian Rail Track Corporation (ARTC's 2013) SSFL Operational Noise and Vibration Management Plan (ONVMP). The assessed rail noise levels in the noise and vibration management plan are representative of SSFL operations including the capacity for IMEX and interstate rail freight.

As discussed in Section 14 of the Technical Paper 2 – *Noise and Vibration Impact Assessment* (Volume 3 of the EIS), the existing and any future noise mitigation implemented for the SSFL would be expected to attenuate noise contributions from rail freight associated with the IMT project where the IMT project operates within the design capacity of the SSFL.

There has been no change in the predicted rail noise levels from the southern rail access connection to the SSFL and noise levels are predicted to comply with the relevant noise assessment criteria from the RING without the requirement for noise mitigation.

Road traffic noise levels

Whilst the revised Project has resulted in a marginal changes in predicted road traffic noise levels (less than ±1 dBA), the revised designs are predicted to comply with the RNP which is consistent with the outcomes of the road traffic noise assessment in the EIS.

Ground vibration levels

There has been no change in the assessed ground vibration levels during the construction and operation of the Project. Potential ground vibration levels assessed in the EIS and revised Project are expected to comply with the vibration criteria at all receptors.

Noise assessment (Mitigated)

To demonstrate that noise levels during the operation of the revised Project can be controlled to achieve the noise assessment criteria, a conceptual design with reasonable and feasible noise mitigation has been assessed.

The following noise mitigation measures have been included in the Full Build concept design of the revised Project:

- It has been assumed that the interstate terminal would be operated with an automated container handling area and electrically power plant, as per the IMEX terminal. In the event the interstate terminal is not able to operate in this manner; the terminal shall use plant with the lowest available noise emissions.
- To the west of the site, a noise barrier 4.5 m in height has been included at the haul road to mitigate noise from trucks operating within the main site. The noise barrier can be a combination of acoustic barriers, solid walls or earth mounding as long as it fully impedes the line of sight between nearest receptors in Casula and the haul road.

Predicted noise levels during neutral and adverse weather conditions comply with the noise assessment criteria at all assessed receptors with the on-site mitigation.

Recommended noise management and mitigation

The noise management mitigation measures in the EIS are directly applicable to the assessed noise and vibration impacts for the revised Project, these are presented in Table 9.1 of this report.

Additional noise mitigation measures to those recommended in the EIS may include:

- Automated container handling areas in the IMEX and interstate terminals to avoid the use of alarms or beepers on the RMGs.
- Electrification of all plant and equipment at the IMEX and interstate terminals, or alternatively sourcing plant and equipment with noise emission levels equivalent to electrified plant.
- Permanently coupled wagons to limit impact noise events from wagon bunching on the freight trains.
- Reversing of vehicles operating within the Main IMT site equipment would be minimised so as to prevent nuisance caused by reversing alarms. This can be achieved through one-way traffic systems and the use of traffic lights which can also limit the use of vehicle horns.
- To further mitigate potential noise from vehicle horns, the practical application of radio contact between operators and limiting the use of vehicle horns to the daylight hours only would be investigated.
- Broadband reversing alarms are to be used instead of tonal reversing alarms, in particular between the hours of 6.00 pm to 7.00 am. This requirement would extend to the heavy vehicles (trucks) entering and leaving the site and where possible (particularly for night works). This should be included as a contractual requirement for all operators accessing the main IMT site.

Summary

In comparison to the EIS, the predicted operational noise levels associated with the revised project at the most affected receptors are up to 7 dBA lower with decreased levels predicted at all receptors. Potential rail noise levels, road traffic noise levels and ground vibration levels predicted to comply with the relevant criteria and the assessment of impacts is consistent with the EIS.

7.10.5 Local air quality

Introduction

Chapter 17 – *Local air quality* of the EIS provides an assessment of the existing local air quality surrounding the Project site and the predicted local air quality impacts resulting from construction and operation. The chapter summarises the detailed local air quality assessment prepared by Environ Australia Pty Ltd (Technical Paper 7 – *Local air quality impact assessment* in Volume 6 of the EIS) and addresses the Commonwealth Department of Environment (DoE)'s EIS Guidelines and NSW SEARS for the Project.

Table 7.11 in section 7.8.3 summarises the assessment approach and key findings of the local air quality impact assessment from the EIS.

An updated – *Local air quality impact assessment report* (Environ, 2015), has been prepared for the revised Project (refer to Appendix G) which details the local air quality assessment of potential impacts associated with the proposed construction and operation of the revised Project, and in particular to assesses:

- changes to the development phasing of revised Project and associated changes to traffic generation assumptions
- changes to the impact on local receptors due to reconfiguration to the IMT layout and key components.

The air quality assessment criteria adopted for the assessment of local air quality impacts, as described in section 17.1.1 in Chapter 17 – *Local air quality* of the EIS remains unchanged and has been adopted to assess the impacts of the revised Project. In addition, the assessment also uses the baseline meteorology and air quality environment at the Project site, as described in Section 17.2 in Chapter 17 – *Local air quality* of the EIS.

Local air quality impact assessment

For the air quality assessment of the revised Project, atmospheric dispersion modelling was carried out using the AMS/US-EPA regulatory model (AERMOD). This was configured and run to take account of the revised Project and focused on Scenario 1 and Scenario 3 (Full Build) as these collectively represented the highest periods of emissions for the various pollutants.

Scenario 1 – 2016 (construction only)

There were no predicted exceedances of the NSW EPA criteria and NEPM advisory reporting goals for particulate matter or combustion pollutants across all surrounding receptor locations. Full results for Scenario 1 are presented in Appendix B of the *Revised Project Design – Local Air Quality Impact Assessment* (Environ, 2015) (refer to Appendix G of this Report. Incremental (Project-only) isopleth plots for PM_{10}, $PM_{2.5}$ and NO_x are presented in Appendix C of the *Revised Project Design – Local Air Quality Impact Assessment* (Environ, 2015) (refer to Appendix G of this Report).

Scenario 3 – Full Build (2030)

Air pollutant concentrations were predicted to be within NSW EPA criteria and NEPM advisory reporting goals. An exceedance of the annual average $PM_{2.5}$ advisory reporting goal at R33 was predicted to occur due to cumulative concentrations during Full Build activities. Whilst this receptor was relocated in 2014 it has been retained in the assessment for completeness. The likely future land use at R33 would be associated with the SIMTA project. The elevated ambient background is the key contributor to these exceedances.

No other exceedances were predicted across the remaining sensitive receptors for all pollutants assessed during the Full Build scenario.

Mitigation measures

Section 17.4 in Chapter 17 – *Local air quality* of the EIS summarises the proposed mitigation measures and safeguards for the Project. Following the local air quality assessment of the revised Project, these measures are still relevant and will be applied to the Project. For completeness, these management and mitigation measures are presented in Table 9.1 of this report.

Summary

Predicted impacts of the revised Project show minor variance from the impacts predicted in the air quality assessment presented in Chapter 17 – *Local air quality* of the EIS. The predictive dispersion modelling demonstrates that concentrations of most pollutants (TSP, PM_{10}, NO_x, CO, SO_2, benzene, toluene, xylene, 1,3-butadiene, acetaldehyde and PAHs) emitted would be below acceptable ambient air quality criteria and would not adversely affect the receiving environment.

The key findings of the local air quality assessment are summarised as follows:

- incremental (Project-only impacts excluding the contribution of ambient air quality) air pollutant concentrations and dust deposition rates associated with all modelled scenarios were predicted to be within NSW EPA criteria and NEPM advisory reporting goals at all surrounding receptor locations;
- taking elevated background airborne PM concentrations into account, no exceedances were predicted for cumulative 24-hour average PM_{10} and $PM_{2.5}$ beyond those already recorded due to bushfire events in 2013;
- exceedance of the annual average NEPM advisory reporting goal for cumulative $PM_{2.5}$
- is predicted for one receptor (R33) in the Full Build scenario (Scenario 3). This receptor was relocated in 2014, however has been retained for completeness. The likely future land use at R33 would be associated with the SIMTA project. The elevated ambient background is the key contributor to these exceedances; and
- all incremental cumulative and gaseous pollutants assessed are below applicable NSW EPA assessment criterion for all scenarios.

7.10.6 Health impact assessment and human health risk

Introduction

Chapter 25 – *Human health risks and impacts* of the EIS describes the potential human health risks and impacts that may arise from activities associated with the construction and operation of the Moorebank Intermodal Terminal (IMT) Project. A detailed Health Impact Assessment (HIA) and Human Health Risk Assessment (HHRA) were prepared by Environmental Risk Services (Technical Paper 15 – *Human Health Risk Assessment* and Technical Paper 16 – *Health Impact Assessment* in Volume 9 of the EIS). Both these Technical Papers address the Commonwealth Department of the Environment (DoE)'s EIS Guidelines and the NSW SEARs.

Table 7.11 in section 7.8.3 of this report summarises the approach and key findings of the HIA and HHRA for the EIS.

Implications of the revised Project on the impact assessment

Changes associated with the revised Project, including the reconfiguration to the IMT layout, development phasing and timing, and the associated changes to the traffic generation, noise and vibration impacts and local air quality impacts the human health risk and impacts associated with the revised Project and been reassessed.

Human Health Risk Assessment

As discussed in section 7.9.5 of this report, the local air quality assessment has been revised and addresses only two development scenarios; Scenario1 (during Phase A) and Scenario 3 (at Full Build).

The HHRA for the revised Project assessed:

- predicted concentrations of emissions of oxides of nitrogen (nitrogen dioxide, carbon monoxide, and sulphur dioxide) against relevant guidelines to protect community health; and
- predicted concentration of individual volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) derived from the Project to health based air guidelines.

The detailed results are presented in the HHRA for the revised Project in Appendix H of this report. A summary of the key findings are presented below.

Nitrogen Dioxide

Concentrations of nitrogen dioxide predicated for the assessment of the revised Project are well below the relevant health based guideline. Hence there are no adverse health effects expected in relation to exposures to nitrogen dioxide in the local area. The concentrations predicted are similar to those presented in the EIS and the outcomes in relation to impacts on public health are unchanged.

Carbon monoxide

Concentrations of carbon monoxide above are well below the relevant health based guideline. Hence there are no adverse health effects expected in relation to exposures to carbon monoxide in the local area. The concentrations predicted are similar to those presented in the EIS and the outcomes in relation to impacts on public health are unchanged.

Sulphur dioxide

Concentrations of sulfur dioxide are well below the relevant health based guideline. Hence there are no adverse health effects expected in relation to exposures to sulfur dioxide in the local area. The concentrations predicted are similar to those presented in the EIS and the outcomes in relation to impacts on public health are unchanged.

Polycyclic Aromatic Hydrocarbons and Volatile Organic Compounds

All the maximum predicted concentration of all key polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) likely to be derived from emission sources (vehicles and locomotives) associated with the revised Project are well below acute and chronic guidelines that are based on the protection of human health (including sensitive individuals). Hence there are no adverse health effects expected in relation to exposures to VOCs and PAHs in the local area. The concentrations predicted are similar to those presented in the EIS and the outcomes in relation to impacts on public health are unchanged.

Particulates

The calculated risks and population incidence associated with exposure to PM_{10} and $PM_{2.5}$ in the community associated with the revised Project are consistent with the levels of risk and increased incidence presented in the HHRA in Volume 9 of the EIS.

On this basis the conclusions presented in the EIS remain unchanged in relation to potential exposures to PM_{10} and $PM_{2.5}$ derived from the Project.

Summary

Based on the revised Project scenarios considered the conclusions presented in the EIS in relation to impacts on the health of the local community are unchanged.

Health Impact Assessment

The HIA for the revised Project (Appendix H of this Response to Submissions report) presents a review of the changes to the technical assessments in relation to traffic generation, noise and vibration, local air quality and human health risk and how these may affect the assessment, outcomes and recommendations presented in the HIA in Volume 9 of the EIS.

A summary of the key findings of the HIA for the revised Project is presented below:

Traffic assessment

The traffic assessment in relation to the revised Project has identified some changes to the proposed upgrade of Moorebank Avenue; however the traffic impacts present in Chapter 11 – *Traffic, transport and access* in the EIS have not changed.

From a health impact perspective the conclusions presented in Chapter 25 – *Human health risk and impacts* of the EIS remain unchanged, i.e. the health outcomes relating to traffic congestion should be positive as long as all the proposed mitigation measures are implemented.

Noise and vibration and human health

The human health assessment presented in Chapter 25 – *Human health risks and impacts* of the EIS identified that where the noise criteria were not met there was the potential for adverse effects on the health of the community.

For the revised scenarios, as with the other scenarios presented in the EIS, the worst case assessment predicts that noise criteria would be exceeded at some locations without additional noise mitigation measures. Such measures should be adopted to ensure the health outcomes related to noise are neutral for the revised Project.

Air quality and human health

The levels of oxides of nitrogen, sulfur dioxide, carbon monoxide, volatile organic compounds and polycyclic aromatic hydrocarbons during construction and operation of the revised Project are all estimated to be acceptable for all Project scenarios evaluated (Scenario 1 and Scenario 3 Full Build).

The assessment of health impacts associated with changes in both $PM_{2.5}$ and PM_{10} concentrations in the local community has been revised based on the changes in the ground level concentrations predicted for the assessment scenarios evaluated.

The assessment of impacts to human health for the revised Project has identified minor variations in the health risks and impacts presented in Chapter 25 – *Human health risk* of the EIS. However the conclusions presented in the EIS remain unchanged.

No additional mitigation measures for human health impact have been identified in relation to the revised Project.

Summary

Based on the assessment of the revised Project, the conclusions presented in Chapter 25 – *Human health risks and impacts* of the EIS in relation to impacts on the health of the local community are unchanged.

In addition, the recommendations presented in the EIS in relation to mitigation or enhancing health benefits remain unchanged. Some additional noise mitigation measures have been outlined for the revised Project and these should be considered in conjunction with other mitigation measures outlined in the relevant assessments.

7.11 Assessment of cumulative impacts

7.11.1 Basis of cumulative impact assessment

For the proposed amendments to the development, three realistic cumulative scenarios have been assessed to determine the cumulative impacts of both the Moorebank IMT Project and the SIMTA IMT project.

The cumulative impact assessment also assesses the impacts of the new concept layout as described in section 7.4 of this report.

Cumulative Scenario A (previously Scenario 1 in the EIS):

Cumulative scenario A assumes that the SIMTA site would operate only as an intensified warehousing development that would support the operation of the Moorebank IMT Project at Full Build (2030) (refer to Figure 7.12). A number of assumptions have been made to define and assess cumulative Scenario A consisting of:

- The Moorebank IMT operating at Full Build as proposed in the EIS (i.e. 1.05 million TEU per annum for the IMEX terminal facility, 500,000 TEU per annum for the interstate terminal facility and 300,000 sq. m of warehousing);
- The SIMTA development having indicative warehouse capacity of 300,000 sq. m gross floor area (GFA)
- Both sites operating at 24 hours a day, seven days a week; and
- The SIMTA development having an operational workforce of 1,470 staff on site per day (three shifts).

Cumulative Scenario B (previously Scenario 3 in the EIS):

Cumulative B consists of an IMEX terminal on the SIMTA site only with throughput of 1 million TEU per year, as well as 300,000 sq. m of warehousing at 2030. An interstate terminal of 500,000 TEU per year and 300,000 sq. m of warehousing would be located on the IMT site. The scenario is taken to represent the precinct sites at Full Build (2030) (refer to Figure 7.13).The following assumptions were made for cumulative Scenario B:

- Both sites operating at 24 hours a day, seven days a week;
- The SIMTA development having an operational workforce of 2,258 staff on site per day (three shifts per day); and
- The Moorebank IMT site would have an operational workforce of 1,800 staff per day.

Cumulative Scenario C1

Cumulative scenario C has been split into C1 (an interim scenario at 2020) and C2 (final scenario from 2030). Scenario C1 consists of the Moorebank IMT site operating at 250,000 TEU IMEX, 250,000 TEU Interstate and 100,000 sq. m warehousing. The SIMTA site would operate at 250,000 TEU IMEX (their Stage 1 DA) and 200,000 sq. m warehousing (refer to Figure 7.14).

Cumulative Scenario C2

Scenario C2 consists of the Moorebank IMT site operating at 550,000 TEU IMEX, 500,000 TEU Interstate and 300,000 sq. m warehousing. The SIMTA site would operate at 500,000 TEU IMEX (their ultimate capacity under the PAC determination) and 300,000 sq. m warehousing (refer to Figure 7.15).

The following sections provide the key findings of the impact assessments of the cumulative scenarios.

7.11.2 Cumulative traffic and transport assessment

For all full-build scenarios the total traffic generation from the IMT activities is largely the same for the cumulative scenarios as it is for the individual Moorebank IMT site (i.e. a total 1.55 million TEU). However for Scenario B, a total 1.5 million TEU is assumed, as SIMTA's IMEX proposal is for a one million TEU facility instead of the 1.05 million TEU proposed for the Moorebank IMT.

The cumulative scenarios at Full Build include a total 600,000 sq. m of warehousing, which results in increased impacts on the surrounding road network compared to the development of the Moorebank IMT only.

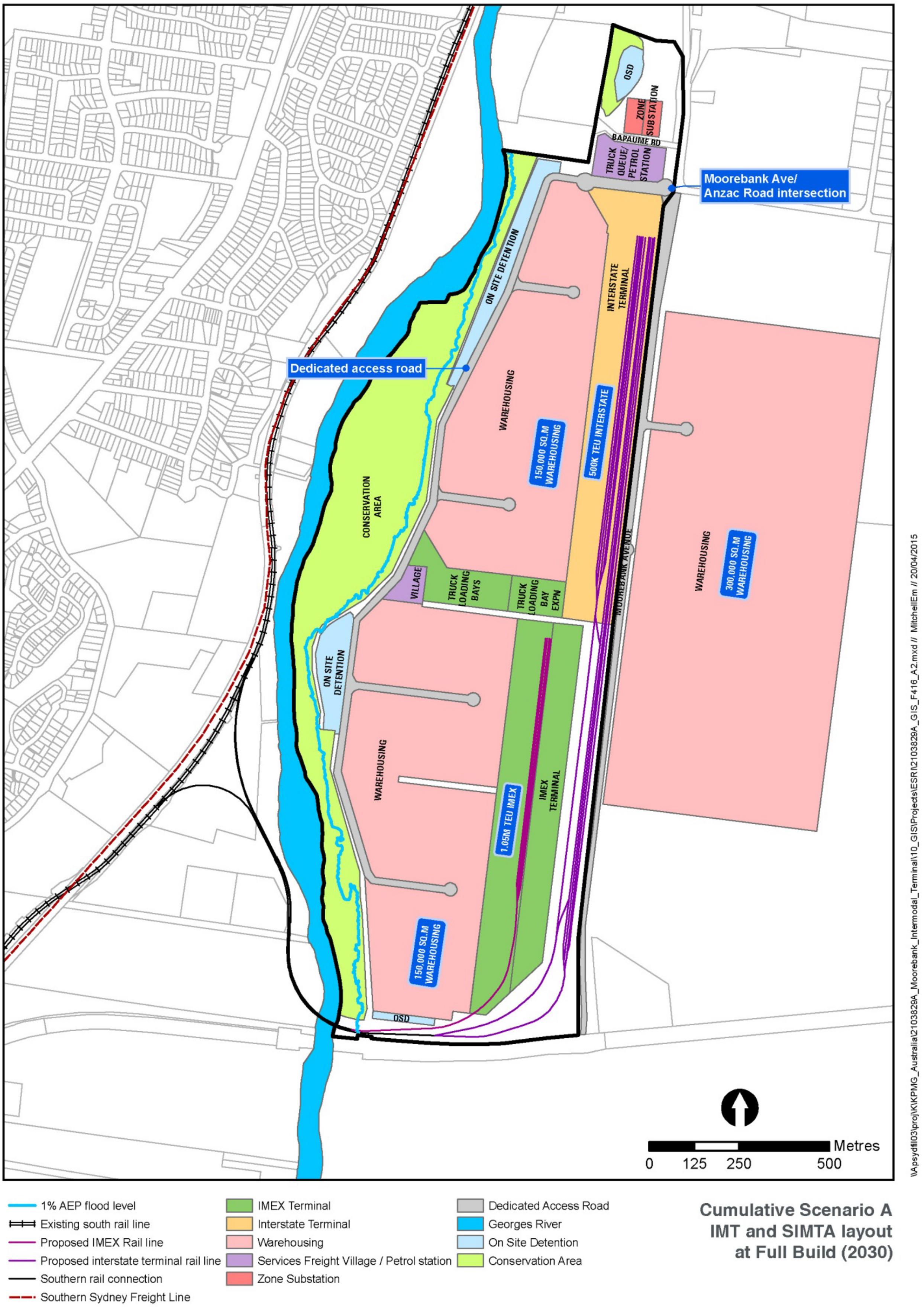

Figure 7.12 Cumulative Scenario A – IMT and SIMTA layout at Full Build (2030)