

Enfield Intermodal Logistics Centre
Noise Impact Assessment
MOD12

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Enfield Intermodal Logistics Centre

Noise Impact Assessment

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DOCUMENT CONTROL

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged by NSW Ports to undertake a noise impact assessment in support of an application to the Department of Planning and Environment (DP&E) to modify the project approval. The project approval was granted by the then Minister for Planning on the 5 September 2007 under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act) for the development of the Enfield Intermodal Logistic Centre (ILC) (MP 05_0147). The proposed changes to the project approval are summarised below and listed in **Section 5** of this assessment.

The approved project entails containers being transported to or from Enfield by rail and truck from either Port Botany, the Sydney metropolitan and regional areas. The project has been progressively modified and assessed since it was originally approved.

The purpose of the proposed modification (MOD12) is to extend the existing rail sidings into the southern portion of the site. The sidings are required to allow port shuttle trains to access the IMT while longer regional trains are held on the main through rail line.

2 REPORT OBJECTIVES

The purpose of the study is to assess the proposed modifications (MOD12) to the Enfield ILC design to ensure that noise emissions from operations at the site continue to satisfy the noise emission criteria in the Project Approval (Condition 2.17).

Previous acoustic assessments carried out for the Enfield ILC include:

- ILC at Enfield Environmental Assessment (SKM, 2005): Appendix E - Noise and Vibration Assessment (Renzo Tonin);
- ILC at Enfield Preferred Project Report (SKM, 2006): Noise Technical Memorandum (Renzo Tonin, April 2006);
- ILC at Enfield Modification Application No. 4 (Sydney Ports, Aug 2009): Appendix A - Detailed Design Acoustic Assessment. Document No 60051533 (AECOM, 2009);
- ILC at Enfield Modification Application No. 4 - Response to Stakeholders (Sydney Ports, Nov 2009): Appendix B - Noise Memorandum (AECOM, Nov 2009);
- ILC at Enfield Modification Application No. 4 - Supporting Information (Sydney Ports, March 2010): Appendix A - Noise Memorandum (AECOM, March 2010);
- ILC at Enfield Modification Application No. 5 - On Site Management of Unsuitable Engineering Fill (Sydney Ports, May 2011): Appendix A - Noise Impact Assessment (SLR, May 2011);
- ILC at Enfield Modification Application No. 6 - Early Contractor Involvement Detailed Design Adjustment (Sydney Ports, April 2012): Appendix A - Acoustic Memo (AECOM, April 2012); and
- ILC at Enfield Modification Application No. 6 - ECI Detailed Design Adjustments and Subdivision - Response to Submissions (Sydney Ports, July 2012): Appendix B - Acoustic Design (AECOM, July 2012).
- ILC at Enfield Modification Application No. 10 – Noise Impact Assessment (SLR, in progress).

Specific acoustic terminology is used within this assessment. An explanation of standard acoustic terms is included as **Appendix A**.

3 APPROVED PROJECT

A project application under Part 3A of the EP&A Act for the construction and operation of the Enfield ILC was submitted to the then Department of Planning in December 2005. The proposal involved the following key elements:

- Demolition, relocation or removal of former railway buildings and structures;
- Earthworks and drainage including the levelling of the site, formation of landscape mounds and detention basins and removal of unsuitable materials, as required;
- Construction and operation of:
 - An intermodal terminal for the loading and unloading of containers between road and rail and the short term storage of containers, with a capacity to handle 300,000 TEU per annum;
 - Rail sidings, railway lines and associated works to connect to the existing freight line;
 - Warehousing for the packing and unpacking of containers and the short-term storage of cargo;
 - Empty container storage facilities, for the storage of empty containers to be later packed or transferred back to the port by rail;
 - Light industrial/commercial area fronting Cosgrove Road complementary to operations at the site;
 - Access works including the construction of a road bridge over the new marshalling yards for access to Wentworth Street and an upgrade of the entrance to the site from Cosgrove Road; and
 - Internal roads, administration buildings, diesel and LPG storage and fuelling facilities, container wash down area, vehicle maintenance shed, and installation of site services (all utilities, stormwater and sewerage).

On 5 September 2007, the then Minister for Planning granted approval of the project under Section 75J of the EP&A Act.

The approval has been modified on six occasions, as outlined in **Table 1**.

Table 1 Approved and Pending Modifications of Project Approval MP05_0147

Modification Number	Description	Approval date
MOD1	Amendment of conditions relating to construction dust monitoring	2 October 2008
MOD2	Amendment of conditions to enable staged construction and operation and modified timing of submission of Site Audit Statements	30 March 2009
MOD 4	Amendment of conditions relating to noise walls, internal roads, stormwater detention, development areas and site layout.	27 May 2010
MOD 5	Relocation and reuse of unsuitable material to Mount Enfield	10 November 2011
MOD6	Incorporation of former Toll Site into project site and subdivision of site into 22 allotments	11 December 2012
MOD 8	Amendment of subdivision layout into 23 allotments to facilitate commercial leasing, development and operation of the site	27 November 2013
MOD10	To enable truck and container related uses which do not interface with rail operations and rail to rail operations which do not interface with trucks.	Pending
MOD11	Additional warehouse on Area G	Pending

4 SITE OVERVIEW

Industrial land adjoins the site to the east and west, with mixed industrial / residential land to the south, and residential to the north-west. The site layout is shown in **Figure 1**.

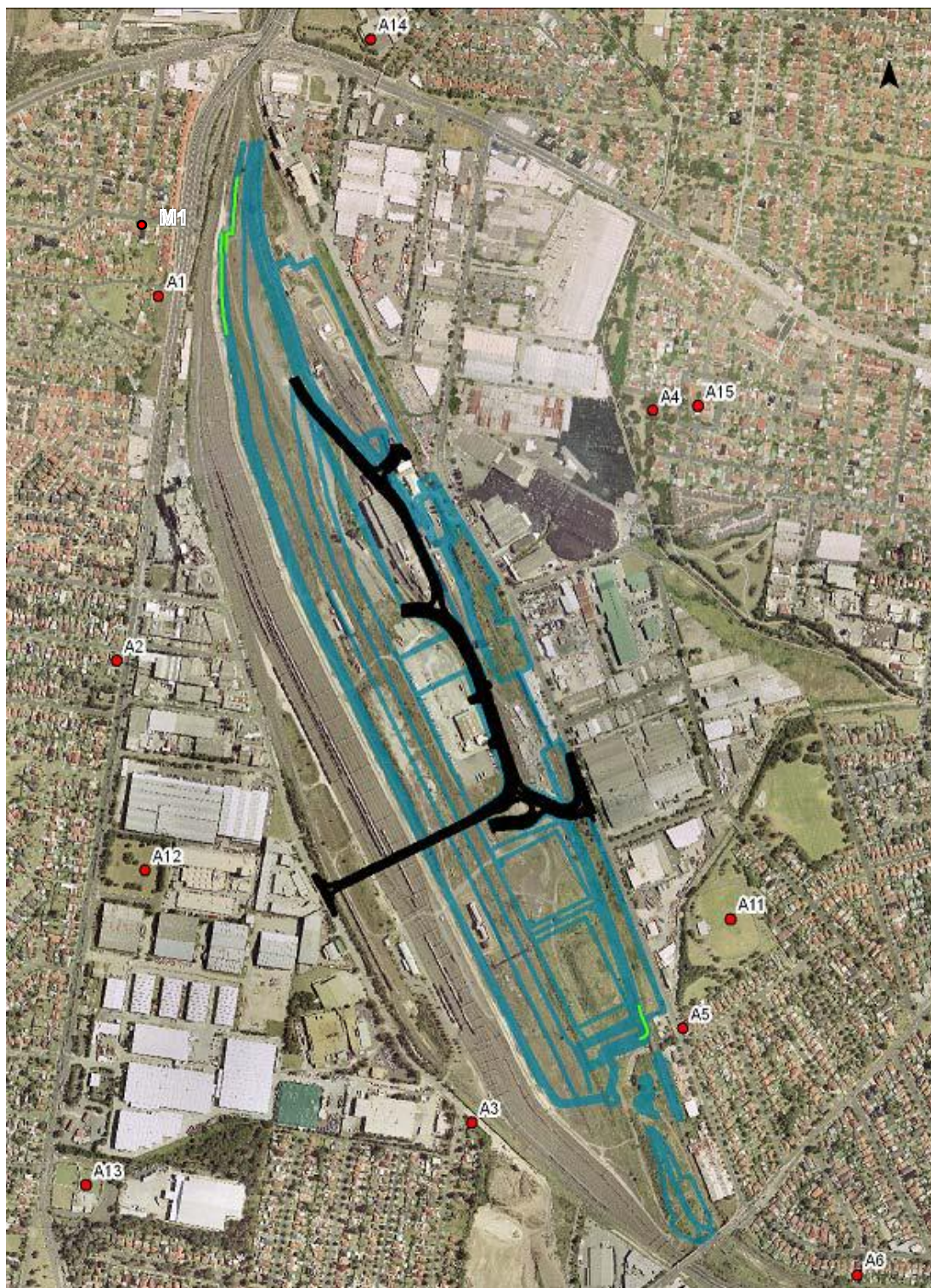
Figure 1 Site Layout Plan



Source: NSW Ports

The noise monitoring and assessment locations are shown in **Figure 2**.

Figure 2 Enfield ILC Site Showing Assessment Locations



Note: Figure from NSW Ports *Enfield ILC Construction Environmental Management Plan*

5 PROPOSED MODIFICATION

The proposed modification (MOD12) is to construct and operate southern extensions to the two (2) existing rail sidings. The existing sidings are located in Lot 11 and the siding extensions will be located in Lot 12. This will allow an 1,800m regional train to be located on the main through rail line while allowing Port Shuttles to access the intermodal terminal (IMT) from the south via the sidings extensions. The MOD12 operation will create 430m clear standing room for each siding and provide better access to the IMT for loading and unloading containers in the existing IMT.

The concept design for the sidings extension is shown in the draing titled Enfield ILC Proposed Rail Sidings Extension Plan and Typical Cross Section (Plan No. SEDP231A, dated 20/10/16). The drawing is attached in the **Appendix B**.

The operating scenario for the proposed MOD12 has been developed with input from NSW Ports and the IMT operator, Aurizon.

5.1 Operating hours

5.1.1 Enfield ILC Operation

The operating hours would be as per the Project Approval. The hours of operation are 24 hours, 7 days per week for the Intermodal terminal, warehousing, empty container yards and associated rail and road infrastructure.

5.1.2 Regional Train Service

The regional train services will be operated as two services per day, both of which are generally handled in daylight hours. The trains typically dwell on site for approximately 1.5 hours, although some trains may dwell for up to 7 hours and depart in the evening period.

5.1.3 Port Shuttle IMEX (Import / Export) Service

The Port Shuttle IMEX service is currently operated as one (1) service per day. However, it is anticipated growing to approximately eight (8) services per day over time, as per the Environmental Assessment and MOD6 (i.e. 24 hours, 7 days per week).

5.1.4 Operating hours for Proposed Modification

The proposed extensions to the rail sidings will be used to facilitate more efficient rail operations during daytime and evening periods (i.e. 7 am till 10 pm). Shunting activities currently occur on the southern part of the main through rail line and will occur on the extended rail sidings during these periods.

At night (i.e. 10 pm to 7 am), there will be no additional rail operations as a result of the proposed modification.

5.2 Noise Barriers

The following noise mitigation barriers have been constructed in accordance with the design approved under Modification Application 6:

- South-eastern L-shaped barrier located adjacent to stormwater detention basin D, with a total length of 77 m;
- North-western barrier aligned with the northern-most point of the container stacking area, with a total length 345 m;
- South-eastern earth noise mound (east of the frog ponds), total length 110 m.

In addition a noise barrier has been constructed by others between the Australian Rail Track Corporation (ARTC) rail corridor and Wentworth Street/Bellfrog Street. The length of this wall is approximately 200m.

6 EXISTING NOISE ENVIRONMENT

The “Intermodal Logistics Centre at Enfield Environmental Assessment – Chapter 11 – Noise and Vibration Assessment” dated October 2005 (EA) presents a detailed study on the existing noise environment in the vicinity of the site.

The background noise monitoring was conducted at selected receiver locations over ten days during February 2005. The existing rating background noise levels (RBLs) are presented in **Table 2**.

Table 2 Measured Existing Background Noise Levels dB(A)

Noise Monitoring Locations	Address	Rating Background Noise Levels - LA90(15minute)			Ambient Noise Levels - LAeq(period)		
		Day (7:00am-6:00pm)	Evening (6:00pm-10:00pm)	Night (10:00pm-7:00am)	Day (7:00am-6:00pm)	Evening (6:00pm-10:00pm)	Night (10:00pm-7:00am)
M1	6 Jean Street	49	49	43	59	59	52
M2	42 Norfolk Road	48	47	42	61	61	55
M3	14 Wentworth St (south)	44	42	37	61	63	48
M4	124B Dean Street	44	42	40	60	56	53
M5	43 Blanche Street	41	41	38	55	60	46
M6	40 Bazentin Street	41	40	36	56	64	49

7 NOISE CRITERIA

7.1 Construction Noise Criteria

The Interim Construction Noise Guideline (ICNG) recommends a construction noise management level (CNML) equivalent to the daytime RBL plus 10 dBA within standard hours (i.e. daytime) and RBL plus 5 dBA outside standard hours. The ICNG also nominates a “highly noise affected level” (HNAL) daytime intrusive LAeq(15minute) noise level of 75 dBA. As construction works would be limited to daytime standard working hours only, the ICNG CNMLs and HNALS are presented in **Table 3**.

Table 3 Construction Noise Management Levels and Highly Noise Affected Level (dBA re 20µPa)

Location		Intrusive LAeq(15minute)	Intrusive LAeq(15minute)
		Daytime ¹ CNML	Daytime ¹ HNAL
A1	Eastern end of Jean Street ²	59	75
M1	Jean Street	59	
A2	Eastern end of Ivy Street ²	58	
A3	2 Wentworth Street (south) ²	54	
A4	Eastern end of Gregory Street ²	54	

Location	Intrusive LAeq(15minute) Daytime ¹ CNML	Intrusive LAeq(15minute) Daytime ¹ HNAL
A5 Western end of Blanche Street ²	51	
A6 40 Bazentin Street ²	51	
Any Industrial ³	External 75 when in use	75
Any Commercial ³	External 70 when in use	
Any Active Recreation ³	External 65 when in use	
Any Passive Recreation ³	External 60 when in use	
Any Church, Cemetery ³	External 55 when in use	
Any Hospital ⁴	External 55 when in use	
Any School ⁴	External 55 when in use	

Note 1: Daytime standard working hours 7:00am to 6:00pm (Monday to Friday), 8:00am to 1:00pm (Saturday)

Note 2: At the most-affected point within 30m of the residential premises.

Note 3: At the most-affected point within 50m of the non-residential premises

Note 4: External criteria equivalent to internal criteria plus 10 dBA.

7.2 Operational Noise Criteria

Ministers Conditions of Approval (MCoA) 2.17 establishes design noise criteria for operations on this site. The relevant MCoA are reproduced as follows:

Operation Noise

2.17 The Proponent shall design, construct, operate and maintain the project to ensure that the operational noise contributions from the project do not exceed the maximum allowable noise contributions specified in Table 3 below, at those locations and during those periods indicated. The maximum allowable noise contributions apply under:

- wind speeds up to 3 ms^{-1} (measured at 10 metres above ground level), or
- temperature inversion conditions up to 3°C per 100 metres and wind speeds up to 2 ms^{-1} (measured at 10 metres above ground level).

Table 3 - Maximum Allowable Noise Contribution (dBA)

Location	Day 7:00am to 6:00pm on any day		Evening 6:00pm to 10:00pm on any day		Night 10:00pm to 7:00am on any day		
	LAeq (15-minute)	LAeq (period)	LAeq (15-minute)	LAeq (period)	LAeq (15-minute)	LAeq (period)	LA1 (1-minute)
A1 - Eastern end of Jean Street	54	54	54	49	48	42	58
A2 - Eastern end of Ivy Street	53	52	52	51	47	45	57
A3 - Wentworth Street (south)	49	52	47	53	42	38	52
A4 - Eastern end of Gregory Street	49	52	47	46	45	37	55
A5 - Western end of Blanche Street	46	58	46	50	43	43	53
A6 - 40 Bazentin Street	46	58	45	54	41	39	51
A11 - Begnell Park	-	50	-	50	-	50	-
A12 - Matthew Park	-	50	-	50	-	50	-
A13 - Greenacre Bowling Club	-	55	-	55	-	55	-
A14 - Strathfield High School (internal)	-	35	-	-	-	-	-
A15 - St Anne's School (internal)	-	35	-	-	-	-	-

2.18 *For the purpose of assessment of noise contributions specified under condition 2.17 of this consent, noise from the development shall be:*

- a) measured at the most affected point on or within the site boundary at the most sensitive locations to determine compliance with LAeq(15-minute) and LAeq(period) noise limits;*
- b) measured in the free field at least 3.5 metres from any vertical reflecting surface in line with the worst-affected dwelling façade to determine compliance with LA1(1-minute) noise limits; and*
- c) subject to the modification factors provided in Section 4 of the New South Wales Industrial Noise Policy (EPA, 2000), where applicable.*

Notwithstanding, should direct measurement of noise from the development be impractical, the Proponent may employ an alternative noise assessment method deemed acceptable by the DECC (refer to Section 11 of the New South Wales Industrial Noise Policy (EPA, 2000)). Details of such an alternative noise assessment method accepted by the DECC shall be submitted to the Director-General prior to the implementation of the assessment method.

2.19 *To avoid any doubt, the Proponent shall ensure that locomotives located on the site and associated with the operation of the project do not cause an exceedance of the noise limits specified under condition 2.17 of this approval. This shall include, where necessary, measures to mitigate and manage noise associated with locomotive idling and any shunting operations occurring on the site.*

2.19A *The Proponent shall implement noise mitigation measures generally in accordance with the measures identified in the document listed in condition 1.1j). In relation to the north-western noise wall, the Proponent shall implement as part of the design and construction of this wall, mitigation measures to minimise potential reflective noise on its western face.*

It has been noted that noise assessment location “A12 - Matthew Park” no longer exists. This site at 51-55 Roberts Road has been developed for commercial retail use. Therefore, the noise criteria for location “A12 - Matthew Park” is no longer applicable and this location will be removed from this assessment, noting there are no other recreation areas in this vicinity of the former park.

8 NOISE ASSESSMENT

8.1 Noise Model Validation

In order to calculate the noise emission levels at the nearest noise sensitive receptor locations, SoundPLAN (Version 7.1) environmental computer models were developed. SoundPLAN is a software package which enables compilation of a sophisticated computer model comprising a digital ground map (containing ground contours), the location and sound power levels (SWL) of noise sources on site, and the location of sensitive receivers for assessment purposes. The computer model predicts noise propagation taking into account factors such as distance attenuation, ground hardness, air absorption and barrier shielding effects, as well as meteorological conditions.

The SoundPLAN model utilised noise propagation calculation algorithms in accordance with CONCAWE prediction method. The CONCAWE method was developed for large open air industrial facilities and incorporates the influence of the wind and atmospheric stability on propagation.

8.2 Meteorological Parameters

Noise predictions were conducted under the meteorological conditions outlined in **Table 4**. The modelled wind speed for the intrusive and amenity calculations, and the percentage of time wind was present during the amenity periods is based on the “Enfield Preferred Project Report” (SKM, 2006): Noise Technical Memorandum (Renzo Tonin, April 2006).

Table 4 Modelled Meteorological Parameters

Weather Conditions	Day		Evening	
	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather
Temperature ¹	18°C	18°C	12°C	12°C
Humidity ¹	63%	63%	75%	75%
Atmospheric Stability Class ¹	D	D	D	D
Wind Speed ²	0 m/s	2.5 m/s/2 m/s	0 m/s	2.5 m/s/2 m/s
Wind Direction	N/A	West North-West South-West	N/A	West North-West North

Notes : 1. Referenced from the “Noise and Vibration Impact Assessment” (Renzo Tonin, 2005) submitted as Appendix E to the Environmental Assessment (SKM, 2005).
2. Wind speed of 2.5 m/s for intrusive noise assessment and 2 m/s for amenity noise assessment referenced from the “Enfield Preferred Project Report” (SKM, 2006): Noise Technical Memorandum (Renzo Tonin, April 2006).

8.3 Noise Sensitive Locations

The noise sensitive locations have been determined in the EA stage. The receiver locations are presented in **Figure 2** and detailed in **Table 5**. It is worth noting that the background noise monitoring was conducted at location M1 (6 Jean Street) in February 2005. The MCoA 2.17 noise criteria for the receivers located at “East end of Jean Street” area Enfield Preferred Project Report (SKM, 2006): Noise Technical Memorandum (Renzo Tonin, April 2006) were determined based on the ambient noise monitoring at location M1 conducted during February 2005. As 6 Jean Street is located approximately 75 m west of Roberts Road it would be expected to have lower ambient noise levels than those receivers at the eastern end of Jean Street, facing the arterial road Roberts Road and most impacted by the ILC. Hence the MCoA 2.17 noise criteria is applicable to 6 Jean Street, and receivers set back from Roberts Road, however higher criteria may be applicable for those receivers more exposed at the eastern end of Jean Street, and facing Roberts Road.

Table 5 Receiver Locations

Receiver	Description	Address
A1	Eastern end of Jean Street	40 Roberts Road, Greenacre
M1	Eastern end of Jean Street	6 Jean Street, Greenacre
A2	Eastern end of Ivy Street	106 Roberts Road, Greenacre
A3	Wentworth Street (south)	2 Wentworth Street, Greenacre
A4	Eastern end of Gregory Street	29 Gregory Street, Strathfield South
A5	Western end of Blanche Street	53 Blanche Street, Strathfield South
A6	40 Bazentin Street	40 Bazentin Street, Strathfield South
A11	Begnell Park	-
A13	Greenacre Bowling Club	-
A14	Strathfield High School	-
A15	St Anne's School	-

8.4 Construction Noise Impact Assessment

8.4.1 Construction Plant and Equipment

The “Intermodal Logistics Centre at Enfield Environmental Assessment – Chapter 11 – Noise and Vibration Assessment” (EA) dated October 2005 also presents typical construction equipment list for the proposed rail sidings.

The equipment list and the typical sound power levels (SWLs) are shown in **Table 6** below:

Table 6 Typical Construction Equipment and Sound Power Levels

Plant Item	Plant Description	Sound Power Levels, LAeq(15minute) (dBA re 1pW)
1	Compactor	108
2	Tracked Excavator	104
3	Grader	105
4	Water Cart	104
5	Rollers	109
6	Truck (>20tonne)	103
7	Backhoe	102
8	Rail Tamper	118

8.4.2 Construction Modelling Scenario

A construction modelling scenario has been developed to represent typical construction works for the proposed rail sidings. It is assumed all the construction mobile plant equipment would be operating within the construction area for the worst-case 15 minute period. Note these results in a conservative assessment as normally there would only likely to be 2 or 3 equipment items operating simultaneously.

8.4.3 Construction Noise Predictions

Construction noise levels have been predicted at all receiver locations in the vicinity of the proposed works. A summary of the resultant LAeq(15minute) noise level predictions are presented in **Table 7** together with the maximum noise level exceedance above the nominated NMLs for the selected noise sensitive receivers.

Table 7 Summary of Worst-case Construction Noise Predictions

Receiver	Description	CNML	HNAL	Maximum Predicted LAeq (15 minute) Noise Level (dBA)	Maximum CNML Exceedance (dB)	Maximum HNAL Exceedance (dB)
A1	Eastern end of Jean Street	59	75	41	-	-
M1	6 Jean Street	59		25	-	-
A2	Eastern end of Ivy Street	58		45	-	-
A3	Wentworth Street (south)	54		58	4	-
A4	Eastern end of Gregory Street	54		43	-	-
A5	Western end of	51		61	10	-

Blanche Street					
A6	40 Bazentin Street	51	43	-	-
A11	Begnell Park	External 65 when in use	42	-	-
A13	Greenacre Bowling Club	External 70 when in use	53	-	-
A14	Strathfield High School	External 55 when in use	46	-	-
A15	St Anne's School	External 55 when in use	49	-	-

8.4.4 Discussion

The worst case noise predictions presented in **Table 7** indicate that CNML exceedances of up to 4 dBA and 10 dBA are to be expected at location A3 (Wentworth Street (south)) and A5 (Western end of Blanche Street) respectively during standard working hours.

The calculated noise levels will inevitably depend on the number of plant items operating at any one time and their precise location relative to the receiver of interest. In practice, the noise levels are likely to vary due to the fact that plant would move about the worksites and would not all be operating concurrently at all times. As such, noise levels are likely to be lower than the worst-case noise levels presented in **Table 7** for most, and probably all, of the time during the works.

The predicted construction noise levels at receiver A3 are similar to those predicted for the EA, and at receiver A5 typically 10 dBA lower than those predicted for the EA. It is worth noting that rail track construction has already been undertaken as part of the ILC development and there were no complaints received that were attributable to this activity.

8.5 Operational Noise Assessment

8.5.1 Operational Plant and Equipment

SLR conducted a review of the equipment sound power levels used in the EA report for the Enfield ILC (SKM, 2005). Documented sound power levels were considered as a reasonable representation of the equipment and activities proposed in this modification and as such they have been adopted for use in this assessment for consistency. Sound power levels for plant/equipment not included in the EA report were based on previous assessments conducted by SLR.

Operational Sound Power Levels are detailed in **Table 8**.

Table 8 Operational Equipment Sound Power Levels

Equipment	Noise descriptor	A-weighted Sound Power Level dBA	Octave Band Centre Frequency (Hz) Sound Power Levels, dB (Lin)								
			31.5	63	125	250	500	1000	2000	4000	8000
Loading and Unloading of Trucks and Trains											
Large Truck	LAeq	102	96	96	101	104	99	97	94	88	82
	LA1	107	101	101	106	109	104	102	99	93	87
Small Truck	LAeq	102	96	96	101	104	99	97	94	88	82

Equipment	Noise descriptor	A-weighted Sound Power Level dBA	Octave Band Centre Frequency (Hz) Sound Power Levels, dB (Lin)								
			31.5	63	125	250	500	1000	2000	4000	8000
Truck Idling	LA1	107	101	101	106	109	104	102	99	93	87
	LAeq	97	98	68	82	83	88	92	92	87	81
	LA1	100	71	71	85	86	91	95	95	90	84
Reach Stacker	LAeq	106	110	111	107	103	105	101	97	96	87
	LA1	111	115	116	112	108	110	106	102	101	92
Metal Clangs	LAeq	84	88	91	91	82	82	80	73	67	60
	LA1	116	120	123	123	114	114	112	105	99	92
Commercial Power Washer	LAeq	94	88	86	87	87	88	87	87	86	85
	LA1	102	97	95	96	96	97	95	96	95	94
Forklifts	LAeq	99	-	101	96	92	96	95	92	85	-
	LA1	107	-	109	104	100	104	103	100	93	-
Idling Locomotive											
Locomotive Idling on Track ¹	LAeq	100	103	107	104	101	98	93	89	88	90
	LA1	114	117	121	118	115	112	107	103	102	104
Moving Locomotives											
Slow Moving Locomotive ¹	LAeq	100	103	107	104	101	98	93	89	88	90
	LA1	114	117	12	118	115	112	107	103	102	104
Coupling Clang	LAeq	-	-	-	-	-	-	-	-	-	-
	LA1	115	105	109	110	110	113	109	110	105	87
Train Refuelling	LAeq	97	98	68	82	83	88	92	92	87	81
	LA1	100	71	71	85	86	91	95	95	90	84

Note 1: Based on EPL3142 noise testing limits for locomotives operating on the NSW network.

A noise model typically assumes that all noise sources are operating simultaneously at full power. For complex noise models with a large number of noise sources (especially mobile equipment) the predictions can overestimate a real world measured noise level as many of the noise sources do not operate continuously at full power and their operation may be intermittent or cyclical.

A duty factor has been applied to selected items associated with the operation of the project to represent realistic noise emissions. The duty of a source is the assumed percentage of time that a source is likely to operate for any 15 minute period, and has been estimated based on previous experience and our current understanding of the project.

8.5.2 Operational Modelling Scenario

A modelling scenario comprising of mobile plant operations, idling, shunting and passing trains has been developed to represent MOD12 operations. The scenario includes allowance for operations associated with the modification request (MOD10) that is currently under assessment. The modelling scenario would be considered representative of the typical operations up to the approved container throughput of 300,000 Twenty Foot Equivalent Units (TEU) capacity with extended rail sidings in the southern portion of the site. The general arrangement of the proposed MOD12 operation is attached in **Appendix C**. The proposed MOD12 operation does not alter the night time operational scenario from that which has been previously assessed.. Therefore, noise impacts have been assessed for day and evening period only as the predicted night-time noise levels for the assessment locations would not be affected by the proposed modification.

8.5.3 Operational Noise Predictions

8.5.3.1 Overview

The assessment procedure in terms of the NSW INP has two components:

- Controlling intrusive noise impacts in the short term for residences (Intrusive Criteria - 15 minutes) and;
- Maintain noise level amenity for residences and other land uses (Amenity Criteria - Period).

The Ministers Conditions of Approval (MCoA) 2.17 has established the design noise criteria for both the Intrusive criteria (15 minute) and Amenity criteria (period).

8.5.3.2 Predicted Operational Noise Levels

Table 9 to **Table 12** presents the predicted operational noise levels at each of the nominated assessment locations (as per MCoA 2.17).

For the assessment against the intrusive criteria (15 minutes) sources have been modelled as a typical 'worst case' 15 minute period. The predicted $L_{Aeq}(15\text{minute})$ noise levels associated with the proposed modification are presented in **Table 9** and **Table 10**.

These tables show the design criteria compared to the predicted noise levels from the assumed worst-case site activity at each of the surrounding assessment locations, including both neutral and enhanced weather conditions.

The noise contours for the proposed MOD12 operation are shown in **Appendix D**.

Table 9 Intrusive Assessment - Daytime

Location	Design Noise Criteria LAeq(15minute) dBA	Predicted LAeq (15 minute Noise levels) dBA				Exceedance dB			
		Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)			Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)		
			Westerly	North- Westerly	South- Westerly		Westerly	North- Westerly	South- Westerly
A1 - Eastern end of Jean Street	54	50	46	47	50	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	54	41	37	37	41	-	-	-	-
A2 - Eastern end of Ivy Street	53	42	38	43	37	-	-	-	-
A3 - Wentworth Street (south)	49	43	44	46	39	-	-	-	-
A4 - Eastern end of Gregory Street	49	40	45	44	45	-	-	-	-
A5 - Western end of Blanche Street	46	42	45	45	44	-	-	-	-
A6 – 40 Bazentin Street	46	35	40	40	36	-	-	-	-
A11 - Begnell Park	-	-	-	-	-	-	-	-	-
A13 - Greenacre Bowling Club	-	-	-	-	-	-	-	-	-
A14 - Strathfield High School	-	-	-	-	-	-	-	-	--
A15 - St Anne's School	-	-	-	-	-	-	-	-	--

Table 10 Intrusive Assessment - Evening

Location	Design Noise Criteria LAeq(15minute) dBA	Predicted LAeq (15 minute Noise levels) dBA				Exceedance dB			
		Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)			Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)		
			Westerly	North-Westerly	Northerly		Westerly	North-Westerly	South-Westerly
A1 - Eastern end of Jean Street	54	47	44	44	48	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	54	38	34	34	40	-	-	-	-
A2 - Eastern end of Ivy Street	52	39	35	40	45	-	-	-	-
A3 - Wentworth Street (south)	47	42	42	44	47	-	-	-	-
A4 - Eastern end of Gregory Street	47	37	42	41	39	-	-	-	-
A5 - Western end of Blanche Street	46	39	42	42	42	-	-	-	-
A6 - 40 Bazentin Street	45	33	38	38	39	-	-	-	-
A11 - Begnell Park	-	-	-	-	-	-	-	-	-
A13 - Greenacre Bowling Club	-	-	-	-	-	-	-	-	-
A14 - Strathfield High School	-	-	-	-	-	-	-	-	-
A15 - St Anne's School	-	-	-	-	-	-	-	-	-

The predicted unmitigated LAeq(period) noise levels for the proposed MOD12 are presented in **Table 11** to **Table 12**.

Table 11 Amenity Assessment - Daytime (11 hour)

Location	Design Noise Criteria LAeq(period) dBA	Predicted LAeq(period) dBA				Exceedance dB			
		Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)			Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)		
			Westerly	North-Westerly	South-Westerly		Westerly	North-Westerly	Northerly
A1 - Eastern end of Jean Street	54	45	45	45	47	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	54	40	39	39	40	-	-	-	-
A2 - Eastern end of Ivy Street	52	40	39	40	38	-	-	-	-
A3 - Wentworth Street (south)	52	41	41	43	40	-	-	-	-
A4 - Eastern end of Gregory Street	52	39	42	41	42	-	-	-	-
A5 - Western end of Blanche Street	58	41	42	42	42	-	-	-	-
A6 - 40 Bazentin Street	58	33	36	36	34	-	-	-	-
A11 - Begnell Park	50	36	38	38	36	-	-	-	-
A13 - Greenacre Bowling Club	55	41	40	42	39	-	-	-	-
A14 - Strathfield High School	45 ¹	40	41	39	43	-	-	-	-
A15 - St Anne's School	45 ¹	42	45	44	45	-	-	-	-

Note 1: External Amenity Noise Criteria.

Table 12 Amenity Assessment - Evening (4 hour)

Location	Design Noise Criteria LAeq(period) dBA	Predicted LAeq(period) dBA				Exceedance dB			
		Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)			Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)		
			Westerly	North-Westerly	Northerly		Westerly	North-Westerly	Northerly
A1 - Eastern end of Jean Street	49	46	45	45	45	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	49	37	35	35	36	-	-	-	-
A2 - Eastern end of Ivy Street	51	36	35	37	38	-	-	-	-
A3 - Wentworth Street (south)	53	37	38	39	40	-	-	-	-
A4 - Eastern end of Gregory Street	46	36	39	38	35	-	-	-	-
A5 - Western end of Blanche Street	50	37	39	39	38	-	-	-	-
A6 - 40 Bazentin Street	54	29	32	32	32	-	-	-	-
A11 - Begnell Park	50	32	35	35	35	-	-	-	-
A13 - Greenacre Bowling Club	55	37	36	38	41	-	-	-	-
A14 - Strathfield High School	-	-	-	-	-	-	-	-	-
A15 - St Anne's School	-	-	-	-	-	-	-	-	-

8.5.3.3 Discussion

The information presented in **Table 9** to **Table 12** has been assessed against the MCoA 2.17 criteria, and also compared with the results of the noise impact assessment for Modification Application No. 6 (MOD6) as assessed in the AECOM report 'Early Contractor Involvement Detailed Design Adjustment'. MOD6 represents the acoustic assessment of the ILC, prior to the proposed modification assessed by this study. The findings are summarised as follows:

- Daytime period:
 - Worst-case 24 hour operations during daytime 15-minute periods are predicted to comply with the LAeq(15minute) MCoA 2.17 criteria for under both neutral and enhanced weather conditions.
 - Compliance of the MCoA 2.17 daytime external amenity criteria was achieved under under both neutral and enhanced weather conditions.
- Evening period:
 - Worst-case 24 hour operations during evening 15-minute periods are predicted to comply with the LAeq(15minute) MCoA 2.17 criteria under both neutral and enhanced weather conditions.
 - Compliance of the MCoA 2.17 evening amenity criteria was achieved under both neutral and enhanced weather conditions.

- Night-time period:
 - The proposed modification will not involve any change to night-time operations at the ILC. Therefore night-time noise impacts will remain as previously assessed.

8.6 Tonality and Low Frequency

The noise character was tested based on Table 4.1 on the NSW INP and found that tonal and low-frequency characteristics were not present in predicted noise emissions from the site to assessment locations. Therefore, no modifying correction factor has been applied.

This is consistent with the EA report noise assessment undertaken for the site.

8.7 Net Impact of the Proposed Modification

8.7.1 Construction Net Impact

The predicted LAeq(15minute) construction noise levels at assessment locations from the proposed MOD 12 construction activities are in the range of 7 dBA to 32 dBA lower than the construction noise predictions from the worst case "Container Pavement Works" presented in the EA (2005) (refer to Table 11-16).

8.7.2 Operational Net Impact

MOD12 proposes a change in rail operations the incremental change in noise level has been examined with the net MOD12 impacts summarised as follows:

- There are minor average increases of up to 1 dB in the LAeq(15minute) intrusive noise levels and LAeq(period) amenity noise levels during the day and evening periods.
- The predicted LAeq(15minute) intrusive noise levels at the assessment locations are in the range of 1 dBA to 17 dBA and 1 dBA to 20 dBA below the Project Approval Condition 2.17 noise criteria during the day and evening periods respectively.
- Assessment location A3 (residences to the south west) and A6 (residences to the south east) experienced the greatest increase in LAeq(15minute) intrusive noise level by up to 4 dBA during daytime period under enhanced weather conditions. Assessment location A3 (residences to the south west) experienced the greatest increase in LAeq(15minute) intrusive noise level by up to 5 dBA during evening period under calm weather conditions.
- The predicted LAeq(period) amenity noise levels at the assessment locations are in the range of 1 dBA to 25 dBA and 8 dBA to 29 dBA below the Project Approval Condition 2.17 noise criteria during the day and evening periods respectively.
- Assessment location A6 (residences to the south east) experienced the greatest increase in LAeq(period) amenity noise level by up to 3 dBA during daytime period under enhanced weather conditions. Assessment location A3 (residences to the south west), A6 (residences to the south east) and A13 (Greenacre Bowling Club) experienced the greatest increase in LAeq(period) amenity noise level by up to 1 dBA during the evening period under enhanced weather conditions.

8.8 Recommended Noise Mitigation

Construction

Construction noise levels associated with MOD12 are generally lower than those predicted for the EA assessment of the Enfield ILC. There are some theoretical exceedances (up to 10 dBA), depending on the duration of construction activities. In practice, construction noise levels are likely to be lower than the predicted and of low impact. Mitigation measures would involve implementing a Construction Noise Management Plan including processes for receiving and investigating noise complaints received during the construction works and implementing feasible and reasonable control measures as required to address those complaints.

Operation

Review of the predicted noise impacts from the proposed MOD12 operation in the Enfield ILC site indicates that the worst-case noise levels comply with the applicable design criteria during the daytime and evening periods.

As per the existing MCoA requirements, management measures will be put in place at the Enfield ILC site to control the noise emission, including:

- Preparation of a Noise Management Plan (in accordance with Project Approval condition 6.5);
- Compliance noise monitoring (in accordance with Project Approval condition 3.3) will be conducted at different annual throughput stages (i.e. 50,000, 150,000 and 250,000 TEU) and commencement of operation in ECS A to assess the compliance with the condition of 2.17 of the existing consent, including LA1(1minute) noise events during the night-time period; and
- Implementation of any additional measures required by the Director-General to address any non-compliances with the noise limits in condition 2.17 identified during noise monitoring as required under condition 3.4.

9 CONCLUSION

SLR has undertaken a construction and operational noise impact assessment for the proposed modification (MOD12) of the existing operation at Enfield ILC. The assessment has considered predicted noise of the proposed operations against the maximum allowable operational noise contributions prescribed under the Project Approval (Condition 2.17).

Construction

The predicted LAeq(15minute) noise levels for the proposed worst case construction works exceed the CNML by up to 4 dBA and 10 dBA at assessment location A3 (residences to the south west) and A5 (residences to the south east) during standard daytime working hours. Compliance was achieved for the HNAL for all the assessment locations during standard daytime working hours. It is worth noting that predicted worst case construction noise levels will depend on the number of plant items operating at any one time and their precise location relative to the receiver of interest. In practice, the noise levels are likely to vary due to the fact that plant would move about the worksites and would not all be operating concurrently at all times. Therefore, the construction noise levels are likely to be lower than the predicted worst case noise levels during the construction works.

Construction noise levels associated with MOD12 are generally lower than those predicted for the EA assessment of the Enfield ILC. Similar rail construction activities have already been undertaken as part of the ILC development and these have not caused complaint from local residents.

Operation

The predicted intrusive $L_{Aeq}(15\text{minute})$ noise levels comply with the Project Approval Condition 2.17 for the day and evening periods under neutral and enhanced weather conditions.

The predicted amenity $L_{Aeq}(\text{period})$ noise levels comply with the Project Approval Condition 2.17 during the day and evening periods under neutral and enhanced weather conditions.

No change in night-time operation will occur as a result of the proposed modification, MOD12.

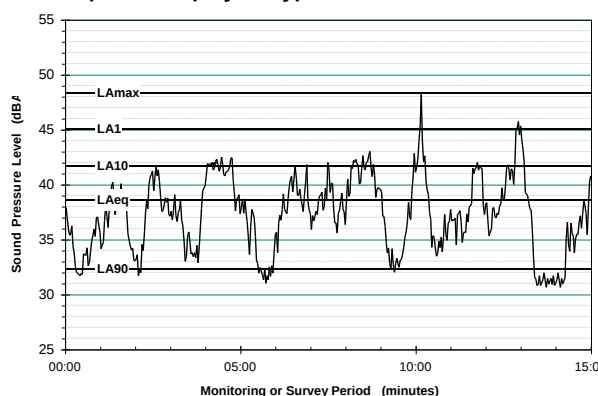
Predicted noise impacts of the proposed modification are, therefore, generally consistent with the conditions of approval for the Enfield ILC project. The noise management measures described in the existing conditions of approval are sufficient to manage the predicted noise impacts associated with the proposed modification.

ACOUSTIC TERMINOLGY

This Report makes repeated reference to certain noise level descriptors, in particular the LA10, LA90 and LAeq and LAmix noise levels.

- The LA10 is the A-weighted sound pressure level exceeded 10% of a given measurement period and is utilised normally to characterise typical maximum noise levels.
- The LAeq is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound over the same measurement period. The LAeq(15hour) is the measurement parameter used to describe the road traffic noise level over the entire daytime (7:00 am to 10:00 pm) period. The LAeq(9hour) is the measurement parameter used to describe the road traffic noise level over the entire night-time (10:00 pm to 7:00 am) period. Similarly, the LAeq(1hour) is the measurement parameter used to describe the road traffic noise level during the loudest 1-hour period during the daytime or night-time periods.
- The LA90 noise level is the A-weighted sound pressure level exceeded 90% of a given measurement period and is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the “background” level.
- The LAmix noise level is the maximum A-weighted noise level associated with road traffic movements.

Graphical Display of Typical Noise Indices



Typical Noise Levels

The following table presents examples of typical noise levels.

Typical Noise Levels		
Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerb side of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to
50	General Office	Quiet
40	Inside private office	Quiet to
30	Inside bedroom	Very quiet
20	Unoccupied recording studio	Almost silent

A-Weighting or dBA Noise Levels

The overall level of a sound is usually expressed in terms of dBA, which is measured using the “A-weighting” filter incorporated in sound level meters. These filters have a frequency response corresponding approximately to that of human hearing. People’s hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the “loudness” of that sound. Different sources having the same dBA level generally sound about equally as loud, although the perceived loudness can also be affected by the character of the sound (eg the loudness of human speech and a distant motorbike may be perceived differently, although they are of the same dBA level).

Sensitivity of People to Noise Level Changes

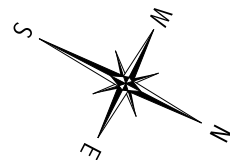
A change of up to 3 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.

Appendix B

Report Number 610.16722.00100

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CONCEPT DESIGN DRAWING



WENTWORTH STREET

MAINLINE ROAD BRIDGE

ENFIELD MARSHALLING YARDS

MAIN THROUGH RAIL LINE

PROPOSED RAIL SIDINGS EXTENSION

EXISTING SIDINGS

PT 22

12

EMPTY CONTAINER STORAGE AREA A

6

WAREHOUSE A & B

19

PT 21

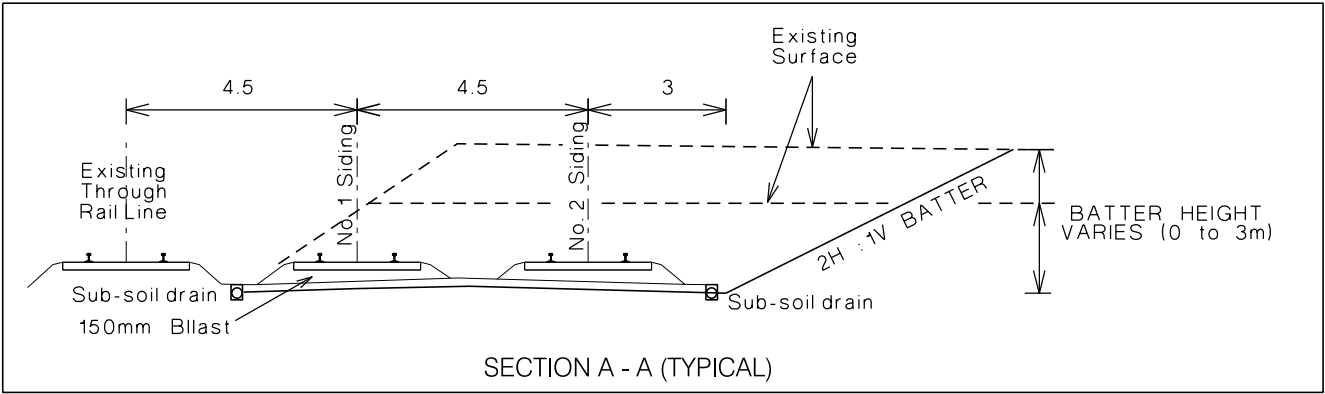
23

7

COSGROVE ROAD

TURNOUT DR

MAINLINE ROAD



NSW PORTS BOUNDARY

EXISTING RAIL LINE & SIDINGS

PROPOSED RAIL SIDINGS EXTENSION

EARTHWORKS BATTER



NSW Ports

PLAN SCALE: 1 : 2000 AT A3 SIZE

PLAN PRODUCED ON MGA GRID

ENFIELD ILC
PROPOSED RAIL SIDINGS EXTENSION
PLAN & TYPICAL SECTION

DRAFTED BY: N.C. DATE : 20.10.16

PLAN NO:

SEDP231A

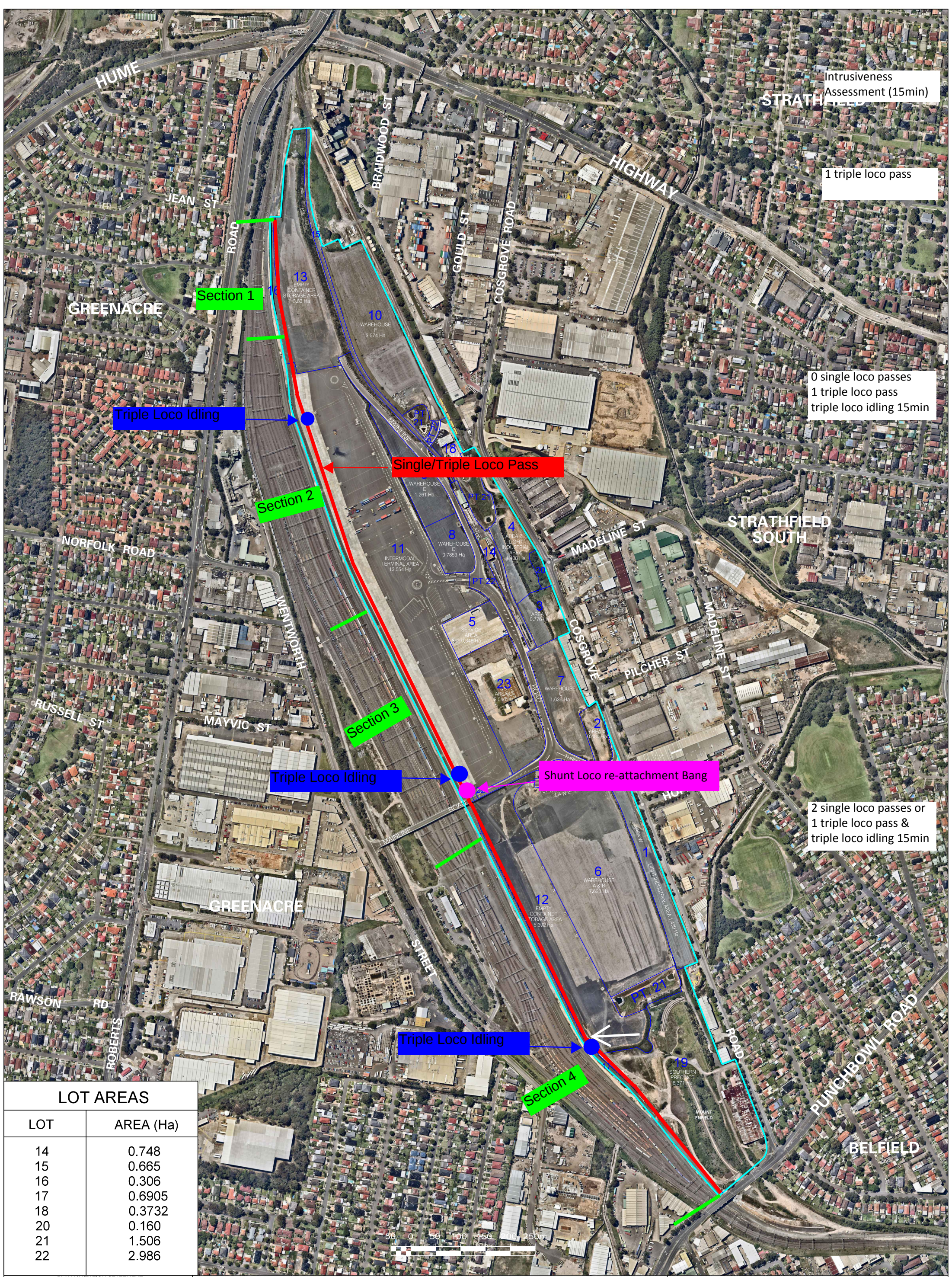
PLAN LIMITATION STATEMENT
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Appendix C

Report Number 610.16722.00100

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MOD 12 OPERATION GENERAL ARRANGEMENT



Intrusiveness
Assessment (15min)

1 triple loco pass

0 single loco passes
1 triple loco pass
triple loco idling 15min

2 single loco passes or
1 triple loco pass &
triple loco idling 15min

LOT AREAS	
LOT	AREA (Ha)
14	0.748
15	0.665
16	0.306
17	0.6905
18	0.3732
20	0.160
21	1.506
22	2.986

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REGISTERED SUBDIVISION BOUNDARIES

NSW PORTS BOUNDARY

INTERNAL LOT BOUNDARIES

19 LOT NUMBER

NSW Ports

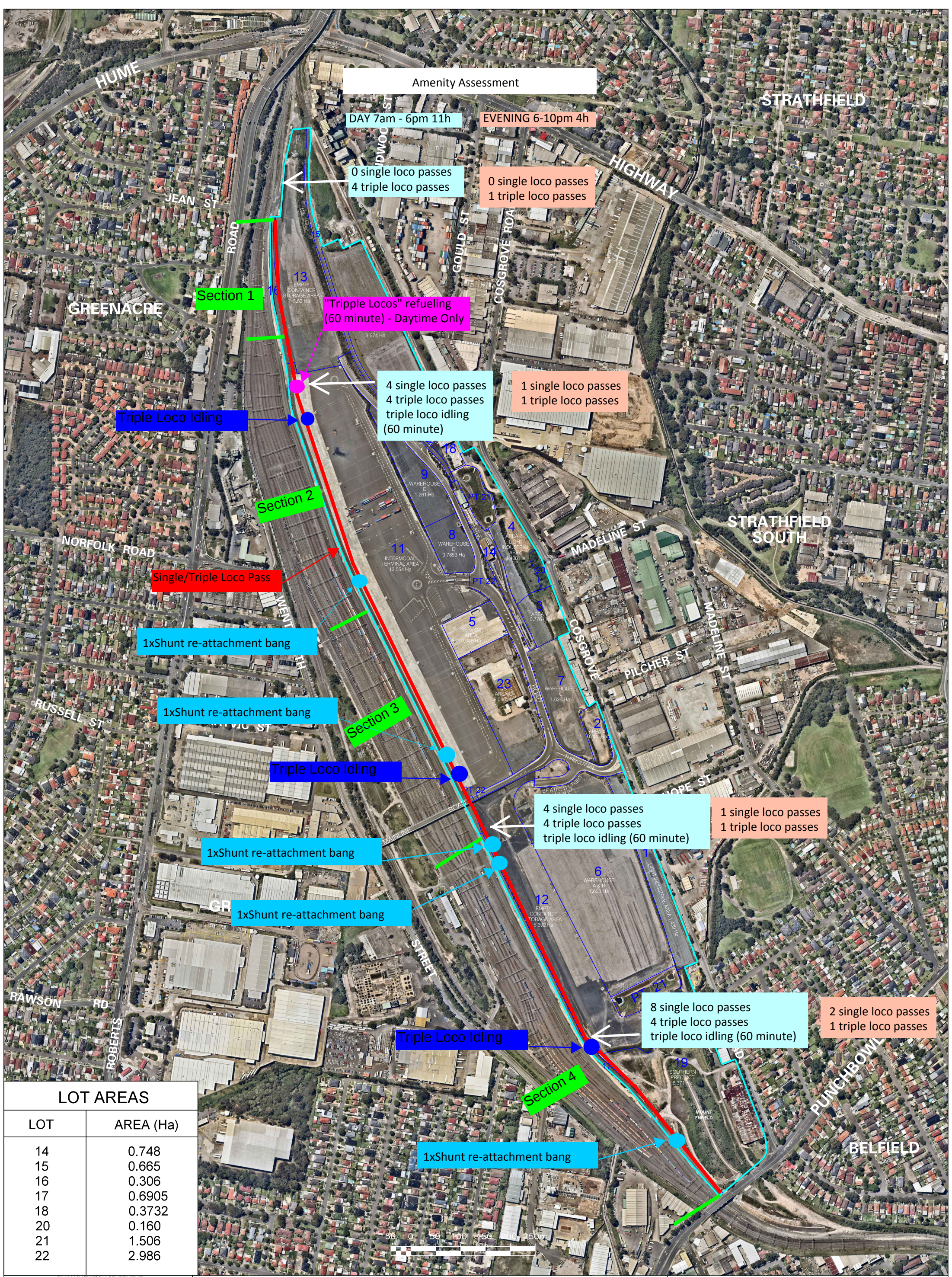
PLAN SCALE: 1 : 7000 AT A3 SIZE

PLAN PRODUCED ON MGA GRID

ENFIELD ILC
REGISTERED SUBDIVISION BOUNDARIES
DEPOSITED PLAN 1183316
8 MAY 2015

DRAFTED BY: N.C.
DATE: 14.1.16
PHOTOGRAPHY DATE: 17.11.15

PLAN NO:
SEDP228B



LOT AREAS	
LOT	AREA (Ha)
14	0.748
15	0.665
16	0.306
17	0.6905
18	0.3732
20	0.160
21	1.506
22	2.986

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REGISTERED SUBDIVISION BOUNDARIES

- NSW PORTS BOUNDARY
- INTERNAL LOT BOUNDARIES
- 19 LOT NUMBER

NSW Ports

PLAN SCALE: 1 : 7000 AT A3 SIZE
PLAN PRODUCED ON MGA GRID

ENFIELD ILC
REGISTERED SUBDIVISION BOUNDARIES
DEPOSITED PLAN 1183316
8 MAY 2015

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