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Enfield Intermodal Logistics Centre

Noise and Vibration Impact Assessment

MOD 14

Report Number 610.16722.00500

30 January 2018

Goodman Property Services (Aust) Pty Limited

Level 17, 60 Castlereagh St

SYDNEY NSW 2000

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Enfield Intermodal Logistics Centre

Noise and Vibration Impact Assessment

MOD 14

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Executive Summary

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Goodman Property Services (Aust) Pty Limited (The Proponent) 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 proposed changes for MOD 14 apply to the warehouse sites within the Enfield ILC situated around the intermodal terminal. The Proponent has engaged with a number of potential customers for Enfield ILC including transport operators, freight forwarders and smaller users who have a requirement for the smaller sites comprises approximately 40% of the Enfield ILC vacant industrial land. Market engagement suggests that operational and built form restrictions imposed by the Approval are discouraging importers from considering the Enfield ILC a viable alternative to their current freight transportation arrangements. Small-scale operators in particular noted the value of rail-to-rail transfers is limited due to low TEU throughput with some, such as local manufacturers, not utilising containers at all.

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). The findings are summarised below:

Construction Noise

The worst-case construction noise levels from MOD 14 construction activities are predicted as up to 81 dBA during standard working hours, which is the same as the predicted construction noise levels predicted in the EA (2005). The construction noise levels associated with MOD 14 are likely to exceed the CNML by up to 30 dBA at assessment locations and the HNAL are likely to be exceeded by up to 6 dBA only at location A5.

Operational Noise

During daytime period, the predicted $L_{Aeq(15minute)}$ intrusive noise levels comply with the Project Approval Condition 2.17 at all assessment locations under neutral weather conditions. Under enhanced weather conditions, minor noise exceedance of up to 2 dBA were found at assessment location A5. Compliance of the MCoA 2.17 daytime external amenity $L_{Aeq(period)}$ criteria was achieved under both neutral and enhanced weather conditions.

During evening period, the predicted operational intrusive noise levels $L_{Aeq(15minute)}$ and amenity noise levels $L_{Aeq(period)}$ comply with the Project Approval Condition 2.17 at all assessment locations under both neutral and enhanced weather conditions.

During night-time period, the predicted operational intrusive noise levels $L_{Aeq(15minute)}$ are likely to exceed the MCoA 2.17 noise criteria by up to 2 dBA at assessment location A1 under neutral weather conditions, and up to 5 dBA, 2 dBA and 3 dBA at assessment location A1, A3 and A5 under enhanced weather conditions. Minor amenity $L_{Aeq(period)}$ exceedance of up to 3 dBA were found at assessment location A1 under enhanced weather conditions. Minor night-time sleep disturbance $L_{A1(1minute)}$ noise exceedance of up to 4 dBA were found at location A1 under neutral weather conditions. Under enhanced weather conditions, minor night-time sleep disturbance $L_{A1(1minute)}$ noise exceedance of up to 4 dBA and 3 dBA were found at location A1 and A5.

The incremental change in noise level has been examined compared to MOD 12 operations, and the net MOD14 impacts summarised as follows.

- The $L_{Aeq(15minute)}$ intrusive noise levels are expected to increase by the minor amount of up to 0.8 dBA during daytime and evening periods and up to 0.4 dBA during night-time period.
- The $L_{Aeq(period)}$ amenity noise levels are expected to increase by the minor amount of up to 0.6 dBA during the daytime and evening periods and up to 0.9 dBA during night-time period.

Executive Summary

Noise management measures have been recommended and described in **Section 8.3.5** of this report to minimise predicted noise impacts. These are considered to be the extent of reasonable and feasible options at this time. It has been recommended to undertake operator-attended noise measurements to validate the noise predictions following commencement of site operation. With implementation of the recommended mitigation measures, it is unlikely that there would be any exceedance of the noise limits identified in the existing conditions of approval.

Road Traffic Noise

The existing 2016 traffic noise levels without the ILC operation exceed the NSW RNP daytime or night-time noise criteria at the assessment locations. The 2 dB allowance has been applied to the existing 2016 traffic noise level as the "Allowable Traffic Noise Level". The traffic noise increases are predicted in the range of 0.1 dB to 0.3 dB at the assessment locations due to the additional traffic generated by the proposed MOD 14 operation. Therefore, the traffic noise from the proposed Enfield ILC MOD 14 operation complies with the NSW RNP. The predicted MOD 14 traffic noise levels at the assessment locations will remain the same or below the approved traffic noise levels presented in the original EA (2005) during the daytime period and likely to be increased by up to 0.2 dB during the night-time period. Given a 2 dBA change in noise level is 'just' noticeable by most people, a 0.2 dB change will not be noticeable.

Vibration

Ground vibration is unlikely to cause any significant effect to the nearest residential properties.

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Goodman Property Services (Aust) Pty Limited (The Proponent) 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 original project approval (Application No. 05-0147) was granted by the 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 for MOD 14 are summarised below and listed in **Section 6** of this assessment.

The purpose of the proposed modification is to provide operational flexibility and built form outcomes better suited to the needs of prospective tenants and operators. This will encourage uptake of spare capacity at the Enfield ILC by smaller users, facilitating the continued growth of container volumes and ensuring the commercial viability of the intermodal terminal. The long-term objective is to ensure rail freight volumes grow to become the predominant transport mode at the Enfield ILC.

The modification entails changing the built form parameters including the site layout and building footprints to create 13 buildings encompassing 126,440 sqm as well as approval to increase the building heights to a maximum of 13.7 metres.

Also proposed are modifications to operational parameters within select lots in response to market feedback received during consultation with potential tenants interested in leasing warehouse space, and using the rail service at Enfield ILC. Feedback suggests that further flexibility is required for the Enfield ILC to be a viable freight solution for prospective tenants. In summary these include:

- Permit warehouse and distribution uses;
- Allow truck-to-truck freight movements for smaller sites with no direct interface with rail sidings
- Extend 24/7 operating hours to specific sites.

2 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

This noise assessment has been prepared as part of the Environmental Impact Statement (EIS) for proposed MOD14 operation. The Secretary's Environmental Assessment Requirements (SEARs) has been issued by NSW Department of Planning and Environment (DPE) in November 2017. The objective of this report is to assess the potential noise and vibration impacts of the modified Enfield ILC site in accordance with relevant state and federal guidelines and regulations, and to address the SEARs relevant to noise and vibration, as shown in **Table 1**.

Table 1 Secretary's Environmental Assessment Requirements – Enfield ILC (MOD 14)

Key Issue	Assessment Requirement	Addressed in Section
Noise and Vibration	Assessment of construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must include consideration to sensitive receivers including residential premises, consideration of sleep disturbance and, as relevant, the characteristics of noise and vibration (e.g. low frequency noise); and	**Section 7** **Section 8** **Section 9**
	The assessment should be conducted in accordance with, but not limited to, Assessing Vibration: a technical guideline (DEC 2006), Interim Construction Noise Guideline (EPA, 2013), NSW Road Noise Policy (DECCW, 2011), Noise Policy for Industry (EPA, 2017), Development Near Rail Corridors and Busy Roads – Interim Guideline (DoP, 2008) and any other relevant guidance.	**Section 7** **Section 8** **Section 9**

Source: SEARs for application number MP05_0147 MOD 14, 9 November 2017.

3 REPORT OBJECTIVES

The purpose of the study is to assess the proposed modifications (MOD 14) to the Enfield ILC approved design operation to ensure that noise emissions at the site continue to satisfy the noise emission criteria in the current 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. 12 – Noise Impact Assessment (SLR Consulting, November 2016).

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

4 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 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 Minister for Planning granted approval of the project under Section 75J of the EP&A Act (MP05_0147).

The approval has been modified on eight occasions, as outlined in **Table 2**.

Table 2 Approved Modifications of Project Approval MP05_0147

Modification Number	Description	Approval date
MOD 1	Amendment of conditions relating to construction dust monitoring	2 October 2008
MOD 2	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
MOD 6	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
MOD 11	Establish an additional warehouse (Warehouse G) in the southern portion of Area G (Lot 23).	8 February 2017
MOD 12	Approval to extend two existing rail sidings and an existing office building.	7 March 2017

Note: Enfield ILC MOD 10 Operation has been lodged to DP&E but is currently on-hold.

5 SITE OVERVIEW

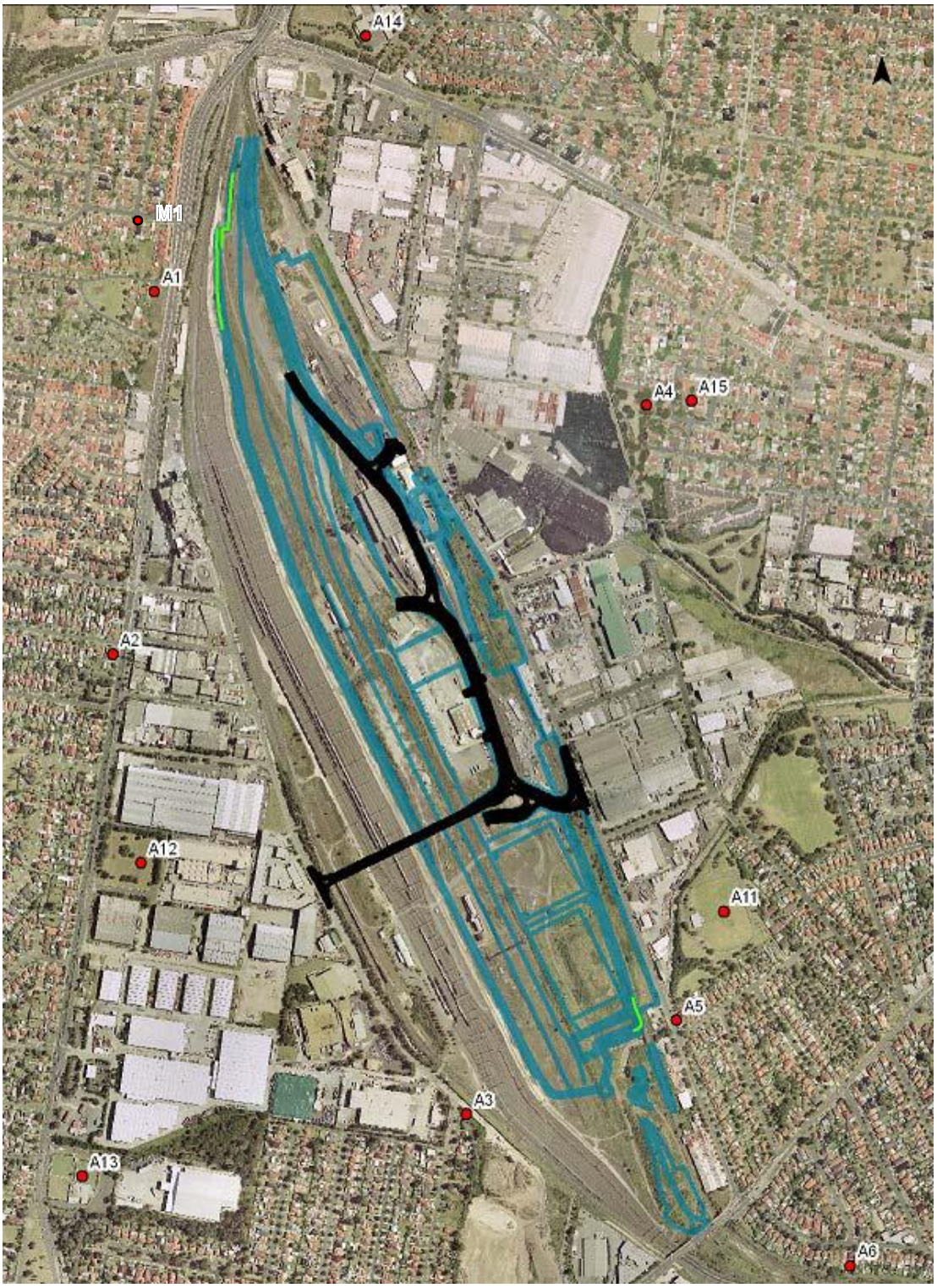
Industrial land adjoins the site to the east and west, with mixed industrial / residential land to the south, and residential to the north-west. The approved site layout is shown in **Figure 1**.

Figure 1 Approved Site Layout Plan[1]

Note 1: Approved Site Layout Plan under Modification 12
Source: NSW Ports

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

Figure 2 Enfield ILC Site Showing Assessment Locations

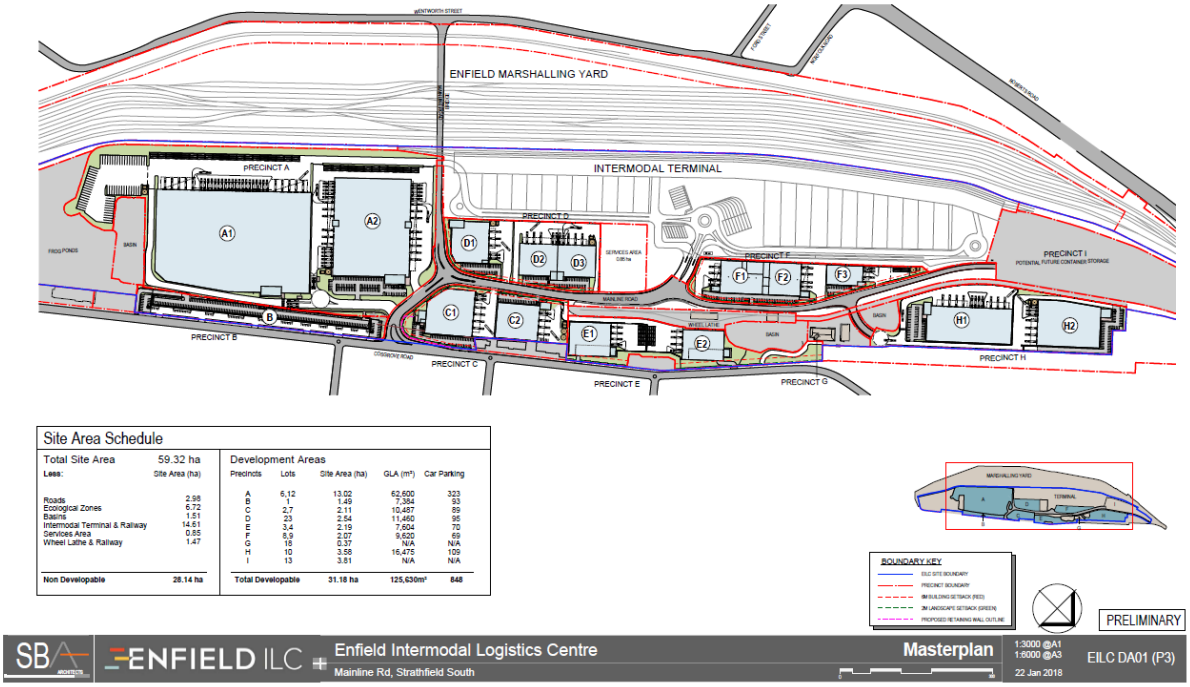


Note: Figure from NSW Ports *Enfield ILC Construction Environmental Management Plan*

6 PROPOSED MODIFICATION

The proposed modification (MOD 14) applies to the warehouse sites within the Enfield ILC situated around the intermodal terminal. The Proponent has engaged with a number of potential customers for Enfield ILC including transport operators, freight forwarders and smaller users who have a requirement for the smaller sites comprises approximately 40% of the Enfield ILC vacant industrial land. Market analysis engagement suggests that operational and built form restrictions imposed by the Approval are discouraging importers from considering the Enfield ILC a viable alternative to their current freight transportation arrangements. Small-scale operators in particular noted the value of rail-to-rail transfers is limited due to low TEU throughput with some, such as local manufacturers, not utilising containers at all. The masterplan for the proposed Enfield ILC MOD 14 operation is shown in **Figure 3** below.

Figure 3 Masterplan of Enfield ILC MOD 14 Operation



The objectives of this proposal are to redress this situation and can be briefly summarised as follows:

- Introduce greater operational flexibility within the Enfield ILC by:
  - extending 24/7 operational hours; and
  - removing the restriction on rail-to-rail and truck-to-truck transfers on smaller sites

  to better service the needs and expectations of importers in the short term;
- Encourage a modal switch toward intermodal freight transportation in the medium to long term to service Greater Sydney's 24/7 port supply chain and alleviate road congestion.
- Implement a masterplan that provides the built form and site layout requirements of prospective commercial tenants and operators.

Road Traffic Assessments for the existing environment and the proposed modification has been conducted by Transport & Urban Planning Pty Ltd (reference number: 16210r) and Ason Group (Reference Number 0440r03). The predicted peak hourly heavy vehicle movement and overall "worse case" daily heavy vehicle movement are presented within this assessment. Notably, the traffic assessment has shown overall traffic volumes to be consistent with the existing Project Approval.

6.1 Operating hours

The existing hours of operation for the Intermodal terminal, warehousing and container yards are 24 hours 7 days per week. The existing hours of operation for the Light Industrial and Commercial Areas are 7:00am - 7:00pm, 7 days per week.

The proposed modification (MOD 14) is seeking to extend the existing operating hours to 24 hours 7 days per week for the light Industrial Area residing on Lots 3 and 4 only (Precinct E).

6.2 Noise Barriers

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

- Southern-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 370 m;
- South-eastern earth noise mound (east of the frog ponds), total length 110 m.

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 $L_{Aeq(15minute)}$ 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**. Note the CNMLs as presented in the Table are based on the daytime project approval 'Maximum Allowable Noise Contribution' noise levels of RBL+5 dBA.

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

Location		Intrusive $L_{Aeq(15minute)}$	Intrusive $L_{Aeq(15minute)}$
		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	
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	

Location		Intrusive $L_{Aeq(15minute)}$	Intrusive $L_{Aeq(15minute)}$
		Daytime[1] CNML	Daytime[1] HNAL
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:

a) wind speeds up to 3 ms^{-1} (measured at 10 metres above ground level), or

b) temperature inversion conditions up to 3^{o}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		
	L_{Aeq} (15-minute)	L_{Aeq} (period)	L_{Aeq} (15-minute)	L_{Aeq} (period)	L_{Aeq} (15-minute)	L_{Aeq} (period)	L_{A1} (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 endof 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 operational 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.

7.3 Off-site Road Noise Criteria

7.3.1 Existing Road Traffic Noise

According to the Noise and Vibration Assessment (dated October 2005) from the original EA (Chapter 11), a programme of background noise surveys to characterise and quantify the noise environment in the vicinity of the ILC operation was conducted in February 2005. The near-field road traffic noise monitoring locations adjacent to Liverpool Road (Hume Highway) and Roberts Road are shown on **Figure 4**.

Figure 4 Road Traffic Noise Monitoring Locations (February 2005)

Source: GoogleMap 2017

The measured traffic noise level results are presented in **Table 4** which include the daytime the night-time $L_{Aeq(period)}$ from all noise sources, which were controlled by traffic noise from the adjacent Liverpool Road (Hume Highway) and Roberts Road.

Table 4 Measured Road Traffic Noise Levels (2005)

ID	Address	Road Traffic Noise Source	Distance from Road	Traffic Noise Levels, dB(A)	
				Day $L_{Aeq(15hour)}$	Night $L_{Aeq(9hour)}$
M7	554 Liverpool Road	Liverpool Road	15	71	67
M8	1 Robinson Street	Hume Highway	10	70	67
M9	20 Rebecca Road	Roberts Road	25	72	69
M10	118 Roberts Road	Roberts Road	10	70	67

Other potentially noise sensitive locations affected by the road traffic noise were identified and presented in **Table 5**. The traffic noise levels at these locations were calculated in accordance with NSW Road Noise Policy's (DECCW, 2011) accepted model, 'Calculation of Road Traffic Noise' (CoRTN) and also presented in **Table 5**.

Table 5 Calculated Road Traffic Noise Levels (2005) at Other Noise Sensitive Locations

ID	Locations	Noise Levels Measured at	Road Traffic Noise Source	Distance from Road (m)	Traffic Noise Levels, dB(A)	
					Day $L_{Aeq(15hour)}$	Night $L_{Aeq(9hour)}$
A4	Eastern end of Gregory Street	-	Liverpool Road / Cosgrove Road	375	58	53
A13	Greenacre Bowling Club, Roberts Road	M10	Roberts Road	10	74	70

Recent road traffic counts and assessment have been prepared by Transport and Urban Planning Pty Ltd in November 2016. The measured and calculated road traffic noise levels for Year 2005 and 2016 without the ILC operation are shown in **Table 6**.

Table 6 Measured (2005) and Calculated 2016 Traffic Noise Levels

ID	Location	Period	Traffic Noise Levels - without ILC Operation	
			2005	**2016[1]**
A4	Eastern end of Gregory Street	Daytime $L_{Aeq(15hour)}$	58	59
		Night-time $L_{Aeq(9hour)}$	53	55
A7	554 Liverpool Road	Daytime $L_{Aeq(15hour)}$	71	73
		Night-time $L_{Aeq(9hour)}$	67	69
A8	1 Robinson Street	Daytime $L_{Aeq(15hour)}$	70	71
		Night-time $L_{Aeq(9hour)}$	67	69
A9	20 Rebecca Road	Daytime $L_{Aeq(15hour)}$	72	72
		Night-time $L_{Aeq(9hour)}$	69	69
A10	118 Roberts Road	Daytime $L_{Aeq(15hour)}$	70	70
		Night-time $L_{Aeq(9hour)}$	67	67
A13	Greenacre Bowling Club, Roberts Road	Daytime $L_{Aeq(15hour)}$	74	76

Note 1: Based on the traffic count conducted by Transport and Urban Planning Pty Ltd in November 2016.

7.3.2 Traffic Noise Assessment Criteria

The NSW Road Noise Policy (RNP) (DECCW, 2011) is the relevant policy for the assessment of road noise in NSW. The RNP classification scheme for assessing traffic noise impacts on an existing road network from the proposed ILC MOD 14 operation is presented in **Table 7**.

Table 7 Road Traffic Noise Assessment Criteria for Residential Land Uses (dBA re 20 µPa)

Road	Project Type and Land Use	Total Traffic Noise Criteria[1,2,3]	Relative Increase Criteria[1,2]
Liverpool Road Hume Highway Roberts Road Cosgrove Road[4]	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use development	Daytime 60 LAeq(15hour)	Existing LAeq(15hour) plus 12dBA
		Night-time 55 LAeq(9hour)	Existing LAeq(9hour) plus 12dBA

Note 1: LAeq = equivalent continuous noise level.
Note 2: Daytime 7:00 am to 10:00 pm, Night-time 10:00 pm to 7:00 am.
Note 3: Where the total traffic criteria is already exceeded, then limit any increase to 2dBA or less.
Note 4: Section 2.2.2 of the NSW RNP states that 'where local authorities identify a 'principle haulage route', the noise criteria for the route should match those for arterial/sub-arterial roads, recognising that they carry a different level and mix of traffic to local roads'. Therefore, Cosgrove Road is identified as a sub-arterial road.

The NSW RNP also sets the noise assessment criteria for other non-residential land uses. **Table 8** below shows the traffic noise criteria which are applicable to Greenacre Bowling Club and Strathfield High School.

Table 8 NSW RNP Traffic Noise Criteria for Non-Residential Land Uses

Type of Land Use	Traffic Nosie Criteria, dB(A)	
	Day	Night
Open Space (active use)	LAeq,(15hour), 60 (external) when in use	-

Note 1: External criteria equivalent to internal criteria plus 10dBA, based on openable windows.

In relation to situations where exceedances of the road traffic noise assessment criteria are predicted, the RNP Section 3.4 relevantly provides:

> *Where existing traffic noise levels are above the noise assessment criteria, the primary objective is to reduce these through feasible and reasonable measures to meet the assessment criteria. A secondary objective is to protect against excessive decreases in amenity as the result of a project by applying the relative increase criteria.*
>
> *In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.*
>
> *… For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.*

As shown in **Table 6**, the calculated 2016 traffic noise levels without Enfield ILC operation at most of the noise affected locations already exceed the RNP daytime or night-time criteria. Therefore, the 2 dB allowance will be applied to the calculated 'existing' 2016 traffic noise levels (which assumes that the Enfield ILC is not operational) as the "allowable traffic noise levels".

8 NOISE ASSESSMENT

8.1 Prediction of Noise Emissions

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 building 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.

8.1.1 Meteorological Parameters

As per the requirements of the MCoA 2.17, noise predictions were conducted under the meteorological conditions outlined in **Table 9**.

Table 9 Modelled Meteorological Parameters

Weather Conditions	Day		Evening		Night	
	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather	Neutral Weather	Enhanced Weather
Temperature[1]	18°C	18°C	12°C	12°C	6°C	6°C
Humidity[1]	63%	63%	75%	75%	90%	90%
Atmospheric Stability Class[1]	D	D	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	0 m/s	2.5 m/s/2 m/s
Wind Direction	N/A	West North-West South-West	N/A	West North-West South-West	N/A	West North-West South-West South-East

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).

8.1.2 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 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 of the on-site equipment are detailed in **Table 10**.

Table 10 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
	LA1	107	101	101	106	109	104	102	99	93	87
Truck Idling	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 Trains											
Train Idling on Track	LAeq	100	103	107	104	101	98	93	89	88	90
	LA1	114	117	121	118	115	112	107	103	102	104
Moving Trains											
Slow Moving Train[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
Mechanical Plants											
Air Condenser Unit	LAeq	60	73	64	57	58	57	56	51	49	46
	LA1	64	77	68	61	62	61	60	55	53	50
Exhaust Fan	LAeq	62	40	44	46	51	52	56	53	50	47
	LA1	65	43	47	49	54	55	59	56	53	50

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 anyone 15 minute period, and has been estimated based on previous experience and our current understanding of the project.

8.1.3 Noise Sensitive Locations

The noise sensitive locations have been determined at the EA stage. The receiver locations are presented in **Figure 2** and detailed in **Table 11.**

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 11 Receiver Locations

Receiver	Description	Address
A1*	Eastern end of Jean Street	40 Roberts Road, 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 George 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	-

* Refer to text above in relation to monitoring and assessment locations in this vicinity

8.2 Construction Noise Impact Assessment

8.2.1 Construction Plant and Equipment

The construction equipment list and the typical sound power levels (SWLs) for the proposed MOD 14 are shown in **Table 12** below:

Table 12 Typical Construction Equipment and Sound Power Levels

Plant Item	Plant Description	Typical Sound Power Levels, $L_{Aeq(15minute)}$ (dBA re 1ρW)
1	Asphalting Machine	106
2	Backhoe	104
3	Compactor	112
4	Concrete Kerb Machine	113
5	Concrete Pump	105
6	Concrete Trucks	110
7	Concrete Vibrator	102
8	Dozer	116
9	Grader	110
10	Mobile Crane	114
11	Pilling Equipment	114
12	Rollers	109
13	Scraper	114
14	Tracked Excavator	112
15	Truck (>20tonne)	108
16	Water Cart	109

8.2.2 Construction Modelling Scenario

Construction modelling scenarios have been developed to represent typical construction works for the proposed site. The construction scenarios together with the associated equipment have been presented in **Table 13**. 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.

Table 13 Construction Scenarios

Scenario	Working Area	Plant	Number of Plant
Earthworks	Precinct A - H	Dozer (CAT D8)	1
		Excavators (30t)	2
		Water Cart (20t)	1
		Compactors	2
		Articulated Trucks	4
		Grader	1
		Scraper	1
Stormwater Drainage System	Precinct A - H	Excavators (30t)	1
		Water Cart	1
		Roller	2
		Backhole	1
		Mobile Crane	1
Retaining walls / embankments	Precinct A - H	Excavators (30t)	1
		Roller	1

Scenario	Working Area	Plant	Number of Plant
		Dozer (CAT D8)	1
		Truck	2
Internal road pavement works	Precinct A & B	Grader	1
		Roller	2
		Water Cart	1
		Backhole	1
		Asphalt Truck	2
		Concrete kerb machines	1
		Asphalting Machine	1
Warehouse Construction	Precinct A - H	Mobile Crane	1
		Pilling Equipment	1
		Grader	1
		Excavators (30t)	1
		Water Cart	1
		Delivery Trucks	2
		Concrete Trucks	1
		Concrete Pumps	1
		Concrete Vibrator	1

8.2.3 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 $L_{Aeq(15minute)}$ noise level predictions are presented in **Table 14** together with the maximum noise level exceedance above the nominated NMLs for the selected noise sensitive receivers.

Table 14 Summary of Worst-case Construction Noise Predictions

Receiver	Description	CNML	HNAL	Maximum Predicted L_{Aeq} (15 minute) Noise Level (dBA)					Maximum CNML Exceedance (dB)					Maximum HNAL Exceedance (dB)				
				Earthworks	Stormwater Drainage System	Retaining walls / embankment	Internal road pavement works	Warehouse Construction	Earthworks	Stormwater Drainage	Retaining walls /	Internal road pavement	Warehouse Construction	Earthworks	Stormwater Drainage System	Retaining walls /	Internal road pavement works	Warehouse Construction
A1	Eastern end of Jean Street	59	75	66	62	63	47	64	7	3	4	-	5	-	-	-	-	-
M1	6 Jean Street	59		47	43	44	26	45	-	-	-	-	-	-	-	-	-	-
A2	Eastern end of Ivy Street	58		52	48	49	45	50	-	-	-	-	-	-	-	-	-	-
A3	Wentworth Street (south)	54		60	56	57	57	58	6	2	3	3	4	-	-	-	-	-
A4	Eastern end of Gregory Street	54		59	55	56	54	57	5	1	2	0	3	-	-	-	-	-
A5	Western end of Blanche Street	51		81	77	78	78	79	30	26	27	27	28	6	2	3	3	4
A6	40 Bazentin Street	51		53	49	50	50	51	2	-	-	-	-	-	-	-	-	-
A11	Begnell Park	External 65 when in use		71	67	68	68	69	6	2	3	3	4	-	-	-	-	-
A12	51-55 Roberts Road	External 70 when in use		57	53	54	54	55	-	-	-	-	-	-	-	-	-	-
A13	Greenacre Bowling Club	External 70 when in use		55	51	52	52	53	-	-	-	-	-	-	-	-	-	-
A14	Strathfield High School	External 55 when in use		54	50	51	46	52	-	-	-	-	-	-	-	-	-	-
A15	St Anne's School	External 55 when in use		61	57	58	53	59	6	2	3	-	4	-	-	-	-	-

8.2.4 Discussion

The worst-case construction noise predictions presented in **Table 14** indicate that CNML exceedances of up to 30 dBA are to be expected at assessment locations during standard working hours. The HNAL exceedances of up to 6 dBA are to be expected due to the close proximity of location A5 (Western end of Blanche Street) during standard working hours. It is worth noted that the worst-case construction noise levels from the EA (2005) were predicted as same as up to 81 dBA at location A5 (Western end of Blanche Street). Thus, the worst-case noise impact at the noise assessable locations will be the same from construction activities associated with MOD 14 and the EA (2005).

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 14** for most, and probably all, of the time during the works.

8.3 Operational Noise Assessment

8.3.1 Modelling Scenario

Intermodal Terminal Operation

A modelling scenario comprising of mobile plant operations, idling, shunting and moving trains has been developed to represent site operations. 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.

The modelling scenarios adopted in this assessment were modified and refined with respect to previous assessments as follows:

a) Truck movements and truck idling were redistributed throughout the day-evening-night periods based upon the predicted traffic generation data from Transport & Urban Planning (2016); and

b) Truck-related container handling activities (i.e. reach stacker operations and container clangs) were correlated to the temporal and spatial distribution of container truck movements on the site.

Intrusive Noise

Based on the Transport & Urban Planning's report and AsonGroup's Traffic Impact Assessment, the predicted "Worse Case" hourly heavy vehicle movements within the Enfield ILC are shown in **Table 15** below.

Table 15 Predicted "Worse Case" Hourly Heavy Vehicle Movements

Period[1]	Hour Commencing	Total Heavy Vehicles			
		Intermodal & Warehouse A	Precinct B	Other Warehouses	Total
Daytime	14:00	102	2	20	124
Evening	18:00	34	0	13	47
Night-time	6:00	56	0	6	62

Note 1: Based on INP, "Daytime" period is defined as between 0700 to 1800 hour; Evening period is defined as between 1800 to 2200 hour; and "Night-time" period is defined as between 2200 to 0700 hour.

Therefore, the 15-minutes heavy vehicle movement can be calculated based on the predicted hourly heavy vehicle movement presented in **Table 15**. The calculated 15-minutes heavy vehicle movement (rounded to the nearest 0.1) for each period and the truck distribution for each route are shown in **Table 16**. Note rounding to the nearest 0.1 will accurately reflect heavy vehicle movements over a 15 minute period, as for example, 0.5 represents a truck for 7.5 minutes of 15 minutes.

Table 16 Calculated 15-minutes Heavy Vehicle Movement and Distribution

Route	Period		
	Daytime	Evening	Night
Intermodal and Warehouse A	12.8	4.3	7.0
Precinct B	0.3	0.0	0.0
Other Warehouses	2.5	1.6	0.8

The quantities of the industrial noise sources (rounded to the nearest 0.1) modelled on site during any one 15-minute period in the intrusive assessment period are shown in **Table 17**.

Table 17 Industrial Source Quantity summary (15-minute period)

Source	Operating Area	Daytime	Evening	Night-time
Idling Trucks	Intermodal	9.6	3.2	5.3
Moving Trucks	Intermodal	9.6	3.2	5.3
Idling Trucks	Warehouse A1	2.1	0.7	1.2
Moving Trucks	Warehouse A1	2.1	0.7	1.2
Idling Trucks	Warehouse A2	1.1	0.4	0.6
Moving Trucks	Warehouse A2	1.1	0.4	0.6
Reach Stacker	Intermodal	4	1.3	2.2
Reach Stacker	Warehouse A1 & A2	1	0.3	0.5
Clangs' @ 4.1m	Intermodal	6	2.0	3.3
Elevated 'Clangs'	Intermodal	9.6	3.2	5.3
Idling Trucks	Precinct B	0.3	0.0	0.0
Moving Trucks	Precinct B	0.3	0.0	0.0
Idling Trucks	Other Warehouses	2.5	1.6	0.8
Moving Trucks	Other Warehouses	2.5	1.6	0.8
Idling Train	Rail Line	1	1	1
Moving Train	Rail Line	1	1	1
Air Condenser Units	All Warehouses	4 Condenser Units per 300m^2		
Exhaust Fans	All Warehouses	4 Exhaust Fans per 6000m^2		
Forklift	All Warehouses	1 forklift per 3000m^2		

Amenity Noise

Based on the Transport & Urban Planning's report, the summarised period heavy vehicle movement within the Enfield ILC (excluding the former Toll Lease Area) for daytime (11 hour), evening (4 hour) and night-time (9 hour) periods are shown in **Table 18**.

Table 18 Heavy Vehicle Movement for Day (11 hour), Evening (4 hour) and Night (9 hour) Period

Period	Total Heavy Vehicles
Daytime (11 hour)	1107
Evening (4 hour)	153
Night (9 hour)	161

The calculated heavy vehicle movement (rounded to the nearest 0.1) for daytime (11 hour), evening (4 hour) and night-time (9 hour) period together with the truck distribution for each route are shown in **Table 19**.

Table 19 Calculated Heavy Vehicle Movement and Distribution for Daytime (11 hour), Evening (4 hour) and Night-time (9 hour) Period

Route	Period		
	Daytime (11 hour)	Evening (4 hour)	Evening (4 hour)
Intermodal and Warehouse A	902	116	130
Precinct B	20	0	0
Other Warehouses	185	37	31

The quantities of the industrial noise sources (rounded to the nearest 0.1) modelled on site during daytime (11 hour), evening (4 hour) and night-time (9 hour) period in the amenity assessment period are shown in **Table 20**.

Table 20 Industrial Source Quantity Summary (15 minute Period)

Source	Operating Area	Daytime		Evening		Night-time	
		Proportional Quantity 15 minutes	Quantity 11 hours	Proportional Quantity 15 minutes	Quantity 4 hours	Proportional Quantity 15 minutes	Quantity 9 hours
Idling Trucks	Intermodal	7.7	338	2.7	44	1.4	49
Moving Trucks	Intermodal	7.7	338	2.7	44	1.4	49
Idling Trucks	Warehouse A1	1.7	74	0.6	10	0.3	11
Moving Trucks	Warehouse A1	1.7	74	0.6	10	0.3	11
Idling Trucks	Warehouse A2	0.9	39	0.3	5	0.2	6
Moving Trucks	Warehouse A2	0.9	39	0.3	5	0.2	6
Reach Stacker	Intermodal	3.2	Operating at 80% of the time	1.1	Operating at 23% of the time	0.6	Operating at 11% of the time
Reach Stacker	Warehouse A1 & A2	0.8	Operating at 80% of the time	0.3	Operating at 23% of the time	0.1	Operating at 11% of the time
Clangs' @ 4.1m	Intermodal	4.8	424	1.7	121	0.8	60
Elevated 'Clangs'	Intermodal & Warehouse A	7.7	677	2.7	192	1.4	96
Moving Trucks	Precinct B	0.2	10	0.0	0	0.0	0
Reach Stacker	Precinct B	0.2	10	0.0	0	0.0	0
Idling Trucks	Other Warehouses	1.1	93	1.2	19	0.4	16
Moving Trucks	Other Warehouses	1.1	93	1.2	19	0.4	16
Idling Train	Rail Line	0.1	7	0.0	3	0.1	6
Moving Train	Rail Line	0.1	15 Movement	0.1	5 Movement	0.1	12 movements

8.3.2 Operational Noise Predictions

8.3.2.1 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).

8.3.2.2 Predicted Noise Levels

Table 21 to **Table 27** 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 modeled as a typical 'worst case' 15 minute period. The predicted unmitigated $L_{Aeq(15minute)}$ noise levels associated with the proposed modification are presented in **Table 21** to **Table 23**.

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. Where exceedances of the design criteria are identified, consideration is given to noise mitigation to minimise the noise impacts (refer to **Section 8.3.5**).

The noise contours for the proposed Mod 14 operation under daytime calm and night-time calm weather conditions are shown in **Appendix B1** and **B2**.

Table 21 Intrusive Assessment - Daytime

Location	Design Noise Criteria $L_{Aeq(15minute)}$ 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	46	50	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	54	42	36	37	41	-	-	-	-
A2 - Eastern end of Ivy Street	53	42	37	43	37	-	-	-	-
A3 - Wentworth Street (south)	49	41	43	45	36	-	-	-	-
A4 - Eastern end of Gregory Street	49	41	45	43	46	-	-	-	-
A5 - Western end of Blanche Street	46	45	**48**	**48**	**47**	-	2	2	1
A6 – 40 Bazentin Street	46	31	37	37	31	-	-	-	-
A11 - Begnell Park	-	-	-	-	-	-	-	-	-
A13 - Greenacre Bowling Club	-	-	-	-	-	-	-	-	-
A14 - Strathfield High School	-	-	-	-	-	-	-	-	-
A15 - St Anne's School	-	-	-	-	-	-	-	-	-

Bold Red Text - Noise level exceed the MCoA 2.17 criteria.

Table 22 Intrusive Assessment - Evening

Location	Design Noise Criteria $L_{Aeq(15minute)}$ 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	Northerly
A1 - Eastern end of Jean Street	54	49	45	45	47	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	54	41	36	36	40	-	-	-	-
A2 - Eastern end of Ivy Street	52	41	37	42	45	-	-	-	-
A3 - Wentworth Street (south)	47	40	42	44	44	-	-	-	-
A4 - Eastern end of Gregory Street	47	40	44	42	38	-	-	-	-
A5 - Western end of Blanche Street	46	43	46	46	45	-	-	-	-
A6 - 40 Bazentin Street	45	30	35	36	36	-	-	-	-
A11 - Begnell Park	-	-	-		-	-	-	-	-
A13 - Greenacre Bowling Club	-	-	-		-	-	-	-	-
A14 - Strathfield High School	-	-	-		-	-	-	-	-
A15 - St Anne's School	-	-	-	-	-	-	-	-	-

Table 23 Intrusive Assessment - Night-time

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	South-Easterly		Westerly	North-Westerly	South-Westerly	South-Easterly
A1 - Eastern end of Jean Street	48	**50**	45	45	**49**	**53**	2	-	-	1	5
M1 - Eastern end of Jean Street (6 Jean Street)	48	41	36	36	40	45	-	-	-	-	-
A2 - Eastern end of Ivy Street	47	41	37	42	37	44	-	-	-	-	-
A3 - Wentworth Street (south)	42	40	42	**44**	36	36	-	-	2	-	-
A4 - Eastern end of Gregory Street	45	40	44	42	45	42	-	-	-	-	-
A5 - Western end of Blanche Street	43	42	**45**	**46**	**44**	40	-	2	3	1	-
A6 – 40 Bazentin Street	41	30	36	36	30	26	-	-	-	-	-
A11 - Begnell Park	-	-	-		-		-	-	-	-	-
A13 - Greenacre Bowling Club	-	-	-		-		-	-	-	-	-
A14 - Strathfield High School	-	-	-		-		-	-	-	-	-
A15 - St Anne's School	-	-	-	-	-	-	-	-	-	-	-

Bold Red Text - Noise level exceed the MCoA 2.17 criteria.

The predicted unmitigated LAeq(period) noise levels for the proposed MOD 14 are presented in **Table 24** to **Table 26**.

Table 24 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	South-Westerly
A1 - Eastern end of Jean Street	54	49	48	48	49	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	54	41	39	39	40	-	-	-	-
A2 - Eastern end of Ivy Street	52	40	39	40	39	-	-	-	-
A3 - Wentworth Street (south)	52	40	40	41	38	-	-	-	-
A4 - Eastern end of Gregory Street	52	40	42	41	42	-	-	-	-
A5 - Western end of Blanche Street	58	44	46	46	45	-	-	-	-
A6 - 40 Bazentin Street	58	30	33	33	30	-	-	-	-
A11 - Begnell Park	50	44	46	45	45	-	-	-	-
A13 - Greenacre Bowling Club	55	41	39	42	39	-	-	-	-
A14 - Strathfield High School	45[1]	39	40	38	42	-	-	-	-
A15 - St Anne's School	45[1]	42	45	44	45	-	-	-	-

Note 1: External Amenity Noise Criteria.

Table 25 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	49	47	47	48	-	-	-	-
M1 - Eastern end of Jean Street (6 Jean Street)	49	41	39	39	40	-	-	-	-
A2 - Eastern end of Ivy Street	51	40	38	40	42	-	-	-	-
A3 - Wentworth Street (south)	53	39	39	40	42	-	-	-	-
A4 - Eastern end of Gregory Street	46	39	42	40	38	-	-	-	-
A5 - Western end of Blanche Street	50	42	44	44	43	-	-	-	-
A6 - 40 Bazentin Street	54	29	33	33	33	-	-	-	-
A11 - Begnell Park	50	43	45	45	43	-	-	-	-
A13 - Greenacre Bowling Club	55	40	39	42	44	-	-	-	-
A14 - Strathfield High School	-	-	-	-	-	-	-	-	-
A15 - St Anne's School	-	-	-	-	-	-	-	-	-

Table 26 Amenity Assessment - Night-time (9 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	South-Easterly		Westerly	North-Westerly	South-Westerly	South-Easterly
A1 - Eastern end of Jean Street	42	42	40	40	42	**45**	-	-	-	-	3
M1 - Eastern end of Jean Street (6 Jean Street)	42	34	31	31	33	37	-	-	-	-	-
A2 - Eastern end of Ivy Street	45	34	32	35	32	36	-	-	-	-	-
A3 - Wentworth Street (south)	38	34	35	37	32	32	-	-	-	-	-
A4 - Eastern end of Gregory Street	37	33	37	36	37	32	-	-	-	-	-
A5 - Western end of Blanche Street	43	37	39	39	38	35	-	-	-	-	-
A6 - 40 Bazentin Street	39	26	30	30	26	23	-	-	-	-	-
A11 - Begnell Park	50	36	39	39	38	35	-	-	-	-	-
A13 - Greenacre Bowling Club	55	35	33	36	32	35	-	-	-	-	-
A14 - Strathfield High School	-	-	-	-	-	-	-	-	-	-	-
A15 - St Anne's School	-	-	-	-	-	-	-	-	-	-	-

Bold Red Text - Noise level exceed the MCoA 2.17 criteria.

The predicted unmitigated $L_{A1(1minute)}$ noise levels for the proposed MOD 14 are presented in **Table 27**.

Table 27 Sleep Arousal Assessment - Night-time1

Location	Night - Sleep Arousal Criteria, $L_{A1(1minute)}$	Predicted Noise Levels, $L_{A1(1minite)}$ 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	South-Easterly		Westerly	North-Westerly	South-Westerly	South-Easterly
A1 - Eastern end of Jean Street	58	**62**	57	**61**	57	**62**	4	-	3	-	4
M1 - Eastern end of Jean Street (6 Jean Street)	58	56	49	51	50	58	-	-	-	-	-
A2 - Eastern end of Ivy Street	57	50	46	51	45	52	-	-	-	-	-
A3 - Wentworth Street (south)	52	47	49	52	43	42	-	-	-	-	-
A4 - Eastern end of Gregory Street	55	46	50	49	51	47	-	-	-	-	-
A5 - Western end of Blanche Street	53	51	**56**	**56**	**54**	48	-	3	3	1	-
A6 - 40 Bazentin Street	51	38	43	43	38	31	-	-	-	-	-

Bold Red Text - Noise level exceed the MCoA 2.17 criteria.

The information presented in **Table 21** to **Table 27** has been assessed against the MCoA 2.17 criteria, and also compared with the results of Modification Application No. 6 (MOD 6) as assessed in the AECOM report 'Early Contractor Involvement Detailed Design Adjustment'. MOD 6 represents the acoustic assessment of the ILC, prior to the proposed modification assessed by this study. The findings are summarised as follows:

- Daytime period:
  - The worst-case operations for 15-minute period during daytime is predicted to comply with the $L_{Aeq(15minute)}$ MCoA 2.17 intrusiveness criteria under neutral weather conditions. Under enhanced weather conditions the daytime $L_{Aeq(15minute)}$ MCoA 2.17 criteria was exceeded at location A5 (Western end of Blanche Street) by up to 2 dBA.
  - Compliance of the MCoA 2.17 daytime external amenity criteria was achieved under both neutral and enhanced weather conditions.
- Evening period:
  - The worst-case operations for 15-minute periods during evening is predicted to comply with the $L_{Aeq(15minute)}$ 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 worst-case operations for 15-minute period during night-time is predicted to exceed the $L_{Aeq(15minute)}$ MCoA 2.17 intrusiveness criteria by up to 2 dBA at location A1 (Eastern end of Jean Street) under neutral weather conditions. Under enhanced weather conditions the night-time $L_{Aeq(15minute)}$ MCoA 2.17 criteria was exceeded by up to 5 dBA, 2 dBA and 3 dBA at location A1 (Eastern end of Jean Street), location A3 (Wentworth Street south) and location A5 (Western end of Blanche Street), respectively.
  - The MCoA 2.17 night-time amenity criteria was exceeded by up to 3 dBA at location A1 (Eastern of Jean Street) under South-Easterly wind conditions.
  - The MCoA 2.17 night-time sleep disturbance criteria was exceeded by up to 4 dBA at location A1 (Eastern of Jean Street) under neutral and enhanced weather conditions and by up to 3 dBA at A5 (Western end of Blanche Street) under enhanced weather conditions.
- The MCoA 2.17 noise criteria for "East end of Jean Street" area is based on the ambient noise monitoring conducted at location M1 (6 Jean Street) in February 2005. The predicted intrusive $L_{Aeq(15minute)}$ and amenity $L_{Aeq(period)}$ noise levels at receiver M1 (6 Jean Street) complies with the MCoA 2.17 noise criteria under both neutral and enhanced weather conditions. Compliance was also achieved for night-time sleep disturbance $L_{A1(1minute)}$ noise levels at location M1 (6 Jean Street) under both neutral and enhanced weather conditions.
- Sensitive receptors at locations A1 (Eastern end of Jean Street) and A3 (Wentworth Street south) experience significant levels of night-time ambient noise as a result of existing road and/or rail activity on Roberts Road and the freight rail through line that is not associated with the Enfield ILC project. The worst case night-time impacts $L_{Aeq(15\ minute)}$ of the Enfield ILC project (including the proposed MOD 14 modifications) predicted at A1 and A3 are lower than the baseline ambient noise levels measured at the corresponding monitoring locations in 2005 (Renzo Tonin, 2005). Therefore it is unlikely that the predicted noise contribution of the Enfield ILC would be perceived as intrusive at these locations, regardless of any criteria exceedances.

8.3.2.3 Sleep Disturbance Discussion

Based on the acoustic study from EA stage of the project Preferred Project Report (Renzo Tonin and Associates, April 2006), the "Background plus 15 dB(A)" criteria was exceeded at some residential assessment locations under both neutral and certain enhanced weather conditions. The likelihood of the sleep disturbance noise levels due to the operation of the Enfield ILC was minimised by a number of mitigating factors:

1. The night-time Rating Background Level (RBL) noise level is used for sleep disturbance $L_{A1(1minute)}$ assessment. The RBL is most influenced by the quietest (lowest 10^{th} percentile background) period during the night-time, typically 2:00 am to 4:00 am. The frequency of hourly truck movements at the Enfield ILC (and resulting the container movement and "Clangs") during this period is very low when considering the hours commencing 3:00 am and 4:00 am (refer to the Road Traffic Assessment by Transport & Urban Planning Pty Ltd, dated November 2016). However, the period when there are significant numbers of container "Clangs" is the INP night-time 'shoulder' period (i.e. 6:00 am to 7:00 am) at which time there is a corresponding increase in background noise levels (resulting from traffic increases and industry commencement in the surrounding Urban area that occurs typically after 5 am) – in the order of 5 to 10 dBA. This has a corresponding effect of diminishing the relative impact of container "Clang" events by 5 to 10 dBA.
2. An analysis of existing night-time maximum noise levels at all residential receivers A1 to A6 revealed that existing maximum noise levels exceeded the predicted maximum noise levels due to ILC operation and the 'Background plus 15 dB(A) criterion for each location. The predicted sleep disturbance noise levels $L_{A1(1minute)}$ and the existing maximum noise levels are summarized in **Table 28**.

Table 28 Predicted Sleep Disturbance Noise Levels and Existing Maximum Noise Levels

Location	Night - Sleep Arousal Criteria, $L_{A1(1minute)}$	Predicted Noise Levels, $L_{A1(1minite)}$ dBA					Existing Average LAmax [1]	
		Neutral Weather	Enhanced Weather (Wind at 2.5 m/s)				Min	Max
			Westerly	North-Westerly	South-Westerly	South-Easterly		
A1 - Eastern end of Jean Street	58	62	57	61	57	62	67	74
M1 - Eastern end of Jean Street (6 Jean Street)	58	56	49	51	50	58	67	74
A2 - Eastern end of Ivy Street	57	50	46	51	45	52	72	83
A3 - Wentworth Street (south)	52	47	49	52	43	42	68	81
A4 - Eastern end of Gregory Street	55	46	50	49	51	47	67	72
A5 - Western end of Blanche Street	53	51	56	56	54	48	67	72
A6 - 40 Bazentin Street	51	38	43	43	38	31	67	77

Notes 1: The existing average LAmax noise levels presented are taken from the Noise Technical Memorandum (Renzo Tonin 2006) which accompanied the Preferred Project Report submitted prior to the original approval of the ILC project.

The summary from **Table 28** shows the predicted $L_{A1(1minute)}$ noise levels consistently below the existing L_{Amax} noise levels. Therefore, it is considered that the potential for sleep disturbance is minimal, irrespective of the prevailing background noise levels.

8.3.3 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.

8.3.4 Net Impact of Proposed Modification

Interrogation of the noise prediction model indicates that the main contributors to the overall noise levels at the assessment locations vary according to receiver location. The main noise contributors at each of the assessment locations have been identified in **Table 29**.

Table 29 Key Noise Contributors

Location	Main noise contributor to overall predicted noise level at receiver			Worst Case Weather Conditions
	1	2	3	
A1 - Eastern end of Jean Street	Reach Stacker	Forklift	Truck Movements	Night-time South-Easterly Wind
M1 - 6 Jean Street	Reach Stacker	Forklift	Truck Movements	Daytime South-Easterly Wind
A2 - Eastern end of Ivy Street	Truck Movements	Reach Stacker	Forklift	Daytime South-Easterly Wind
A3 - Wentworth Street (south)	Truck Movements	Reach Stacker	Moving Train	Night-time North-Westerly Wind
A4 - Eastern end of Gregory Street	Reach Stacker	Forklift	Truck Movements	Daytime South-Westerly Wind
A5 - Western end of Blanche Street	Truck Movements	Reach Stacker	Idling trucks	Night-time North-Westerly Wind
A6 - 40 Bazentin Street	Forklift	Truck Movements	Reach Stacker	Daytime North-Westerly Wind
A11 - Begnell Park	Forklift	Truck Movements	Reach Stacker	Daytime Westerly Wind
A13 - Greenacre Bowling Club	Reach Stacker	Truck Movements	Forklift	Daytime North-Westerly Wind
A14 - Strathfield High School	Reach Stacker	Truck Movements	Forklift	Daytime South-Westerly Wind
A15 - St Anne's School	Truck Movements	Reach Stacker	Forklift	Daytime South-Westerly Wind

Note: Shaded rows indicate no identified criteria exceedances.

The information presented in **Table 29** indicates that the main noise contributor to the proposed MOD 14 operational noise levels at adjacent assessment locations is from the movement of reach stackers, forklift and trucks on site. However, MOD 14 does not propose to increase the number of reach stackers or forklifts used on the site, nor does it significantly affect their utilisation or the locations in which they operate. Noting that MOD 14 proposes a change in truck operations to increase flexibility of the vacant land, the incremental change in noise level has been examined and the net MOD 14 impacts compare with MOD 12 operations have been summarised as follows.

- The $L_{Aeq(15minute)}$ intrusive noise levels are expected to increase by the minor amounts of up to 0.8 dBA during daytime and evening periods and up to 0.4 dBA during night-time periods.
- The $L_{Aeq(period)}$ amenity noise levels are expected to increase by the minor amounts of up to 0.6 dBA during the daytime and evening periods and up to 0.9 dBA night-time periods, respectively.

These net increases are minor and would not be expected to result in any perceived change in noise level from the ILC at the receivers surrounding the site as a result of MOD 14.

8.3.5 Recommended Noise Mitigation

Review of the predicted noise impacts from the proposed MOD 14 operation in the Enfield ILC site indicates that receivers A1, A3 and A5 may be subjected to worst-case noise levels which have minor to marginal exceedance of the applicable design criteria (i.e. exceedances in a range of 1 to 5 dB). With reference to **Section 8.3.4**, considering the dominant noise sources from the site, the following additional mitigation measures should be considered where practicable:

- It is recommended that reach stackers be operated in a "Low Horse Power" or "Night Mode" at night to reduce the overall noise emissions. It is also recommended to fit all site-based mobile plant with non-tonal variable reverse alarms to reduce the site wide noise emissions.

- Following the commencement of MOD 14 operations, it is recommended that attended noise monitoring be conducted to further quantify the predicted noise emissions from the site. Monitoring will be used to validate the noise model and account for any variances in actual operating conditions compared to the input assumptions used in this assessment. In particular, the requirement for monitoring of empty container storage operations within 30 days of commencement as per Condition 3.3 of the Project Approval could be applied to the Precinct A area. This would ensure that potential impacts on receivers around Roberts Road and Jean St are assessed and addressed in a timely manner.
- Following noise monitoring, if exceedances are identified, the use of noise reducing kits should be investigated. Noise reducing kits may include high performance mufflers and acoustic louvers, if available and feasible, for noise intensive mobile plant used permanently on site.

  As detailed in **Table 29**, the reach stackers and forklifts are typically the most dominant noise source on site. If required, the noise reducing kits may achieve a noise reduction of 4 dBA on all reach stackers forklifts and hence the potential predicted exceedances may not eventuate.
- All plant and equipment should be inspected regularly and kept in good running order, regularly maintained and free of defective components which may affect noise emissions.

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 $L_{A1(1minute)}$ noise events during the night-time period; and

8.4 Traffic noise impact assessment

8.4.1 Road Traffic Movements

Road Traffic and Transport Assessment (dated October 2005) was prepared as part of the original Environmental Assessment (EA) (Chapter 7). Recent road traffic count and assessment have also been conducted by Transport and Urban Planning Pty Ltd in November 2016. The original assessment assumed the peak traffic movements during the daytime period. For the purposes of this modification, a new worst case traffic movement scenario has been developed to assess the impact of MOD 14 operation. The predicted 2016 weekday hourly truck movements generated by ILC from EA (2005) and proposed MOD 14 are presented in **Table 30**.

Table 30 Weekday Hourly Traffic Movement

Hour Commencing	Predicted 2016 ILC Truck Movement (2005)[1]	Proposed ILC MOD 14 Truck Movement[2]
0:00	7	7
1:00	11	11
2:00	11	12
3:00	0	4
4:00	0	6
5:00	18	22
6:00	57	62
7:00	88	110
8:00	86	116
9:00	78	105
10:00	84	104
11:00	81	88
12:00	81	88
13:00	97	110
14:00	103	124
15:00	92	108
16:00	69	89
17:00	53	65
18:00	34	47
19:00	33	38
20:00	28	37
21:00	21	31
22:00	18	26
23:00	9	11

Note 1: Road Traffic and Transport Assessment (dated October 2005) - EA (Chapter 7).
Note 2: Proposed truck movement figure was provided by AsonGroup Pty Ltd in 2017.

The Preferred Project Report (dated June 2006) prepared by Sinclair Knight Merz has recommended that approximately 75% of the truck movement would occur through the primary truck route via Wentworth Street and Roberts Road; and 25% of the truck movement would occur through the secondary truck route via Cosgrove Road and Liverpool Road (Hume Highway).

The results from the traffic counts conducted in 2005 and the estimated traffic movements with and without ILC operation in 2016 (as predicted in the original EA, 2005) are summarised in **Table 31**. **Table 31** also estimates the possible traffic movements associated with and without MOD 14 operation (i.e. a potential worst case scenario).

Table 31 Traffic Movements with and without ILC Operation

Road	Assessment Period	2005 without ILC[1]		Approved 2016 with ILC[1]		2016 without ILC		2017 with ILC (MOD 14)	
		Measured Movement	% Heavy Vehicles	Estimated Movement	% Heavy Vehicles	Estimated Movement	% Heavy Vehicles	Estimated Movement	% Heavy Vehicles
Liverpool Road (Hume Highway)	Daytime (15hour)[2]	39125	6%	58206	6%	57819	6%	58793	6%
	Night-time (9hour)[2]	6300	6%	9645	7%	9553	7%	10280	7%
Roberts Road	Daytime (15hour)[2]	55252	11%	54928	11%	53767	10%	54813	11%
	Night-time (9hour)[2]	10600	13%	10408	12%	10133	11%	10676	12%
Cosgrove Road	Daytime (15hour)[2]	-[3]	-[3]	88`89	12%	8502	10%	8918	13%
	Night-time (9hour)[2]	-[3]	-[3]	1684	12%	1592	11%	2055	10%

Note 1: Based on "Table 11-11 Traffic Movements per Year With and Without the ILC" from EA (2005).

Note 2: Daytime 7:00 am to 10:00 pm, Night-time 10:00 pm to 7:00 am

Note 3: No baseline traffic data were provided for Cosgrove Road from EA (2005).

8.4.2 Predicted Road Traffic Noise

Traffic noise levels at the potentially noise affected residential and non-residential receivers have been predicted in accordance with the RNP's accepted CoRTN model, as implemented by SoundPLAN. **Table 32** presents the existing 2016 traffic noise levels without the ILC operation, the "allowable traffic noise levels" based an increase of 2 dB allowance, the predicted overall traffic noise levels with the proposed MOD 14 operation and the noise increase due to the additional traffic generated by the proposed MOD 14 operation at each assessment location.

Table 32 Predicted Traffic Noise Levels

ID	Location	Period	Existing Traffic Noise Levels (2017 without ILC)	Allowable Traffic Noise Level	Approved Predicted Traffic Noise Levels (2016 with ILC)	Predicted Noise Level (2016 with ILC MOD 14 Operation)	Noise Increase due to ILC MOD 14 Operation	Difference between the Approved Predicted Noise Levels and the MOD 14 Predicted Noise Levels
A4	Eastern end of Gregory Street	Daytime $L_{Aeq(15hour)}$	59	60	-[1]	59	0.1	NA
		Night-time $L_{Aeq(9hour)}$	55	57	-[1]	56	0.3	NA
A7	554 Liverpool Road	Daytime $L_{Aeq(15hour)}$	73	75	72	72	0.1	0.1
		Night-time $L_{Aeq(9hour)}$	69	71	69	69	0.3	0.3
A8	1 Robinson Street	Daytime $L_{Aeq(15hour)}$	71	73	71	71	0.1	0.0
		Night-time $L_{Aeq(9hour)}$	69	71	69 [2]	69	0.3	0.2
A9	20 Rebecca Road	Daytime $L_{Aeq(15hour)}$	72	74	72	72	0.3	0.1
		Night-time $L_{Aeq(9hour)}$	69	70	69	69	0.2	0.1
A10	118 Roberts Road	Daytime $L_{Aeq(15hour)}$	70	72	70	70	0.2	0.0
		Night-time $L_{Aeq(9hour)}$	67	69	67	67	0.3	0.1
A13	Greenacre Bowling Club, Roberts Road	Daytime $L_{Aeq(15hour)}$	76	78	76	76	0.2	0.0

Notes: 1. No traffic noise predictions provided for Cosgrove Road from EA (2005).
2. The EA presented a noise level of 66 dBA, assumed to be a typographical error as it is below the existing no ILC noise level. A calculated noise level of 69 dBA is shown in the table.

The noise predictions presented in **Table 32** shows that the traffic noise levels are likely to be increased in the range of 0.1 dB to 0.3 dB at assessment locations due to the proposed ILC MOD 14 operation. Such minor traffic noise increases are much lower than the 2 dB allowance in accordance with Section 3.4 of the RNP. Therefore, traffic noise generated by the proposed MOD 14 operation complies with the NSW RNP.

The noise predictions presented in **Table 32** also shows that the traffic noise levels from the proposed MOD 14 operation will remain the same or below the approved traffic noise levels presented in 2005 EA for the daytime period, and likely to be increased by up to 0.3 dB at assessment locations during night-time period.

9 VIBRATION

Ground vibration will be generated from both construction and operational activities from the Enfield ILC site. However, a review of the construction and operational equipment lists (**Table 12** and **Table 10**) has shown that no significant ground vibration generate equipment will be used for the proposed MOD 14 construction or operation activities. In addition, ground vibration is potentially significant within approximately 25 metres from the activities. The nearest potential vibration affected residential receiver is located approximately 50 metres away from the Enfield ILC site. It is unlikely that the proposed MOD 14 construction and operational activities will cause significant ground vibrations at the nearest residential properties and therefore will not be further discussed in this assessment.

10 CONCLUSION

SLR has undertaken a noise impact assessment for the proposed modification (MOD 14) 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).

For construction activities associated with MOD 14 during standard working hours, the predicted worst-case construction noise levels are likely to exceed the CNML by up to 30 dBA at assessment locations and the HNAL are likely to be exceeded by up to 6 dBA only at location A5. The worst-case construction noise levels are predicted as up to 81 dBA at location A5 which is the same as predicted noise levels in the EA (2005). No further construction noise impact is expected at the assessable locations compare with EA.

For MOD 14 operational activities during daytime period, the predicted $L_{Aeq(15minute)}$ intrusive noise levels comply with the Project Approval Condition 2.17 at all assessment locations under neutral weather conditions. Under enhanced weather conditions, minor noise exceedance of up to 2 dBA were found at assessment location A5. Compliance of the MCoA 2.17 daytime external amenity $L_{Aeq(period)}$ criteria was achieved under both neutral and enhanced weather conditions.

During evening period, the predicted operational intrusive noise levels $L_{Aeq(15minute)}$ and amenity noise levels $L_{Aeq(period)}$ comply with the Project Approval Condition 2.17 at all assessment locations under both neutral and enhanced weather conditions.

During night-time period, the predicted operational intrusive noise levels $L_{Aeq(15minute)}$ are likely to exceed the MCoA 2.17 noise criteria by up to 2 dBA at assessment location A1 under neutral weather conditions, and up to 5 dBA, 2 dBA and 3 dBA at assessment location A1, A3 and A5 under enhanced weather conditions. Minor amenity $L_{Aeq(period)}$ exceedance of up to 3 dBA were found at assessment location A1 under enhanced weather conditions. Minor night-time sleep disturbance $L_{A1(1minute)}$ noise exceedance of up to 4 dBA were found at location A1 under neutral weather conditions. Under enhanced weather conditions, minor night-time sleep disturbance $L_{A1(1minute)}$ noise exceedance of up to 4 dBA and 3 dBA were found at location A1 and A5.

MOD 14 proposes a change in truck-to-truck freight movements for proposed warehouses with no direct interface with rail sidings. The incremental change in noise level has been examined compared to MOD 12 operations and the net MOD 14 impacts summarised as follows.

- The $L_{Aeq(15minute)}$ intrusive noise levels are expected to increase by the minor amount of up to 0.8 dBA during daytime and evening periods and up to 0.4 dBA during night-time period.
- The $L_{Aeq(period)}$ amenity noise levels are expected to increase by the minor amount of up to 0.6 dBA during the daytime and evening periods and up to 0.9 dBA during night-time period.

The predicted exceedances of intrusiveness criteria are unlikely to result in significant impacts on residents due to the following considerations:

i. The locations (A1 and A3) at which exceedances are predicted are close to existing arterial roads and/or freight rail sources that are not part of the Enfield ILC site than they are to the ILC itself. Baseline ambient noise levels measured in 2005 are higher than the worst-case predicted contributions of the ILC at these locations.

ii. The intrusiveness criteria which apply to location A1 under MCoA 2.17 may be overly conservative because they are derived from rating background levels measured at a site (M1, 6 Jean Street) which is 75m further away from the major Roberts Road noise source than the assessment location used for modelling predictions.

iii. The predicted worst-case intrusive noise levels from MOD 14 operation at location A5 is lower than the noise predictions from the original EA (2005) under weather enhanced conditions. Thus, there will be no significant noise impact on location A5 due to the proposed MOD 14 operation.

Noise management measures have been recommended and described in **Section 8.3.5** of this report to minimise predicted noise impacts. These are considered to be the extent of reasonable and feasible options at this time. It has been recommended to undertake operator-attended noise measurements to validate the noise predictions following commencement of site operation. With implementation of the recommended mitigation measures, it is unlikely that there would be any exceedance of the noise limits identified in the existing conditions of approval.

SLR has also undertaken a traffic noise impact assessment for the proposed modification (MOD 14) of the existing operation at Enfield ILC. The assessment has considered predicted traffic noise of the proposed operations against the noise criteria in accordance with NSW RNP. The existing 2016 traffic noise levels without the ILC operation exceed the NSW RNP daytime or night-time noise criteria at the assessment locations. The 2 dB allowance has been applied to the existing 2016 traffic noise level as the “Allowable Traffic Noise Level”. The traffic noise increases are predicted in the range of 0.1 dB to 0.3 dB at the assessment locations due to the additional traffic generated by the proposed MOD 14 operation. Therefore, the traffic noise from the proposed Enfield ILC MOD 14 operation complies with the NSW RNP. The predicted MOD 14 traffic noise levels at the assessment locations will remain the same or below the approved traffic noise levels presented in the original EA (2005) during the daytime period and likely to be increased by up to 0.2 dB during the night-time period. Given a 2 dBA change in noise level is ‘just’ noticeable by most people, a 0.2 dB change will not be noticeable.