Crawfords Freightliners Pty Ltd

Crawfords Freightlines Ammonium Nitrate Storage and Distribution Facility

Section 96 Modification to SSD 5119

Statement of Environmental Effects

0359011_Final

October 2016

The business of sustainability

Document Control: 0359011 RP1 - SOEE					
				ERM Approval to Issue	
Version	Revision	Author	Reviewed by	Name	Date
Draft	D01	Amanda Antcliff	Murray Curtis	Murray Curtis	2 September 2016
Final	F01	Amanda Antcliff	Murray Curtis	Murray Curtis	12 September 2016
Final	F02	Amanda Antcliff	Murray Curtis	Murray Curtis	13 October 2016

Crawfords Freightlines Ammonium Nitrate Storage and Distribution Facility Section 96 Modification to SSD 5119

Statement of Environmental Effects -

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Signed:	
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Environmental Resources Management Australia Pty Ltd Quality System

Crawfords Freightlines Pty Ltd

October 2016

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1 INTRODUCTION

1.1 OVERVIEW

Crawfords Freightlines Pty Ltd (Crawfords) operate an Ammonium Nitrate Storage and Distribution Facility on Old Maitland Road Sandgate, NSW (Lot 12 DP 625053) (the 'Site'). A locality map is provided in *Figure 1.* On 13 June 2013, Crawfords was granted development consent, State Significant Development 5119 (SSD-5119) by the Executive Director Development Assessment Systems and Approval, Department of Planning and Infrastructure, under delegation from the Minister of Planning and Infrastructure, for the storage and distribution of up to 13,500 tonnes of Ammonium Nitrate (AN) at the Site.

SSD-5119 provided for:

- the receival, handling, storage and transportation of to 13,500 tonnes of AN;
- maximum of one train (ingress and egress, ie two movements) per day for the transportation of goods to Port Botany;
- building modification works;
- site fire system and safety upgrades; and
- site regrading and sealing, including installation of water management devices.

Materials generally stored at the facility include AN (up to 13,500 tonnes) and general freight, including aluminium and timber.

1.2 PURPOSE OF SOEE

This Statement of Environmental Effects (SoEE) has been prepared to support an application for the proposed modification of SSD-5119 under Section 96(1A) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The modification is being sought to facilitate:

- increased approved train movements at the Site from one train per day (ingress and egress, currently approved) to two trains per days (ingress and egress, ie a total of 4 train movements per day) to meet increased operational demands;
- increased hours of operation to facilitate the proposed increased train movements and general site works; and

- utilisation of updated locomotives by removing reference to the number and weight of train carriages, as this operational arrangement is no longer valid and does not reflect modern rail wagons.

No other operational changes to the development are proposed.

A detailed modification description is provided in *Chapter 3.*

1.3 PROPONENT

The Proponent for this Section 96(1A) modification application is:

Crawfords Freightlines Pty Ltd

Address: 158 Old Maitland Road, Sandgate NSW (Lot 12 DP 625053)

Contact: Paul McGrath – Compliance Manager: 0429 873 709

Crawfords is a privately owned transportation company servicing the mining, agricultural and manufacturing industries, specialising in Dangerous Goods (including Class 1) transportation. Crawfords is one of the region's leading suppliers of transport solutions and is one of three intermodal hubs based in Newcastle offering local, intrastate and interstate road transport. Crawfords is also a company operated rail service with access to Sydney Ports.

1.4 CONTENT OF S96 MODIFICATION APPLICATION

An application for modification of development consent under Section 96 of the EP&A Act must contain the information stipulated in Clause 115 of the Environmental Planning and Assessment Regulation 2000. The required information, and where it has been addressed in this SoEE, is detailed in *Table 1.1.*

Table 1.1 Clause 115 Requirements for Section 96 Modification Applications

Requirement	Where addressed in SoEE
The name and address of the applicant.	Section 1.4
A description of the development to be carried out under the consent (as previously modified).	Chapters 2 and 3
The address, and formal particulars of title, of the land on which the development is to be carried out.	Section 1.1
A description of the proposed modification to the development consent.	Chapter 3
A statement that indicates either:	Section 4.2
(i) that the modification is merely intended to correct a minor error, misdescription or miscalculation, or	
(ii) that the modification is intended to have some other effect, as specified in the statement.	

Requirement	Where addressed in SoEE
A description of the expected impacts of the modification.	Chapter 5
An undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved.	Chapter 6
If the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner).	Landowners consent obtained and submitted with application.
A statement as to whether the application is being made to the Court (under section 96) or to the consent authority (under section 96AA).	The application is not being made to the Court (under Section 96) or to the consent authority (under Section 96AA).

Legend

Site Boundary

Cadastre

N

0 100 200m

Source:
- nearmap imagery date May 2015
- DLPI, DCDB 2015

Client:	Crawfords Freightlines Pty Ltd	
Drawing No:	0359011s_S96_G001_R0.mxd	
Date:	25/08/2016	Drawing Size: A4
Drawn By:	GC	Reviewed By: RL

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 1 - Locality Map

Crawfords Freightlines - Section 96 Modification to SSD 5119
Old Maitland Road, Sandgate, NSW

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

2 APPROVED OPERATIONS

2.1 PLANNING APPROVAL FRAMEWORK FOR APPROVED OPERATIONS SSD-5119

2.1.1 Environmental Planning and Assessment Act 1979

The development approved under SSD-5119 was classified as 'State Significant Development' (SSD) by the then Minister for Planning and Infrastructure under Part 4, Division 4.1 of the EP&A Act. Clause 8(1b) of State Environmental Planning Policy (State and Regional Development) 2011 (SEPP S&RD) declares development to be SSD if the development is specified in Schedule 1 or 2. Clause 10(3) of Schedule 1 states:

*"Development for the purpose of the manufacture, storage or use of dangerous goods in such quantities that constitute the development as a major hazard facility within the meaning of Chapter 6B of the Occupational Health and Safety Regulation 2001"(*OH&S Regulations). Ammonium Nitrate is classified as a Class 5 dangerous good. (OH&S Regulations referred to above has been repealed and is replaced with the Work Health and Safety Act 2011. Notwithstanding this, the OH&S Regulations are still applicable until those provisions in the State and Regional Development SEPP are amended).

The definitions listed in Chapter 6B of the OH&S Regulations states that a Major Hazard Facility (MHF) is "*a facility at which Schedule 8 materials are present or likely to be present in a quantity that exceeds their threshold quantity.*" Schedule 8 lists Ammonium Nitrate with a threshold quantity of 2500 t.

The Crawfords development approved under SSD-5119 was classified as a MHF as it stores and distributes up to 13,500t of Ammonia Nitrate.

2.2 OTHER APPROVALS

2.2.1 Protection of the Environment Operations Act 1997 - Environment Protection Licence

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes the NSW environmental regulatory framework and includes a licensing requirement for certain activities. Crawfords is defined as 'general chemical storage' which has the capacity to store more than 2,000t of chemicals. It is therefore classified under Schedule 1 of the POEO Act as a "Scheduled Activity" requiring an Environment Protection Licence (EPL).

The development currently operates under EPL 20295 which was issued on 18 July 2013.

2.2.2 Dangerous Goods Licence

Crawfords operate in accordance with Dangerous Goods, Licence No. XTRN 100011 issued by WorkCover NSW under the *Explosives Act 2003* and the *Explosive Regulation 2013*. The proposed modification will not impact or require any changes to this existing licencing.

3 PROPOSED MODIFICATION

3.1 MODIFICATION OVERVIEW

Crawfords is seeking a Section 96 (1A) amendment to development consent SSD-5119 to increase the number of train movements on the existing siding at the Site to two trains per day (ie four movements) to meet increased rail transportation demand. This would also require an extension to the approved operating hours of the facility and utilisation of updated locomotives.

The prerequisite to a Modification Application under section 96(1A) is that the consent authority is satisfied that the proposed development (including this proposed modification and any previous modifications) is 'substantially the same development' as the originally approved development. SSD-5119 has not been previously modified. This proposed modification sought to SSD-5119 will not result in any substantial changes nor radical transformation to the development as originally approved.

3.2 CHANGES SOUGHT TO SSD 5119

The specific changes sought to SSD-5119 are shown below in the following subsections of SSD-5119:

1. Definitions

Addition of the following definitions:

SoEE — *The Statement of Environmental Effects titled 'Crawfords Freightlines Ammonium Nitrate Storage and Distribution Facility Section 96 Modification to SSD-5119' and accompanying appendices, prepared by Environmental Resources Management Australia Pty Ltd and dated September 2016.*

2. Schedule 3, Condition 2 (additions in BOLD)

The Applicant shall carry out the development generally in accordance with the:

a) EIS;
b) RTS;
c) SoEE;
d) Management and Mitigation Measures (see Appendix A); and
e) Site Plans (Appendix B and Drawings in the EIS);

3. Schedule 3, Condition 25 (additions in BOLD, deletions in ~~strikethrough~~)

The Applicant shall comply with the operating hours in Table 2 for the site, unless otherwise agreed in writing by the Director-General.

Table 2: Operating Hours

Activity	*Day*	*Hours*
Construction	*Monday – Friday*	*7.00am – 6.00pm*
	Saturdays	*8.00am – 1.00pm*
	Sundays and Public Holidays	*Nil*
Operations	*Monday - Sunday*	~~*6.00am to 10.00pm*~~ ***4:00am to 12:00 midnight***
	Public Holidays	*Nil*

4. Schedule 3 Condition 35 (*additions in* ***BOLD,*** *deletions in* ~~*strikethrough*~~***)***

The Applicant shall ensure that ~~*1*~~ ***2*** *train****s*** *(*~~*2*~~ ***4*** *movements) in total (*~~*with a maximum of 40 carriages at 76 tonnes per carriage*~~*) is permitted to ingress and egress from the site in any 24 hour period.*

Note: The removal of the reference to 40 carriages at 76 tonnes is proposed as this operating arrangement is no longer valid as it was based on 3 slot wagons, and is not reflective of the availability of modern 2 slot rail wagons. Although the number of wagons utilised by the introduction of 2 slot wagons will increase, the overall payload of each train will not increase. General freight (non-dangerous goods) will be transported on the trains, including aluminium and timber. The proposed modification is not related to the transport of AN and as such the risk profile of the facility will not change.

3.3 COMPARISON OF THE APPROVED OPERATIONS TO THIS MODIFICATION

Crawfords is seeking to increase the number of train movements on the existing siding at the Site to two trains per day (ie 4 movements) to meet increased transportation demand. This would also require an extension to the approved operating hours of the facility to service those train movements.

The difference between the proposed operation and the existing operations is that the "morning" train that currently arrives at the Site between 6:00am and 7:00am is now scheduled to arrive between 4:00am and 5:00am. This triggers a need for a noise assessment as the previous assessment occurred in the "morning shoulder" and the proposed train arrival is now to occur during the more sensitive night time period, which typically has a lower, stricter noise criteria. The existing "afternoon" train service is unchanged in terms of operating times, other than the utilisation of updated locomotives than previously assessed. Activities during the proposed extended hours from 10:00pm to 12:00 midnight would be on an as needed basis (ie on occasion) and would consist of material and vehicle movements associated with finalising the days' activities prior to site shutdown. All other operations on-site including AN storage remain unchanged.

Table 3.1 presents a comparison of the approved operations to the proposed modifications.

Table 3.1 Project Summary - Approved Operations versus Proposed Modification

Project Aspect	Approved Operations	Proposed Modification
Project Summary	• The project involves the storage and distribution of AN from existing warehouses at the Sandgate facility, minor building modifications and construction of stormwater management devices.	• No change
Operating Capacity	• 13,500 tonnes of bagged AN, incorporating: • Shed A - 4,500t (indoor only); • Shed B – 4,500t (3,500t indoor and 1,000t outdoor); and • Shed C – 4,500t (3,500t indoor and 1,000t outdoor). General storage in Shed D	• No Change
Land	• Lot 12 DP 625053, being 8.77ha	• No Change
Hours of Operation	• Monday to Sunday 6:00am to 10:00pm,, no work on public holidays	• Modify approved operating hours to: Monday to Sunday 4:00am *to* 12:00 midnight, no operations on public holidays
Transportation	• Trucks utilising Old Maitland Road / New England Highway • One train (2 movements) per day	• No change to truck movements • Two trains (4 movements) per day and utilisation of updated locomotives – there will be no change to the overall payload of the trains.
Building	• Utilise existing storage sheds, undertake building upgrades and install fire safety systems	• No Change

3.4 JUSTIFICATION AND ALTERNATIVES CONSIDERED

The do nothing option would not address the current and future increasing demand for goods being transport to Sydney port areas via the existing rail network. This would result in increasing pressures on truck movements to these areas and the associated risks with heavy vehicles transiting public and inner city roads to access port areas.

The proposed modification will provide for greater utilisation of the existing rail transport facilities, thereby providing a more efficient means of transport of goods between the Site and Sydney port areas. This in turn limits the number of heavy vehicles used on public roads, thus reducing risks associated with heavy vehicles transiting public and inner city roads.

4 STATUTORY PLANNING FRAMEWORK

4.1 EXISTING DEVELOPMENT CONSENT

On 13 June 2013, the Secretary of the DP&E as delegate of the Minister for Planning granted SSD-5119 to Crawfords Ammonium Nitrate Storage and Distribution Facility under section 89E of the EP&A Act. Supporting documentation for SSD-5119 is the Crawfords Environmental Impact Statement prepared by ERM (2012a).

4.2 SECTION 96 MODIFICATION TO CONSENT

4.2.1 Overview

Section 96 of the EP&A Act allows for a Development Consent to be modified by the consent authority to which the original application was made, in this instance the Minister for Planning.

Section 96(1A) of the EP&A Act states:

A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

(a) it is satisfied that the proposed modification is of minimal environmental impact, and

(b) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted and before that consent as originally granted was modified (if at all)

Under Section 96(1A), the consent authority must be satisfied that what is proposed is no more than to "modify" (i.e. alter without radical transformation) the proposed development (including this modification and any previous modifications) such that it remains '*substantially the same development*' as the originally approved development.

SSD-5119 has not been previously modified. If this current modification is approved, SSD-5119 will have the following additional features as compared to the originally approved development would be limited to:

- Two additional train movements at the site within a 24 hour period;
- Additional operating hours to facilitate the additional rail movements, being an additional two (2) hours in the period 4:00am – 6:00am and an additional two (2) hours in the period 10:00pm – 12:00 midnight; and

- The removal of the reference to 40 carriages at 76 tonnes is also proposed as this operating arrangement is no longer valid as it was based on 3 slot wagons, and is not reflective of the availability of modern 2 slot rail wagons. Although the number of wagons utilised by the introduction of 2 slot wagons will increase, the overall payload of each train will not increase.

4.2.2 Minimal Environmental Impact

The proposed modification constitutes a minor change to the existing Ammonium Nitrate storage and distribution facility. The key environmental issue associated with the proposed modification is potential noise impacts due to increase train movements, increased operating hours and changes to the train wagons permitted to be utilised on site.

An operational noise assessment has been undertaken as part of the impact assessment for this proposed modification, a copy of which is attached in *Annex A*. The results indicate that calculated noise levels are at or below the relevant Project-Specific Noise Levels (PSNL) at all locations, for all operating periods during both calm and adverse meteorological conditions and hence, noise impacts are not anticipated. A comparison of estimated maximum noise levels to the sleep disturbance criterion indicated that maximum noise level events are unlikely to exceed the criterion at all residential receptors. Sleep disturbance (and awakenings) impacts potentially associated with maximum noise level events during the night time period were assessed as unlikely to occur.

The proposed modification is therefore considered to result in minimal environmental impact and is being sought under the provisions of Section 96 (1A) of the EP&A Act.

4.2.3 Substantially the Same Development

The proposed changes to the increased rail movement and operating hours in comparison to the elements approved under SSD- 5119 will not result in any substantial changes or radical transformation to the development as originally approved. Environmental assessment of this modification as detailed in *Chapter 5* has shown that environmental impacts are minimal. This modification will not result in any change to the core elements of SSD-5119 such as:

- the size of the existing operational footprint;
- the type of activities occurring at site;
- the type and volumes of materials stored and distributed at the Site; and
- the payload of each rail movement.

4.3 *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)*

The EPBC Act requires approval of the Commonwealth Minister for the Environment for actions that may have a significant impact on matters of national environmental significance (MNES). The EPBC Act also requires Commonwealth approval for certain actions on Commonwealth land.

The EIS (ERM, 2012a) assessed whether the operations of the Site as an AN storage and distribution facility would likely have a significant impact on MNES. The assessment concluded that operations, with the implementation and management measures such as stormwater management, were not expected to significantly impact features of ecological significance. Site upgrades and stormwater management devices have been installed across the site in accordance with the requirements of SSD-5119.

The proposed modification will not have any impact on MNES under the EPBC Act.

4.4 *OTHER RELEVANT LEGISLATIVE PROVISIONS*

4.4.1 *Protection of the Environment Operations Act (POEO Act 1997)*

The development currently operates under EPL 20295 which was issued on 18 July 2013. EPL 20295 does not stipulate hours of operations for operational activities.

A Noise Assessment has been completed to assess noise impacts as a result of the proposed modification. The results of the assessment are summarised in *Chapter 5,* with the full report provided in *Annex A.*

The proposed modification will not result in any required variations to EPL 20295.

4.4.2 *Threatened Species Conservation Act 1995*

Projects determined by a statutory authority of the NSW Government are required to be assessed in accordance with the EP&A Act as amended by the *Threatened Species Conservation Act 1995* (TSC Act). The TSC Act lists threatened species, populations and ecological communities under Schedules 1 and 2 of the Act, that are priorities for conservation within NSW. The potential impacts on threatened species have been considered in accordance with the requirements of the TSC Act and the EP&A Act.

The Site is located on highly disturbed land that has previously been developed for a storage facility. The proposed amendments will not increase the approved footprint of the Site and will not provide for any ground disturbing activities being undertaken.

4.4.3 Explosives Act 2003 - Dangerous Goods Licence

Crawfords operate in accordance with Dangerous Goods, Licence No. XTRN 100011 issued by WorkCover NSW under the *Explosives Act 2003* and the *Explosive Regulation 2013*. The proposed modification will not impact or require any changes to this existing licencing.

4.5 ENVIRONMENTAL PLANNING INSTRUMENTS

4.5.1 State Environmental Planning Policy (State and Regional Development) 2011)

The existing development approved under SSD-5119 was classified as 'State Significant Development' (SSD) under Part 4, Division 4.1 of the EP&A Act. Clause 8(1b) of State Environmental Planning Policy (State and Regional Development) 2011 (SEPP S&RD) declares development to be SSD if the development is specified in Schedule 1 or 2. As detailed in *Section 2.1*, the existing development was defined as SSD.

The proposed modifications do not alter the status of the development under SEPP (S&RD).

4.5.2 State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33)

SEPP 33 aims to ensure that in considering any application to carry out potentially hazardous or offensive development, the consent authority has sufficient information to assess whether the development is hazardous or offensive and to impose conditions to reduce or minimise any adverse impact. SEPP 33 applies to any development which falls under the policy's definitions of 'potentially hazardous industry' or 'potentially offensive industry'.

The Crawfords development approved under SSD-5119 was subject to an assessment of the degree of hazard in accordance with the SEPP 33 guidelines by Health and Safety Essentials (HSE, 2012). The Hazard Analysis demonstrated compliance of the development with the qualitative principles for land use safety outlined in the Department of Planning's Hazardous Industry Planning Advisory Paper No. 4 (HIPAP 4). The assessment identified that with the implementation of proposed controls including a safety management system, emergency plan, and security plan, the risk had been reduced to 'As Low As Reasonably Practicable'.

No change to the type or quantity of goods stored or handled on the Site is proposed under this modification.

4.5.3 State Environmental Planning Policy 71 - Coastal Protection (SEPP 71)

SEPP 71 applies to land within the NSW Coastal Zone. The policy seeks to protect the unique features of the NSW coastal environment by ensuring:

- development in the NSW coastal zone is appropriate and suitably located;
- there is a consistent and strategic approach to coastal planning and management; and
- there is a clear assessment framework for development proposed within the Coastal Zone.

The Site is mapped as being located within the NSW coastal zone (Map 1). Clause 8 of SEPP 71 details matters to be taken into consideration by a consent authority in determining a development application.

The proposed modifications are not amending the current type of operation occurring at the Site, nor expanding the current footprint of the Site. The proposed modification is not inconsistent with the requirements of SEPP 71.

4.5.4 State Environmental Planning Policy 14 – Coastal Wetlands (SEPP 14)

The aim of SEPP 14 is to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the State. The Site is within close proximity of a SEPP 14 - Coastal Wetland (840). The boundary of the wetland is on the western side of the Main Northern Railway, outside the footprint of the Site.

The proposed amendments will not increase the approved footprint of the Site, will not provide for any ground disturbing activities being undertaken, nor change the Site's approved stormwater configuration or output.

4.5.5 State Environmental Planning Policy 55 – Remediation of Land (SEPP 55)

SEPP 55 requires a consent authority to consider, at the development application stage, the potential for contamination to adversely affect the suitability of a site for its proposed use. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed.

The Site is located in, and surrounded by, areas of historical industrial land use with a number of current and potentially contaminating processes identified both on and off site.

A Phase 1 Environmental Site Assessment (ERM 2012b) and a Targeted Phase 2 Environmental Site Assessment (ERM, 2012c) were completed as part of the Environmental Impact Statement (EIS) (ERM 2012a) prepared for SSD-5119. Contamination sources were found to be generally associated with the historical storage of AN, historic storage and handling of hydrocarbon based fuels, historic storage and handling of general fertiliser and possible impacts related to historic filling processes on and adjacent to the site.

The proposed modifications are not amending the current type of operation occurring at the Site, nor expanding the current footprint of the Site. No ground disturbing works are proposed.

4.5.6 State Environmental Planning Policy – Infrastructure 2007 (ISEPP)

Clause 104 (3) of the ISEPP states that before determining a development application for development identified in Schedule 3 - 'traffic generating development,' the development must be referred to the Roads and Traffic Authority (RTA) (now known as the Roads and Maritime Services (RMS)). Schedule 3 states that 'freight intermodal facilities and freight facilities' of any size or capacity must be referred to the RMS for comment.

A Traffic Impact Assessment was undertaken as part of the EIS (Mark Waugh Pty Ltd, 2012). The proposed increase in rail movements will likely reduce truck movements by greater utilisation of the existing rail network between the Site and the Sydney ports area. No extra vehicle movements are expected as a result of the increased rail movements.

4.6 REGIONAL AND LOCAL PLANNING PROVISIONS

4.6.1 Lower Hunter Regional Strategy 2006 - 2031

The Lower Hunter Regional Strategy 2006-2031 plans for the provision of sufficient new urban and employment lands to meet expected strong demands for growth, and refocuses development in the Lower Hunter. The strategy establishes a hierarchy and network of urban centres for the Lower Hunter to aid in land use planning. The Strategy will be superseded by the Hunter Regional Plan, once adopted.

The Lower Hunter Regional Strategy recognises the importance of the Hamilton area as a regional growth centre.

The proposed modification is not inconsistent with the Strategy.

4.6.2 *Draft Hunter Regional Plan 2015 and accompanying Draft Plan for Growing Hunter City 2015*

The Draft Hunter Regional Plan outlines a vision to grow and diversify the Hunter economy over the next 20 years. The plan was on public exhibition until 24 March 2016. The government is currently considering submissions received. The Plan is accompanied by the Draft Plan for Growing Hunter City which specifies specific strategies for the 'Hunter City' subregion.

The Site is located in the Hunter City subregional area of the draft Hunter Regional Plan. The proposed modification is not inconsistent with the draft Plan.

4.6.3 *Newcastle Local Environmental Plan 2012*

The site is zoned IN3 – Heavy Industry Zone in the Newcastle Local Environmental Plan (LEP) 2012. This zone applies to heavy industrial land, predominantly around Hexham and Sandgate. The development as approved under SSD-5119 aligns to objectives of the IN3 – Heavy Industry Zone.

4.6.4 *Newcastle Development Control Plan (DCP) 2012*

Newcastle DCP 2012 does not apply to the development in accordance with the provisions of Clause 11 of SEPP S&RD. Notwithstanding this, the EIS (ERM, 2012a) and associated specialists assessments did have regard to relevant requirements of the DCP.

The proposed modification is not amending the current type of operation occurring at the Site, nor expanding the current footprint of the Site.

5 ENVIRONMENTAL IMPACTS, MITIGATION AND MANAGEMENT

5.1 NOISE ASSESSMENT

5.1.1 Previous Noise Assessments

Noise and Vibration Impact Assessment For SSD-5119 Application

ERM completed a Noise and Vibration Impact Assessment (NVIA) in 2012 (ERM, 2012d) to accompany the EIS for the proposed AN storage and distribution facility. The assessment considered potential for noise and vibration impacts on the surrounding environment from construction and operational activities of the AN storage and distribution facility to occur at nearby sensitive receptors. Nine potential sensitive receptors were identified at locations surrounding the Site and these were generally the closest residential properties in each direction from the Site.

Noise Validation Monitoring 2015

Following preparation of the initial noise assessment in 2012, noise validation monitoring was then undertaken in May 2015 (ERM, 2015) to validate the predicted noise levels presented in the NVIA referred to above and to address the noise conditions stipulated in SSD-5119, and EPL 20295.

The findings of the noise validation monitoring showed that Site noise events and associated emissions were inaudible for the majority of the time and were compliant with SSD-5119 and EPL 20295 noise conditions (ERM, 2015). When Site emissions were audible, they were barely detectable, of short duration typically associated with the infrequent use of motion alarms and metal-on-metal contact from activities on site. Whilst audible these site noise events did not dominate the acoustic environment at any of the identified sensitive receptors where extraneous noise emissions (mostly road traffic noise) prevailed as the most significant noise in the area.

5.1.2 Noise Assessment for Section 86 Modification

This Section 96 (1A) modification proposes to change approved operating hours for the development to:

- Monday to Sunday, 4:00am to 12:00 midnight; and
- No operations on public holidays.

For noise, this represents a two hour extension to the Site's morning and night time operational period, four hours total per working day; Monday to Sunday. This is necessary to allow for the proposed two trains (4 movements per day), rather than a single train (two movements) per day.

The previous NVIA (ERM, 2012d) and operational compliance assessment (ERM 2015) was undertaken based on the use of GL Class locomotives. These will continue to undertake rail movements during the daytime and evening periods (ie afternoon train movements). The new C44 Class locomotives proposed for rail movements during the night time period (ie the morning train movements) will utilise modern two slot wagons, rather than three slot wagons. These new C44 locomotives are considerably quieter than the GL locomotives utilised for existing operations upon which the previous NVIA prepared as part of the EIS (ERM, 2012d) and the noise compliance monitoring (ERM, 2015) were based. .

These changes have triggered the need for an updated noise assessment to be prepared. This is provided an *Annex A*.

The findings of the operational noise assessment detailed in *Annex A* indicate that calculated noise levels are at or below the relevant Project-Specific Noise Levels (PSNL) at all locations, for all operating periods during both calm and adverse meteorological conditions and hence, noise impacts are not anticipated. A comparison of estimated maximum noise levels to the sleep disturbance criterion indicates that maximum noise level events are unlikely to exceed the criterion at all residential receptors. Sleep disturbance (and awakenings) impacts potentially associated with maximum noise level events during the night time period were assessed as unlikely to occur.

It was recommended that all implemented noise control mitigation and/or management measures be maintained onsite to remain compliant with the noise assessment criteria for the night time period. It was also recommended that an operational noise monitoring survey be undertaken within three months of the modified operations in order to confirm compliance with the noise assessment criteria.

5.2 TRAFFIC

The proposed modification will provide for greater utilisation of the existing rail transport facilities, thereby providing a more efficient means of transport of goods between the Site and Port Botany. This in turn limits the number of heavy vehicles used on public roads, thus reducing risks associated with heavy vehicles transiting public and inner city roads to access port areas.

5.3 HAZARDS AND RISKS

No change to the materials to be stored or handled on the site is proposed.

The approved risk management procedures and design elements will be retained and implemented as part of the proposed modified development.

General freight (non-dangerous goods) will be transported on the trains, including aluminium and timber. The proposed modification is not related to the transport of AN and as such the risk profile of the facility will not change.

5.4 CONSULTATION

Crawfords has revised and updated the Safety Interface Agreement with ARTC relating to the connection of the rail siding to Northern Rail Line, including the completion of a revised risk analysis. This agreement was completed 30 September 2016.

6 CONCLUSION

The proposed modification to enable an increase in the number of train movements per day from one train (two movements) to two trains per day (four movements), an increase in the operating hours to 0400 – 2400 Monday to Sunday with no operations on public holidays; and removing specifications for wagons is considered to be substantially the same development as that approved under SSD-5119.

The proposed modification involves no changes to the approved use of the Site, the existing infrastructure at the Site, nor the type and quantities of materials stored onsite. The proposed modification is not related to the transport of AN and as such the risk profile of the facility will not change.

The proposed modification is consistent with all relevant legislative provisions and requirements.

The noise assessment indicates that the Site is expected to comply with the relevant noise assessment criterion, and in fact, the proposed utilisation of modern rail transport equipment is likely to decrease net noise emissions form the Site. This would be achieved through the continued successful implementation of the current good practice noise management measures described in the noise assessment (*Annex A*).

ERM recommends that within three months of the approval of the modified operations, an operational noise monitoring survey be undertaken to evaluate site noise contribution and confirm compliance with the noise assessment criterion at a representative number of the closest and/or potentially most affected noise sensitive receptors in near proximity to the Site.

REFERENCES

ERM, 2012a, Crawfords Freightlines **Ammonium Nitrate Storage and Distribution Facility, Environmental Impact Statement**. Prepared for Crawfords Freightlines Pt Ltd.

ERM, 2012b, Crawfords Freightlines **Ammonium Nitrate Storage and Distribution Facility, Phase 1 Environmental Site Assessment**. Prepared for Crawfords Freightlines Pt Ltd.

ERM, 2012c, Crawfords Freightlines **Ammonium Nitrate Storage and Distribution Facility, Trageted Phase 2 Environmental Site Assessment**. Prepared for Crawfords Freightlines Pt Ltd.

ERM, 2012d, Crawfords Freightlines **Ammonium Nitrate Storage and Distribution Facility, Noise and Vibration Impact Assessment**. Prepared for Crawfords Freightlines Pt Ltd.

ERM, 2015, Crawfords Freightlines **Ammonium Nitrate Storage and Distribution Facility, Noise Validation Monitoring**. Prepared for Crawfords Freightlines Pt Ltd.

HSE, 2012, **Ammonium Nitrate Storage Facility Hazard Analysis**. Prepared for Crawfords Freightlines Pt Ltd.

Annex A

Noise Assessment

Crawfords Freightliners Pty Ltd

Crawfords Freightlines Ammonium Nitrate Storage and Distribution Facility

Section 96 Modification to SSD 5119

Noise Impact Assessment

0359011_Final

September 2016

The business of sustainability

Document Control: 0359011 RP1 - NIA					
				ERM Approval to Issue	
Version	**Revision**	**Author**	**Reviewed by**	**Name**	**Date**
Draft	D01	Rod Linnett	Murray Curtis	Murray Curtis	2 September 2016
Final	F01	Rod Linnett	Murray Curtis	Murray Curtis	12 September 2016

Crawfords Freightlines Ammonium Nitrate Storage and Distribution Facility

Section 96 Modification to SSD 5119

Noise Impact Assessment

Crawfords Freightlines Pty Ltd

September 2016

0359011

www.erm.com

Prepared by:	*Amanda Antcliff*
Project Manager:	*Project Manager*
Signed:	
Date:	*12 September, 2016*
Approved by:	*Murray Curtis*
Position:	*Partner*
Signed:	
Date:	*12 September, 2016*

Environmental Resources Management Australia Pty Ltd Quality System

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EXECUTIVE SUMMARY

Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Crawfords Freightlines Pty Ltd (Crawfords) has completed an acoustic assessment of environmental noise associated with the S96 modification to the operations of the ammonium nitrate storage facility site located at Lot 12 DP 625053 Old Maitland Road, Sandgate in New South Wales (NSW).

The scope of this assessment included operational noise arising from an increase in the number of train movements and extension to the approved operating hours of the facility. The methodology, findings and recommendations for the proposed operations under assessment are presented here and include areas of interest in the vicinity of the ammonium nitrate storage facility site. Specifically, the assessment considered potential acoustic impacts generated by the proposed additional train movements utilising the updated C44 Class locomotives during the night time period and the GL Class locomotives during the daytime and evening periods.

The assessment was completed to reflect the intent and requirements of the applicable local, state and Australian standards, acoustic documents and relevant noise guidelines endorsed by NSW regulators.

SUMMARY OF FINDINGS

The findings of the operational noise assessment indicate that calculated noise levels are at or below the relevant Project-Specific Noise Levels (PSNL) at all locations, for all operating periods during both calm and adverse meteorological conditions and hence, noise impacts are not anticipated. A comparison of estimated maximum noise levels to the sleep disturbance criterion indicates that maximum noise level events are unlikely to exceed the criterion at all residential receptors. Sleep disturbance (and awakenings) impacts potentially associated with maximum noise level events during the night time period are unlikely to occur.

RECOMMENDATIONS

Operational Noise

Based on the calculated noise levels it is recommended that all implemented noise control mitigation and/or management measures be maintained onsite to remain compliant with the noise assessment criteria for the night time period.

Operational Noise Monitoring

ERM recommends that within three months of the approval of the modified operations, an operational noise monitoring survey be undertaken to evaluate site noise contribution and confirm compliance with the noise assessment criterion at the closest and/or potentially most affected noise sensitive receptors in near proximity to the Site. Further detail regarding this task is provided in Section 6.

1 INTRODUCTION

This document has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Crawfords Freightlines Pty Ltd (Crawfords) to assess environmental noise associated with the proposed Section 96 Modification for the ammonium nitrate storage and distribution facility site located at Lot 12 DP 625053, Old Maitland Road , Sandgate in New South Wales (NSW) (the 'Site').

1.1 PROJECT OVERVIEW

Crawfords is seeking a Section 96 Modification to amend State Significant Development 5119 (SSD -5119) to permit an increase in the number of train movements on the existing rail siding at the Site. This modification proposes two trains per day (ie four movements, two in and two out) to meet the increased transportation demand. This change to the Site's transportation of product would also require an extension to the approved operating hours of the facility.

The difference between the proposed operation and the existing operations is that the "morning" train that currently arrives at the Site between 6:00am and 7:00am is now scheduled to arrive between 4:00am and 5:00am. This triggers a need for a noise assessment as the previous assessment occurred in the "morning shoulder" and the proposed train arrival is now to occur during the more sensitive night time period, which typically has a lower, stricter noise criteria. The existing "afternoon" train service is unchanged in terms of operating times, other than the utilisation of updated locomotives than previously assessed. Activities during the proposed extended hours form 10:00pm to 12:00 midnight consist of material and vehicle movements associated with finalising the days' activities prior to site shutdown. All other operations on-site including AN storage remain unchanged.

1.2 PREVIOUS ASSESSMENTS

Noise validation monitoring was undertaken in May 2015 to validate the predicted noise levels presented in the previous Noise and Vibration Impact Assessment and to address the noise conditions presented in the NSW Government – Department of Planning and Infrastructure (DoPI) - Development Consent - SSD-5119 Final Consent (SSD-5119), dated 13 June 2013; and the NSW Environment Protection Authority (EPA) Environment Protection Licence 20295 (EPL 20295).

The findings of the noise validation monitoring showed that Site noise events and associated emissions were inaudible for the majority of the time and were compliant with EPL 20295 and SSD-5119 noise conditions (refer ERM Report *0286425RP01_D01 - Crawfords Noise Validation Monitoring*). When Site emissions were audible, they were barely detectable, of short duration typically associated with the infrequent use of motion alarms and metal-on-metal contact from activities on site. Whilst audible, these Site noise events did not dominate the acoustic environment at any of the identified sensitive receptors where extraneous noise emissions (mostly road traffic noise) prevailed as the most significant noise in the area. No noise complaints have been received attributable to the Crawfords operations.

1.3 HOURS OF OPERATION

The approved hours of operation for the Site as defined in SSD-5119 are as below:

- Monday to Sunday, 6:00am to 10:00pm; and
- No operations on public holidays.

The Section 96 Modification proposes to change approved operating hours to:

- Monday to Sunday, 4:00am to 12:00 midnight; and
- No operations on public holidays.

For noise, this represents a two hour extension to the Site's morning and night time operational period, four hours total per working day; Monday to Sunday.

1.4 SITE DESCRIPTION

The Site is located approximately 9.8 kilometres (km) north-west of the Newcastle Central Business District and 6.7 km west-north-west of industrial operations on Kooragang Island. The Site is situated within a small light industrial area.

The Site is bound by the main Northern Railway (Newcastle-Maitland (Hunter) railway line) to the west and south, where rail container deliveries are made; the Newcastle Inner City Bypass (Shortland to Sandgate); Sandgate Cemetery and the Pacific Highway to the east and Old Maitland Road to the north; the Hunter River is situated approximately 820 metres (m) to the east between Sandgate and Kooragang Island.

1.4.1 Surrounding Land Uses

Land uses and activities directly surrounding the Site are generally limited to minor industrial and commercial uses, and residential areas.

To the west of the Northern Railway line (beyond the Hunter Wetlands area) is a residential area with receptors located on Blanch Street, the rear of their properties are approximately 800 metres distant from the Site. Directly adjacent and west of the Site on the other side of the railway is the Newcastle Golf Range and Practice Centre; to the south of the Site is a residential area with receptors located on Astra Street.

Sandgate Cemetery and mixed industrial and residential areas are located to the south east of the Site however these are not directly considered in this assessment. Further to the east of the Site is the Pacific Highway which has a strip of residential receptors and a commercial development situated directly on the highway. These locations, although in relatively near proximity to the Site; experience significant existing road traffic noise from the highway.

To the north of the Site are other industrial premises situated within the same industrial area as the Crawfords site and the St Joseph's Home (residential aged care) and St Joseph's Village (independent living), which are on the northern side of Old Maitland Road.

1.4.2 Site Layout and Locality

The Site, surrounding area and other general items relevant to this assessment are presented in *Figure 1* and *Figure 2*. The sensitive receptor locations where the Site's noise compliance is assessed in this report are presented in *Figure* 3.

Legend

Site Boundary

Cadastre

N

0 100 200m

Source:
- nearmap imagery date May 2015
- DLPI, DCDB 2015

Client:	Crawfords Freightlines Pty Ltd	
Drawing No:	0359011s_S96_G001_R0.mxd	
Date:	25/08/2016	Drawing Size: A4
Drawn By:	GC	Reviewed By: RL

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 1 - Locality Map

Crawfords Freightlines - Section 96 Modification to SSD 5119
Old Maitland Road, Sandgate, NSW

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Legend

Site Boundary

Cadastre

N

0 25 50m

Source:
- nearmap imagery date May 2015
- DLPI, DCDB 2015

Client:	Crawfords Freightlines Pty Ltd	
Drawing No:	0359011s_S96_G002_R0.mxd	
Date:	25/08/2016	Drawing Size: A4
Drawn By:	GC	Reviewed By: RL

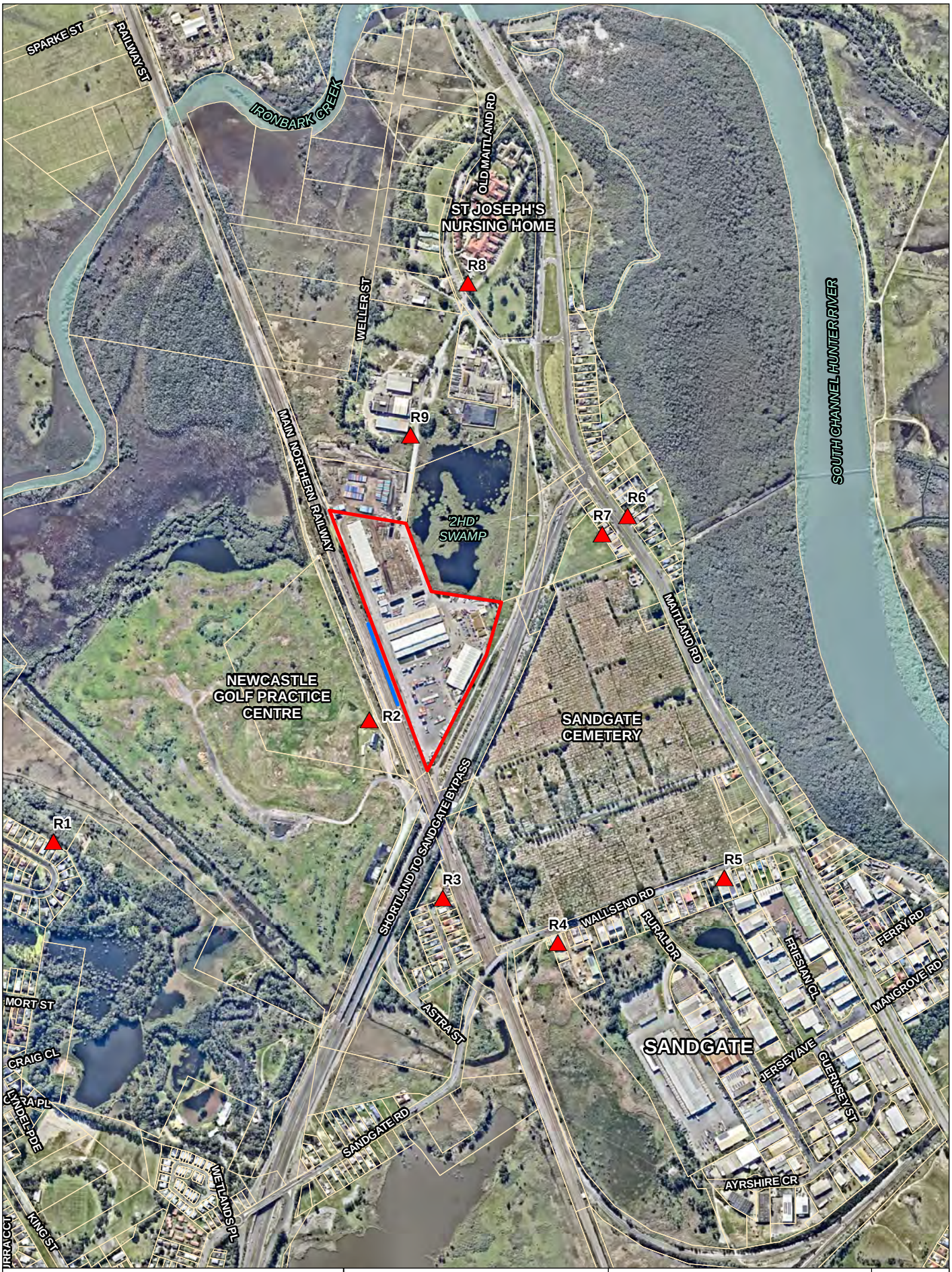
Figure 2 - Site Layout Plan

Crawfords Freightlines - Section 96 Modification to SSD 5119
Old Maitland Road, Sandgate, NSW

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Legend

- Site Boundary
- Cadastre
- Noise Validation Monitoring (Receptor) Locations

Source:
- nearmap imagery date May 2015
- DLPI, DCDB 2015

N

0 100 200m

Client:	Crawfords Freightlines Pty Ltd	
Drawing No:	0359011s_S96_G003_R0.mxd	
Date:	25/08/2016	Drawing Size: A4
Drawn By:	GC	Reviewed By: RL

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 3 - Acoustic Assessment Map

Crawfords Freightlines - Section 96 Modification to SSD 5119
Old Maitland Road, Sandgate, NSW

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

2 *ASSESSMENT METHODOLOGY*

The Section 96 Modification proposes the introduction of an additional train service (ingress and egress) which will arrive between 04:00am and 07:00am each day, departing before 12:00pm (noon).

This additional train service is proposed during the 'night time' assessment period. In accordance with the relevant NSW noise policy, the assessment periods are defined as follows:

- Daytime is the period from 07:00am to 06:00pm - Monday to Saturday; or 08:00am to 06:00pm on Sundays and Public Holidays;
- Evening is the period from 06:00pm to 10:00pm; and
- Night time is all remaining periods.

This report is technical in nature. A glossary of relevant acoustical concepts and terminology is presented in *Annex A*.

All sound pressure levels presented in this report (eg noise levels predicted at a receptor) are in decibels referenced to 2×10^{-5} Pa, with A-weighting applied. All sound power levels presented in this report (eg noise levels assigned to specific sources) are decibels referenced to 10^{-12}W, with A-weighting applied.

2.1 *OBJECTIVES*

The broad objectives of this noise assessment (the assessment) are to:

- quantify potential environmental noise levels associated with the additional train movements using the new C44 Class locomotives during the night time period;
- quantify potential environmental noise levels associated with the existing site operations and train movements using the updated GL Class locomotives during the daytime and evening period;
- qualify the magnitude of any noise impacts; and
- where necessary, provide recommendations to reduce any noise impacts identified as part of the assessment.

All works are being undertaken to reflect the intent and requirements of the applicable local, state and Australian standards, acoustic documents and relevant noise guidelines endorsed by NSW regulators. Refer *Section 2.2* of this report that summarises the applicable policy and lists the relevant documents, standards and guidelines applicable to the assessment.

The assessment presents the methodology, findings and recommendations for the proposed modification to operations and includes areas of interest in the vicinity of the Site.

The scope of the assessment includes operational noise associated with the S96 modification, and specifically, focusses on the potential for noise impacts generated from the proposed additional train movements utilising the new C44 Class locomotives during the night time period; and the updated GL Class locomotives during the daytime and evening periods.

2.1.1 Scope of Works

To meet the assessment objectives the following scope of works were completed:

- review and become familiar with the relevant local standards and guidelines, applicable to the project and the assessment;
- review any previous assessments, existing project data and/or information relevant to the assessment;
- undertake noise measurements of the new C44 Class locomotives to determine their operational sound power level (L_W) to be incorporated into the noise prediction model;
- develop a project-specific noise model (refer 'Noise Modelling') to accurately quantify operational noise level contributions including all fixed and mobile noise sources associated with the Site;
- compare the resultant noise levels to the project-specific criteria and determine the impact at the closest and/or potentially most affected sensitive receptor locations in the vicinity of the Site; and
- recommend relevant noise and/or vibration control mitigation and/or management measures (and monitoring actions), to be considered by Crawford's for implementation at the Site, if required.

2.2 POLICY SETTING

In NSW, noise pollution is regulated through the *Protection of the Environment Operations Act 1997* (POEO Act) as the key piece of environment protection legislation. Noise pollution is defined under the POEO Act as:

'*the emission of offensive noise, which means noise that by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances, is harmful (or is likely to be harmful) to or interferes unreasonably (or is likely to interfere unreasonably) with the comfort or repose of a person outside the premises from which the noise is emitted*'.

Under the POEO Act, the 'POEO (Noise Control) Regulation 2008' addresses common noisy activities that occur in residential situations; it limits the time of day that noisy articles (such as lawn mowers, stereos and leaf blowers) are permitted to be heard in neighbouring residences, however it does not specify noise limits and an applicable assessment approach for the assessment of new or existing developments

In this case various noise assessment guidelines endorsed by NSW regulators provide a guideline framework and methodology for deriving acceptable levels and standard methods for assessing and measuring impacts with due regard to the POEO Act, refer below.

2.2.1 Relevant Documents, Standards and Guidelines

This report has been prepared with due regard to and in general accordance with the following documents, standards and guidelines:

- NSW Environment Protection Authority – NSW *Environmental Noise Management – Industrial Noise Policy* (INP), January 2000 and relevant application notes;
- Standards Australia AS1055–1997™ (AS1055) – *Description and Measurement of Environmental Noise*, Parts 1, 2 and 3;
- Standards Australia AS IEC 61672.1–2004™ (AS61672) – *Electro Acoustics - Sound Level Meters Specifications Monitoring* or Standards Australia AS1259.2-1990™ (AS1259) – *Acoustics – Sound Level Meters – Integrating Averaging*, as applicable to the device;
- Standards Australia AS/IEC 60942:2004/IEC 60942:2003 (IEC60942) – Australian Standard™ – *Electroacoustics – Sound Calibrators*
- International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - *Acoustics – Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation*;
- '*Crawford Freightlines Pty Ltd - Hazard Analysis (Revision 2)*' prepared by Health & Safety Essential Pty Ltd, dated 22 May 2012 (May 2012 hazard analysis);
- ERM Technical Report *0286425RP01_D01 - Crawfords Noise Validation Monitoring*, dated 29 May 2015; and
- ERM Report Reference: *0143175RP01_Final* dated July 2012.

A detailed description of the INP assessment methodology is provided here as *Annex B*.

2.3 SENSITIVE RECEPTOR LOCATIONS

Based on a review of aerial photos, observations made onsite and information provided by Crawfords the sensitive receptor locations shown in *Table 2.1* was identified.

It should be noted that the locations presented *Table 2.1* do not include all sensitive receptors in the vicinity of the Site. These locations have been selected by ERM based on the review of data available at the time of the assessment. These locations have been selected as they are considered to be representative of the closest and/or potentially most affected receptor locations near the Site, where worst-case operational noise levels may be experienced.

Noise levels for receptors at greater distances from the Site are expected to be lower than those assessed here. Predicted noise levels around each location under assessment (eg other houses near the selected sensitive receptors) are expected to be broadly similar.

Guidance Note

Based on observations made by ERM during the noise validation monitoring conducted in May 2015, the acoustic environment surrounding the Site varies. Generally, the receptor locations in the vicinity of the Site are best described as either Urban or Suburban as defined in the INP and presented below:

Suburban—an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristics:

- decreasing noise levels in the evening period (1800–2200); and/or
- evening ambient noise levels defined by the natural environment and infrequent human activity.

This area may be located in either a rural, rural-residential or residential zone, as defined on a Local Environmental Plan (LEP) or other planning instrument.

Urban—an area with an acoustical environment that:

- is dominated by 'urban hum' or industrial source noise;
- has through traffic with characteristically heavy and continuous traffic flows during peak periods;
- is near commercial districts or industrial districts; and/or
- has any combination of the above, where 'urban hum' means the aggregate sound of many unidentifiable, mostly traffic-related sound sources.

This area may be located in either a rural, rural-residential or residential zone as defined on an LEP or other planning instrument, and also includes mixed land use zones such as mixed commercial and residential uses.

The sensitive receptor locations (nine in total) will be adopted to assess noise impacts; they are described in *Table 2.1* and visually presented in *Figure* 3.

Table 2.1 Sensitive Receptor Locations

ID	Description	GPS Coordinates[1]		Direction from Site	Distance from Site (m)	Elevation (m)[2]
		Easting	Northing			
R1	Residential receptor located on Blanch Street	377728	6362297	South-west	907	2.4
R2	Newcastle Golf Practice Centre	378565	6362177	South-west	213	4.6
R3	Residential receptor located on Astra Street[1]	378807	6362092	South	574	5.8
R4	Residential receptor located on Wallsend Road	379159	6362222	South	726	7.7
R5	Residential receptor located on Wallsend Road	378906	6362965	South-east	842	10.3
R6	Residential receptor located on the eastern side of the Pacific Highway[1]	378970	6363002	East	523	12.2
R7	Residential receptor located on the western side of the Pacific Highway	378622	6363491	East	448	13.5
R8	St Joseph's aged care and independent living	378411	6362560	North	431	4.5
R9	Industrial receptor located within the same industrial area and south of Old Maitland Road	378498	6363182	North	749	5.5

1. All GPS are UTM, Zone 56H; and
2. Australian Height Datum (AHD).

2.4 EQUIPMENT NOISE SOURCE LEVELS

The additional "morning" train movements will utilise new C44 Class locomotives purchased by Crawford's in April 2016. These new locomotives are considerably quieter than the locomotives utilised for existing operations.

The previous assessment (refer ERM Reference: *0143175RP01_Final* dated July 2012) and operational compliance assessment (refer ERM Report *0286425RP01_D01 - Crawfords Noise Validation Monitoring*) was undertaken with different locomotives in operation. The GL Class locomotives continue to undertake rail movements during the daytime and evening periods with the C44 Class locomotives proposed for rail movements during the night time period.

Therefore, noise measurements were undertaken to determine the operational 'Sound Power Level' (LW) of the C44 Class locomotives. This was conducted on the Crawford's site, to determine the following:

- LW of the C44 locomotives under various throttle settings.
- Measure the noise emission from typical shunting operations onsite.

LW is a measure of the total power radiated by a source. The "sound power" of a source is a fundamental property of the source and is independent of the surrounding environment. This differs from the Sound Pressure Level (LP) which is the level of "sound pressure" as measured at distance by a standard sound level meter with a microphone. LP is the received sound as opposed to LW that is the sound 'intensity' at the source itself.

The results of the noise measurements are presented in *Table 2.2*.

Table 2.2 Locomotive Source Levels

Source	Operating Condition	Measured Sound Pressure Level LP	Calculated Sound Power Level Lw
2 x C44 Class Locomotive "Carrot" & "Spud"	Engine idle	75	106
	Maximum engine speed	79	110
	Shunt out of siding	76	107

1. All measurements conducted at 15m from the locomotive.

2.5 ASSESSMENT SCENARIOS

This section presents the assessment scenarios adopted to predict noise levels at each of the sensitive receptor locations identified.

Where applicable the adopted source term (LW) data is provided for each emission source considered as part of the assessment and included in the project-specific noise model (refer *Section 2.5*).

2.5.1 *Operational Assessment Scenarios*

Based on the proposed modification, the operational scenario for the additional rail movements consists of the following activities:

- Trains (C44 and GL Class) entering and leaving the Crawford's siding;
- Shunting of locomotives and positioning train for loading and unloading;
- Unloading and loading of the trains using the large container forklifts and placement of containers in various storage areas of the site;
- General material movements around the Site using the various mobile equipment and forklifts on site.
- Heavy vehicle movements - entering, leaving and moving around the Site.

Therefore the following assessment scenarios have been developed to reflect the existing and proposed operations:

Night time (Proposed) Rail Movement and Operations: The arrival and unloading of the "morning" train (new C44 Class locomotives) during the night time period before 07:00am, using 2 large forklifts and 1 small forklift. Activities during the night time period between 10:00pm and 12:00 midnight would be on an as needed basis (ie on occasion) and would consist of 2 large forklifts, 1 small forklift and light vehicle movements finalising the days' activities prior to site shutdown.

Daytime Existing Rail Movement and Operations: Continued unloading and re loading of the "morning" train and its departure prior to the arrival of the "afternoon" train (GL Class locomotives) and its subsequent unloading and re loading. During the daytime period, all forklifts are in operation and heavy vehicles entering, leaving and moving around the Site.

Evening Existing Rail Movement and Operations: depending on arrival time of the "afternoon" train, its departure could occur during the daytime period (before 6:00pm) or in the evening period (before 10:00pm). During the evening period all forklifts are in operation and other vehicles entering, leaving and moving around the Site.

These operational scenarios have been assumed to potentially occur during all hours of proposed and existing operations (refer *Section 1*), except for the operation of the GL Class locomotives, which will **not** operate during the night time period, as defined by the INP.

Maximum noise level events are also considered as part of this assessment for works occurring during the night time period.

2.6 NOISE MODELLING

To quantify operational noise level contributions at the closest and/or potentially most affected noise sensitive receptor locations in the vicinity of the Site, a comprehensive noise modelling assessment for the Site has been conducted. Brüel & Kjær's Predictor 7810 (Version 11.0) noise modelling software package was utilised to calculate noise levels using the ISO 9613.2 industrial noise propagation algorithms (international method for general purpose, 1/1 octaves).

The Predictor software package allows topographic[1] details to be combined with ground regions, water, grass, significant building structures etc. and project-specific assessment locations, to create a detailed and accurate representation of the Site and surrounding area. Noise emission sources deemed representative of typical conditions under each scenario (refer *Table 2.2* and *Table 2.3* above) can be placed at locations within the Site area.

The noise model allowed quantification of noise levels from multiple sources (fixed, moving and line), based on sound pressures or sound power levels emitted from the key plant components. The model computed the noise propagation in the project area of influence and quantified the A-weighted decibels, dB(A) noise level from Site at each noise assessment location.

Detailed source terms and quantities are presented in *Table 2.3* below.

[1] © Commonwealth of Australia (Geoscience Australia) 2011

Table 2.3 Noise Sources and Quantities

Source	Lw	Equipment Quantity/ Utilisation per Assessment Period (15 min)		
		Day	Evening	Night
36T Forklift container lift (@train)	100	2	2	2
25T Forklift	95	1	1	--
5T Forklift	93	8	8	--
36T Forklift	97	2	2	2
25T Forklift	95	1	1	1
36T Forklift container place (@yard)	97	2	2	2
ALL Forklift Moving Source across Site[2]	96	1	1	1
Train Shunt C44 (2 Locos)	108	1	--	1
Train Shunt GL (2 Locos)	113	1	1	--
Heavy Vehicle Moving Source[1]	98	2	2	--

1 - number of movements per assessment period

3 EXISTING ENVIRONMENT

A key element in assessing environmental noise impacts is to quantify the existing ambient and background noise environment at or near to the closest and/or potentially most affected noise sensitive receptor locations.

As such, continuous unattended environmental noise logging was conducted for the initial noise assessment (refer ERM Reference: *0143175RP01_Final* dated July 2012) to quantify the existing noise environment and to establish the INP Assessment Background Level (ABL), Rating Background Level (RBL) parameters. A summary of measured existing ambient and background noise levels applied to determine the appropriate INP noise policy criteria are presented in *Table 3.1*.

Table 3.1 Overall Ambient and Background Noise Levels

	Measured Overall Noise Levels[1]					
Location	**RBL Day**	**RBL Evening**	**RBL Night**	**Leq Day**	**Leq Evening**	**Leq Night**
49 Blanch Street	34	38	35	49	46	43
24 Astra Street	37	41	37	53	47	46
211 Maitland Road	55	52	43	72	69	67

1. L_{A90} values (RBL) represent the level exceeded for 90 per cent of the interval period and is referred to as the average minimum or background noise level;
2. the LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period;

Guidance Note

The results of long term unattended background noise monitoring has determined that the RBL for the evening and night period are higher than the RBL for the daytime period at 49 Blanch Street and 24 Astra Street. This has most likely arisen due to increased noise from traffic during the evening and night, or due to temperature inversion conditions. Therefore, in determining noise criteria (refer *Section 4*) for this Site, ERM has set the noise levels for evening and night time no greater than the intrusive noise level for daytime in accordance with the recommended approach presented in the INP.

3.1.2 Meteorological Conditions

Meteorological conditions, especially prevailing winds and temperature inversions have the potential to increase noise levelsat the closest and/or potentially most affected noise sensitive receptor locations in the vicinity of the Site. The initial noise assessment (refer ERM Reference: *0143175RP01_Final* dated July 2012) identified that in accordance with the INP, prevailing winds are not a feature of the area. However, Class D temperature inversions may occur more than 30% of the time and are conservatively considered as a potential feature of the area.

4 PROJECT-SPECIFIC CRITERIA

4.1 NOISE ASSESSMENT

This section summarises the project-specific noise criteria that have been determined with due regard to and in accordance with the relevant documents, standards and guidelines - extracted from the initial noise assessment (refer ERM Reference: *0143175RP01_Final* dated July 2012).

4.1.1 INP Summary

The intrusiveness and amenity criteria determined for each assessment location, as well as the Project-specific Noise Level (PSNL) are presented in *Table 4.1*.

Table 4.1 Project-Specific Noise Levels

ID	Description	Intrusiveness			Amenity[1]			PSNL[1]		
		D	E	N	D	E	N	D	E	N
R1	Residential receptor located on Blanch Street	39	43	40	55	44	40	**39**	**39**	**39**
R2	Newcastle Golf Practice Centre	*n/a[1]*			55	55	55	**55**	**55**	**55**
R3	Residential receptor located on Astra Street	42	46	42	60	50	45	**42**	**42**	**42**
R4	Residential receptor located on Wallsend Road	42	46	42	60	50	45	**42**	**42**	**42**
R5	Residential receptor located on Wallsend Road	42	46	42	60	50	45	**42**	**42**	**42**
R6	Residential receptor located on the eastern side of the Pacific Highway	60	57	48	60	50	45	**60**	**57**	**48**
R7	Residential receptor located on the western side of the Pacific Highway	60	57	48	60	50	45	**60**	**57**	**48**
R8	St Joseph's aged care and independent living	43	40	35	60	48	45	**43**	**40**	**35**
R9	Industrial receptor located within the same industrial area and south of Old Maitland Road	*n/a[1]*			70	70	70	**70**	**70**	**70**

1. not applicable at active recreational or industrial receptors;

5 NOISE ASSESSMENT

5.1 OPERATIONAL NOISE

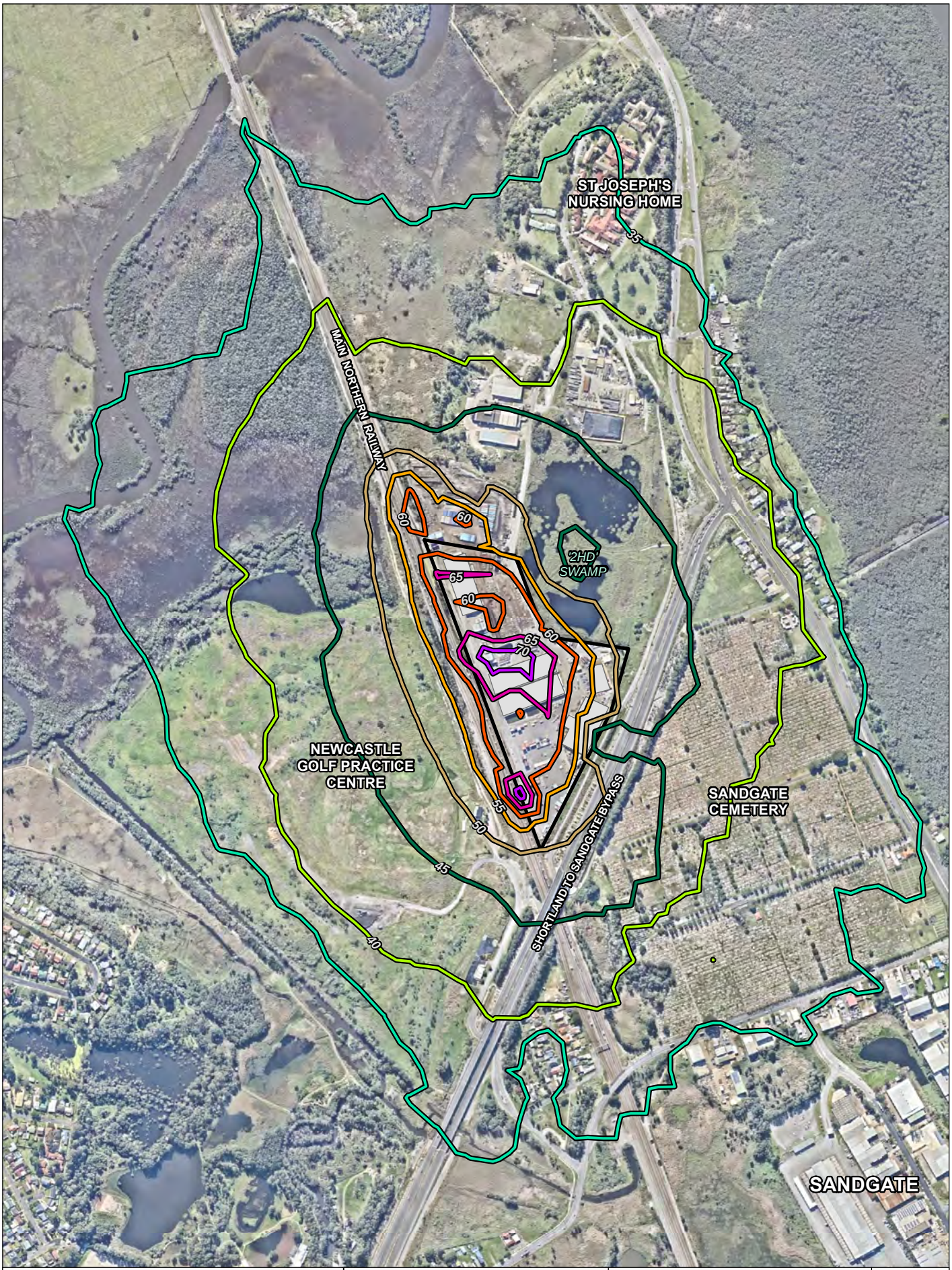
The results of the operational noise assessment including results for all scenarios during both calm and adverse (Class D atmospheric stability) meteorological conditions, and comparison to the PSNL at each assessment location are presented in *Table 5.1* and *Table 5.2.* Due to the difference in source emission level from the C44 and GL Class locomotives, the predicted noise levels presented are the highest noise level calculated, representing a worst case scenario. These results are visually presented as noise contour maps in *Figure 4* and *Figure 5,* representing the worst case scenario in terms of locomotive noise emission and calm/ adverse conditions.

Table 5.1 Operational Noise Levels - Calm Conditions and INP Compliance Assessment

Receptor	Calculated Noise Level[1]			Project Specific Noise Level[1]			Compliance		
	Daytime	Evening	Night time	Daytime	Evening	Night time	Daytime	Evening	Night time
R1	31	31	28	39	39	39	Yes	Yes	Yes
R2	52	52	50	55	55	55	Yes	Yes	Yes
R3	42	42	39	42	42	42	Yes	Yes	Yes
R4	35	35	32	42	42	42	Yes	Yes	Yes
R5	35	35	32	42	42	42	Yes	Yes	Yes
R6	41	41	36	60	57	48	Yes	Yes	Yes
R7	42	42	37	60	57	48	Yes	Yes	Yes
R8	39	39	35	43	40	35	Yes	Yes	Yes
R9	47	47	42	70	70	70	Yes	Yes	Yes

Table 5.2 Operational Noise Levels – Adverse Conditions and INP Compliance Assessment

Receptor	Calculated Noise Level[1]			Project Specific Noise Level[1]			Compliance		
	Daytime	Evening	Night time	Daytime	Evening	Night time	Daytime	Evening	Night time
R1	31	31	28	39	39	39	Yes	Yes	Yes
R2	52	52	50	55	55	55	Yes	Yes	Yes
R3	42	42	39	42	42	42	Yes	Yes	Yes
R4	35	35	32	42	42	42	Yes	Yes	Yes
R5	35	35	32	42	42	42	Yes	Yes	Yes
R6	41	41	36	60	57	48	Yes	Yes	Yes
R7	42	42	37	60	57	48	Yes	Yes	Yes
R8	39	39	35	43	40	35	Yes	Yes	Yes
R9	47	47	42	70	70	70	Yes	Yes	Yes



Legend

Site Boundary

Noise Level dB(A):

35 40 45 50 55 60 65 70

Source:
- nearmap imagery date May 2015
- DLPI, DCDB 2015

N

0 100 200m

Client:	Crawfords Freightlines Pty Ltd	
Drawing No:	0359011s_S96_G004_R0.mxd	
Date:	25/08/2016	Drawing Size: A4
Drawn By:	GC	Reviewed By: RL

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

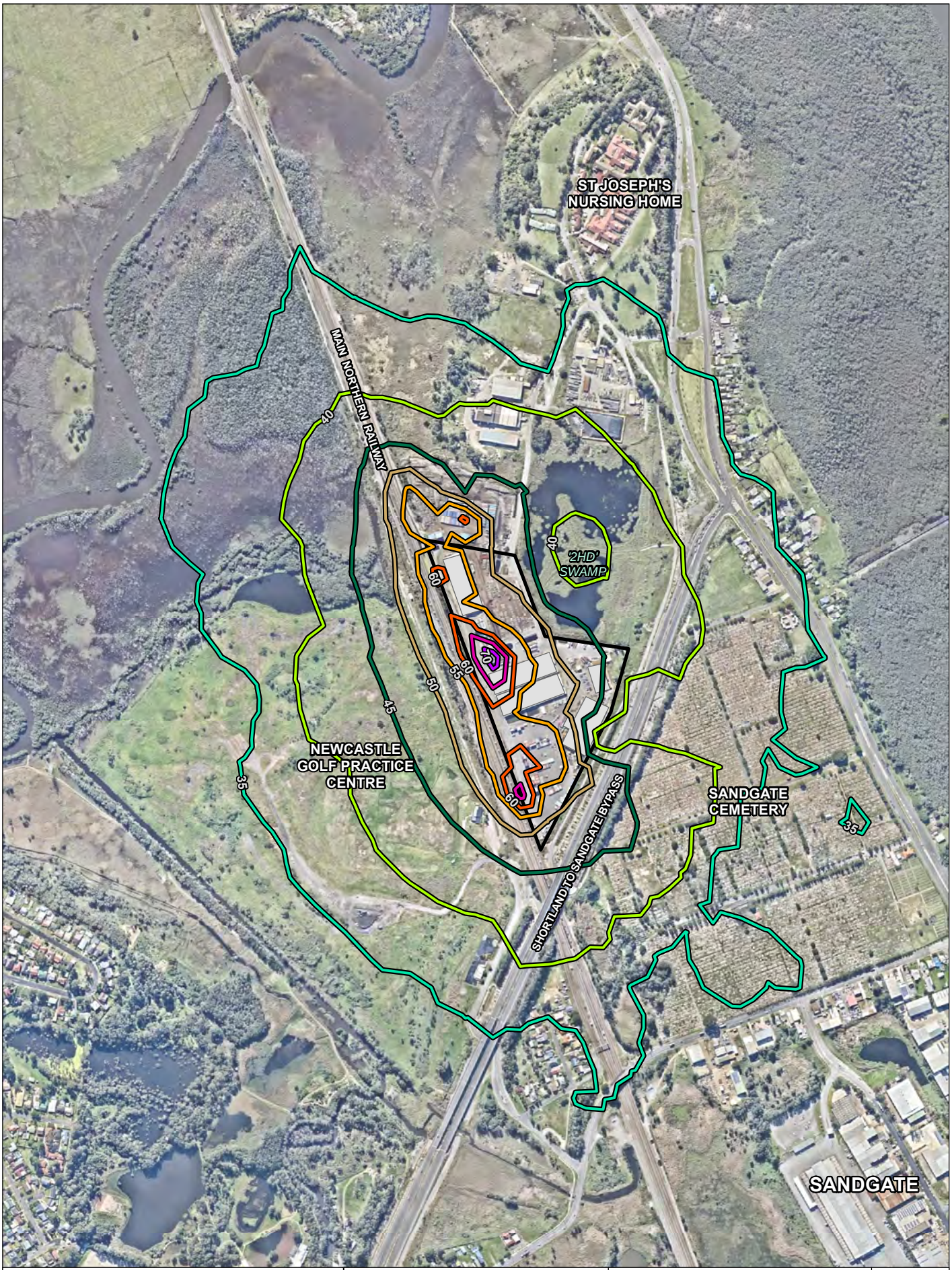
Figure 4 - Operational Noise Levels – Daytime & Evening (Worst Case Calm and Adverse Conditions)

Crawfords Freightlines - Section 96 Modification to SSD 5119
Old Maitland Road, Sandgate, NSW

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Legend

Site Boundary

Noise Level dB(A):

35 40 45 50 55 60 65 70

Source:
- nearmap imagery date May 2015
- DLPI, DCDB 2015

N

0 100 200 m

Client:	Crawfords Freightlines Pty Ltd	
Drawing No:	0359011s_S96_G005_R0.mxd	
Date:	25/08/2016	Drawing Size: A4
Drawn By:	GC	Reviewed By: RL

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 5 - Operational Noise Levels – Night time (Worst Case Calm and Adverse Conditions)

Crawfords Freightlines - Section 96 Modification to SSD 5119
Old Maitland Road, Sandgate, NSW

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

5.1.1 Sleep Disturbance

The noise modelling process has conservatively predicted noise levels for comparison to the PSNL. Further, consideration must be given regarding the potential for sleep disturbance (or awakenings) during the night time period that may be associated with transient, impulsive or maximum noise level events.

The INP does not specifically address sleep disturbance from high noise level events however from various research, NSW regulators accept the following criterion to address maximum noise events:

- $L_{A1\ (1\ minute)}$ not exceeding the $L_{A90\ (15\ minute)}$ by more than 15 dB(A)

This criterion is adopted to mean that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required.

Noise logging data collected in the vicinity of the Site from the initial noise assessment (refer ERM Reference: *0143175RP01_Final* dated July 2012) has been considered to determine the sleep disturbance criterion based on the night time period RBL for each receptor location. Sleep disturbance noise criteria are presented in *Table 5.3*.

Table 5.3 Sleep Disturbance Noise Criteria

ID	Description	RBL Night Time	Sleep Disturbance Criteria[1]
R1	Residential receptor located on Blanch Street	35	**50**
R2	Newcastle Golf Practice Centre	*n/a*[2]	
R3	Residential receptor located on Astra Street	37	**52**
R4	Residential receptor located on Wallsend Road	37	**52**
R5	Residential receptor located on Wallsend Road	37	**52**
R6	Residential receptor located on the eastern side of the Pacific Highway	43	**58**
R7	Residential receptor located on the western side of the Pacific Highway	43	**58**
R8	St Joseph's aged care and independent living	30	**45**
R9	Industrial receptor located within the same industrial area and south of Old Maitland Road	*n/a*[2]	

1. $L_{A1,\ 1\ minute}$;
2. exceedances to PSNL in **bold** typeset.

ERM estimates that the predicted values presented *Table 5.1* to *Table 5.2* may increase by up to 10 dB(A) for $L_{A1\ (1\ minute)}$ values. A comparison of these estimated $L_{A1\ (1\ minute)}$ values to the sleep disturbance criterion are presented in *Table 5.4*.

Table 5.4 Sleep Disturbance Assessment

ID	Description	Estimated $L_{A1\ (1\ minute)}$	Sleep Disturbance Criteria[1]
R1	Residential receptor located on Blanch Street	38	50
R2	Newcastle Golf Practice Centre	*n/a*[2]	
R3	Residential receptor located on Astra Street	49	52
R4	Residential receptor located on Wallsend Road	42	52
R5	Residential receptor located on Wallsend Road	42	52
R6	Residential receptor located on the eastern side of the Pacific Highway	46	58
R7	Residential receptor located on the western side of the Pacific Highway	47	58
R8	St Joseph's aged care and independent living	45	45
R9	Industrial receptor located within the same industrial area and south of Old Maitland Road	*n/a*[2]	

1. $L_{A1,\ 1\ minute}$;
2. exceedances to PSNL in **bold** typeset

A comparison of these estimated $L_{A1\ (1\ minute)}$ values to the sleep disturbance criterion for all residential receptors indicates that maximum noise level events are unlikely to exceed this criterion.

5.1.2 Discussion

The findings of the operational noise assessment presented in *Table 5.1* and *Table 5.2* may be summarised as below:

- operational noise levels for the proposed night time train operations are calculated to be below the night time PSNL (10:00pm to 7:00am) during both calm and adverse meteorological conditions at all noise assessment locations;
- operational noise levels for the proposed night time train operations are calculated to be below the night time sleep disturbance criteria; and
- operational noise levels for all site operations are calculated to be below the PSNL during all operating periods for both calm and adverse meteorological conditions at all noise assessment locations.

6 RECOMMENDATIONS

This section presents a consolidated set of noise and vibration control mitigation and/or management measures that are to be considered and implemented by Crawford's where feasible and reasonable. No further recommendations are made by ERM to those presented here or already implemented on site.

6.1 OPERATIONAL NOISE

ERM's review of the operational noise level results presented in *Table 5.1* to *Table 5.4* has identified that operational noise levels are at or below the night time (10:00pm to 7:00am) PSNL at all locations and hence noise impacts are not anticipated.

ERM has reviewed the rank file generated by the noise modelling software, which sorts noise emission sources from the highest to the lowest for each scenario. Based on this review ERM has identified that the significant noise sources are train shunts, large forklift (i.e. 36T) usage within the Site area, motion alarms and heavy vehicle movements.

Based on this ERM makes the following recommendations for continued noise management measures during the evening and night time periods:

- during shunting, operators should be instructed to quietly operate the equipment following good operational practices to minimise noise emissions, in particular bunching of wagons on arrival and departure; and
- the use of large forklifts (i.e. 36T) should be limited wherever possible. Furthermore, where large forklift usage is required, the operators should be instructed to quietly operate the equipment following identified good operational practices.

6.1.1 *Operational Noise Monitoring*

The results indicate that the site is expected to comply with the requirements presented in the INP; however this is based on the continued successful implementation of the recommended good practice noise management measures described in this report.

Accordingly, ERM recommends that within three months of the approval of the modified operational activities, a noise monitoring survey be undertaken by a qualified and suitably experienced acoustician to verify actual site noise level contributions at a representative number of the closest and/or potentially most affected noise sensitive receptors in near proximity to the Site.

The results of these measurements should be compared to the applicable daytime, evening and night time PSNL presented in this report to determine INP compliance.

The findings of the recommended operational noise monitoring survey should be used to verify the effect of noise management measures implemented on site and to identify any additional measures that should be considered by Crawfords to assist in reducing operational noise levels and the risk of potential impacts for sensitive receptors located in the vicinity of the site.

Where measured operational noise levels are determined to comply with the INP criteria, no further actions are required to those already taken to reduce noise at the time of the operational noise monitoring survey. These measurements should be undertaken during the times of the proposed rail operations and normal site operations, where practical and completed with due regard to and in accordance with the requirements specified in AS 1055 and the INP.

6.1.2 Sleep Disturbance

Maximum (or peak) noise level events associated with the Site are expected to be below the project-specific sleep disturbance criterion at all residential locations.

ERM does not recommend any additional noise control mitigation and/or management measures to those described above and already implemented on-site but notes that Crawfords should continue to manage potential high noise level generating events to occur outside the night time period (i.e. after 07:00am and before 10:00pm) to assist in minimising the risk of potential noise impacts.

7 *CONCLUSION*

ERM on behalf of Crawford has completed a detailed assessment of environmental noise associated with the Section 96 Modification and proposed amendment to SSD 5119. The assessment has considered an increase to the number of train movements on the existing rail siding at the ammonium nitrate storage facility site.

The assessment was conducted to achieve a scope of works that allowed for the successful identification of potential receptors situated in the vicinity of site emission sources and identification of significant noise and vibration generating plant, equipment and/or activities associated with the Proposal and their likely/known emissions.

ERM quantified existing ambient and background noise levels in the area and developed noise criteria in accordance with recognised NSW policy, standards and guidelines as applicable to the site activities, and developed applicable assessment scenarios. Specifically, this report focusses on the potential noise impacts generated from the proposed additional train movements utilising the new C44 Class locomotives during the night time period; and the updated GL Class locomotives during the daytime and evening periods.

The assessment was completed to reflect the intent and requirements of the applicable local, state and Australian standards, acoustic documents and relevant noise guidelines endorsed by NSW regulators.

A quantitative operational assessment was conducted by predicting noise levels via modelling. Resultant noise levels were then compared to criteria at each receptor location and any exceedances identified.

Based on these findings ERM has recommended noise mitigation, management measures and/or monitoring options suitable to the significance of the predicted levels and designed to minimise impacts as far as is feasible and reasonable.

The assessment indicates that the Site is expected to comply with the relevant noise assessment criterion; however this is based on the continued successful implementation of the current good practice noise management measures described in this report.

ERM recommends that within three months of the approval of the modified operations, an operational noise monitoring survey be undertaken to evaluate Site noise contribution and confirm compliance with the noise assessment criterion at a representative number of the closest and/or potentially most affected noise sensitive receptors in near proximity to the Site.

REFERENCES

NSW Environment Protection Authority – NSW Environmental Noise Management – **Industrial Noise Policy** (INP), January 2000 and relevant application notes

Standards Australia AS1055–1997™ (AS1055) – D**escription and Measurement of Environmental Noise**, Parts 1, 2 and 3

International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - **Acoustics – Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation**

'**Crawford Freightlines Pty Ltd - Hazard Analysis (Revision 2)**' prepared by Health & Safety Essential Pty Ltd, dated 22 May 2012 (May 2012 hazard analysis)

Annex A

Acoustic Glossary

A.1 ACOUSTICS - GLOSSARY OF TERMS, DEFINITIONS AND METHODOLOGY

A.1.1 What Is Noise And Vibration?

Noise

Noise is often defined as a sound, especially one that is loud or unpleasant or that causes disturbance[2] or simply as unwanted sound, but technically, noise is the perception of a series of compressions and rarefactions above and below normal atmospheric pressure.

A.1.2 How To Measure And Describe Noise?

Noise is measured using a specially designed 'sound level' meter which must meet internationally recognised performance standards. Audible sound pressure levels vary across a range of 10^7 Pascals (Pa), from the threshold of hearing at 20μPa to the threshold of pain at 200Pa. Scientists have defined a statistically described logarithmic scale called Decibels (dB) to more manageably describe noise.

To demonstrate how this scale works, the following points give an indication of how the noise levels and differences are perceived by an average person:

- 0 dB - represents the threshold of human hearing (for a young person with ears in good condition);
- 50 dB – represents average conversation;
- 70 dB – represents average street noise, local traffic etc;
- 90 dB – represents the noise inside an industrial premises or factory;
- 140 dB - represents the threshold of pain – the point at which permanent hearing damage may occur.

A.1.3 What Factors Contribute To Environmental Noise?

The noise from an activity, like construction works, at any location can be affected by a number of factors, the most significant being:

- how loud the activity is;
- how far away the activity is from the receptor;
- what type of ground is between the activity and the receptor location eg concrete, grass, water or sand;

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[2] Copyright © 2011 Oxford University Press

- how the ground topography varies between the activity and the receptor (is it flat, hilly, mountainous) as blocking the line of sight to a noise source will generally reduce the level of noise; and

- any other obstacles that block the line of sight between the source to receptor eg buildings or purpose built noise walls.

A.1.4 How To Calculate Or Model Noise Levels?

There are two recognised methods which are commonly adopted to determine the noise at particular location from a proposed activity. The first is to undertake noise measurements whilst the activity is in progress and measure the noise, the second is to calculate the noise based on known noise emission data for the activity in question.

The second option is preferred as the first option is largely impractical in terms of cost and time constraints, notwithstanding the meteorological factors that may also influence its quantification. Furthermore, it is also generally considered unacceptable to create an environmental impact simply to measure it. In addition, the most effective mitigation measures are determined and implemented during the design phase and often cannot be readily applied during or after the implementation phase of a project.

Because a number of factors can affect how 'loud' a noise is at a certain location, the calculations can be very complex. The influence of other ambient sources and the contribution from a particular source in question can be difficult to ascertain. To avoid these issues, and to quantify the direct noise contribution from a source/site in question, the noise level is often calculated using noise modelling software packages. The noise emission data used in each noise model of this assessment has been obtained from ERM's database of measured noise emissions.

A.1.5 Acoustic Terminology & Statistical Noise Descriptors

Environmental noise levels such as noise generated by industry, construction and road traffic are commonly expressed in dB(A). The A-weighting scale follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics. Time varying noise sources are often described in terms of statistical noise descriptors. The following descriptors are commonly used when assessing noise and are referred to throughout this acoustic assessment:

- **Decibel (dB is the adopted abbreviation for the decibel) –** The unit used to describe sound levels and noise exposure. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure;

- **dB(A)** - unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear;

- **dB(C) –** unit used to measure 'A-weighted' sound pressure levels. C-weighting is an adjustment made to sound-level measurements which takes account of low-frequency components of noise within the audibility range of humans;

- **dB(Z) or dB(L) –** unit used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear;

- **Hertz (Hz)** - the measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz;

- **Octave –** a division of the frequency range into bands, the upper frequency limit;

- **1/3 Octave –** single octave bands divided into three parts;

- **Leq** - this level represents the equivalent or average noise energy during a measurement period. The $L_{eq, 15min}$ noise descriptor simply refers to the L_{eq} noise level calculated over a 15 minute period. Indeed, any of the below noise descriptors may be defined in this way, with an accompanying time period (eg $L_{10, 15\ minute}$) as required;

- **Lmax** - the absolute maximum noise level in a noise sample;

- **LN -** the percentile sound pressure level exceeded for N% of the measurement period calculated by statistical analysis;

- **L10 -** the noise level exceeded for 90 per cent of the time and is approximately the average of the maximum noise levels;

- **L_{90}** - the noise level exceeded for 90 per cent of the time and is approximately the average of the minimum noise levels. The L_{90} level is often referred to as the "background" noise level and is commonly used as a basis for determining noise criteria for assessment purposes;

- **Sound Power Level (L_W)** - this is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment;

- **Sound Pressure Level (L_P)** - the level of sound pressure; as measured at a distance by a standard sound level meter with a microphone. This differs from L_W in that this is the received sound as opposed to the sound 'intensity' at the source;

- **Background noise** – the underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor;

- **Ambient noise** – the all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far;

- **Cognitive noise** – noise in which the source is recognised as being annoying; and

- **Masking** – the phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.

A.1.6 Terms to Describe the Perception of Noise

The following concepts offer qualitative guidance in respect of the average response to changes in noise levels:

- differences in noise levels of less than approximately 2 dB(A) are generally imperceptible in practice, an increase of 2 dB is hardly perceivable;

- differences in noise levels of around 5 dB(A) are considered to be significant;

- differences in noise levels of around 10 dB(A) are generally perceived to be a doubling (or halving) of the perceived loudness of the noise. An increase of 10 dB is perceived as twice as loud. Therefore an increase of 20 dB is four times as loud and an increase of 30 dB is eight times as loud etc;

- the addition of two identical noise levels will increase the dB level by about 3 dB. For example, if one car is idling at 40 dB and then another identical car starts idling next to it, the total dB level will be about 43 dB;

- the addition of a second noise level of similar character which is at least 8 dB lower than the existing noise level will not add significantly to the overall dB level; and

- a doubling of the distance between a noise source and a receptor results approximately in a 3 dB decrease for a line source (for example, vehicles travelling on a road); and a 6 dB decrease for a point source (for example, the idling car discussed above). A doubling of traffic volume for a line source results approximately in a 3 dB increase in noise, halving the traffic volume for a line source results approximately in a 3 dB decrease in noise.

The following terms offer quantitative and qualitative guidance in respect of the audibility of a noise source:

- **Inaudible / Not Audible** - the noise source and/or event could not be heard by the operator, masked by extraneous noise sources not associated with the source. If a noise source is 'inaudible' its noise level may be quantified as being less than the measured L_{A90} background noise level, potentially by 10 dB or greater;

- **Barely Audible** – the noise source and/or event are difficult to define by the operator, typically masked by extraneous noise sources not associated with the source. If a source is 'barely audible' its noise level may be quantified as being 5 - 7 dB below the measured L_{A90} or L_{Aeq} noise level, depending on the nature of the source eg constant or intermittent;

- **Just Audible** – the noise source and/or event may be defined by the operator. However there are a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator;

- **Audible** - the noise source and/or event may be easily defined by the operator. There may be a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator; and

- **Dominant** – the noise source and/or event are noted by the operator to be significantly 'louder' than all other noise sources. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.

The following terms offer qualitative guidance in respect of acoustic terms used to describe the frequency of occurrence of a noise source during an operator attended environmental noise measurements:

- **Constant** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible for the duration of the noise measurement eg an air-conditioner that runs constantly during the measurement;

- **Intermittent** – this indicates that the operator has noted the noise source(s) and/or event to be audible, stopping and starting intervals for the duration of the noise measurement eg car pass-bys; and

- **Infrequent** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible, however; not occurring regularly or at intervals for the duration of the noise measurement eg a small number of aircraft are noted during the measurement.

Industrial Noise Policy Terminology

- **Assessment Background Level (ABL)** - is defined in the INP as a single figure background level representing each assessment period (day, evening and night). Its determination is by the tenth percentile method (of the measured L_{A90} statistical noise levels) described in *Appendix B* on the INP;

- **Rating Background Level (RBL)** - is defined in the INP as the overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24hr period used for the ABL). This is the level used for assessment purposes. It is defined as the median value of:

  - all the day assessment background levels over the monitoring period for the day;

  - all the evening assessment background levels over the monitoring period for the evening; or

  - all the night assessment background levels over the monitoring period for the night.

- **Extraneous noise** – noise resulting from activities that are not typical of the area. Atypical INP activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous;

- **Most affected location(s)** – locations that experience (or will experience) the greatest noise impact from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source location(s), distance from source (or proposed source) to receptor, and any shielding between source and receptor;

- **Noise criteria** – the general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (for example, noise levels for various land uses).

- **Noise limits** – enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action;

- **Project Specific Noise Levels** – target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility;

- **Compliance** – the process of checking that source noise levels meet with the noise limits in a statutory context;

- **Non-compliance** – development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit by more than 2 dB;

- **Feasible and Reasonable measures** – feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:

    - noise mitigation benefits (amount of noise reduction provided, number of people protected);

    - cost of mitigation (cost of mitigation versus benefit provided);

    - community views (aesthetic impacts and community wishes); and

    - noise levels for affected land uses (existing and future levels, and changes in noise levels).

- **Meteorological Conditions** – wind and temperature inversion conditions;

- **Temperature Inversion** – an atmospheric condition in which temperature increases with height above the ground; and

- **Adverse Weather** – weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

Annex B

Industrial Noise Policy Methodology

B.1 NSW INDUSTRIAL NOISE POLICY - NOISE ASSESSMENT PROCEDURES

Responsibility for the control of noise emissions in NSW is vested in Local Government and the Department of Environment, Climate Change and Water (DECCW, and formerly the EPA – Environment Protection Authority).

The NSW *Industrial Noise Policy* (INP) first published by the EPA in January 2000, provides a framework and methodology for deriving limit conditions for consent and licence conditions. Using this policy the DECCW regulates premises that are scheduled under the *Protection of the Environment Operations Act, 1997* (POEO Act). The specific INP objectives are:

- to establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses;
- to use the criteria as the basis for deriving PSNL;
- to promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects;
- to outline a range of mitigation measures that could be used to minimise noise impacts;
- to provide a formal process to guide the determination of feasible and reasonable noise limits for consent or licence conditions that reconcile noise impacts with the economic, social and environmental considerations of industrial development; and
- to carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the POEO Act.

The INP is designed for large and complex industrial sources and outlines processes designed to strike a feasible and reasonable balance between the operations of industrial activities and the protection of the community from noise levels that are intrusive or unpleasant. The application of the INP involves the following processes:

- determining the Project-Specific Noise Levels (PSNL) from intrusiveness and amenity based measurement of the existing background and ambient noise levels;
- predicting or measuring the noise levels produced by the development; and
- comparing the predicted noise levels with the PSNL and assessing impacts.

Where the PSNL are predicted to be exceeded the INP provides guidelines on the assessment of feasible and reasonable noise mitigation strategies, including:

- 'weighing up' the benefit of the development against the social and environmental costs resulting from the noise impacts;

- establishment of achievable and agreed noise limits for the development in consultation with the consent authority; and

- undertaking performance monitoring of environmental noise levels to determine compliance with the consent and licence conditions.

B.1.1 NSW INP - Assessment Methodology

There are two criteria to consider when establishing PSNL for the assessment of industrial noise sources. These criteria are as follows:

- the 'Intrusive Noise' criterion, which is based on the background noise level plus 5 dB. The background noise level, or Rating Background Level (RBL), is determined in accordance with Section 3 of the INP and is based on the use of noise monitoring data to establish the assessable background noise levels; and

- the 'Amenity Noise' criterion, which is based on the recommended noise levels in the INP for prescribed land use. The recommended acceptable and maximum ambient noise levels are outlined in *Table 2.1* of the INP. *Table 2.2* of the INP outlines the requirements for developments where the existing noise level from industrial noise sources is close to the acceptable noise level.

The relevant tables in *Section 2* of the INP relating to the amenity criteria relevant to the project are presented in *Table B.1* and *Table B.2*.

Table B.1 Amenity Criteria - Recommended Noise Levels (Industrial Noise Sources)

Type of Receptor	Indicative Noise Amenity Area	Time of Day	Recommended LAeq Noise Level	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50 dB(A)	55 dB(A)
		Evening	45 dB(A)	50 dB(A)
		Night	40 dB(A)	45 dB(A)
	Suburban	Day	55 dB(A)	60 dB(A)
		Evening	45 dB(A)	50 dB(A)
		Night	40 dB(A)	45 dB(A)
	Urban	Day	60 dB(A)	65 dB(A)
		Evening	50 dB(A)	55 dB(A)
		Night	45 dB(A)	50 dB(A)
	Urban/Industrial Interface - for existing situations only	Day	65 dB(A)	70 dB(A)
		Evening	55 dB(A)	60 dB(A)
		Night	50 dB(A)	55 dB(A)
Area specifically reserved for passive recreation	All	When in use	50 dB(A)	55 dB(A)
Active recreation area (School playground, golf course)			55 dB(A)	60 dB(A)
Commercial premises			65 dB(A)	70 dB(A)
Industrial premises			70 dB(A)	75 dB(A)

1. in accordance with the INP the assessment periods are defined as follows: Daytime is the period from 7am to 6pm - Monday to Saturday; or 8am to 6pm on Sundays and Public Holidays, Evening is the period from 6pm to 10pm and Night time is all remaining periods; and
2. the LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Table B.2 ***Modification to Acceptable Noise Level (ANL) to Account for Existing Levels of Industrial Noise***

Total Existing LAeq Noise Level from Industrial Noise Sources	Maximum LAeq Noise Level for Noise from New Sources Alone, dB
≥ Acceptable noise level plus 2 dB	If existing noise level is likely to decrease in future acceptable noise level minus 10 dB If existing noise level is unlikely to decrease in future existing noise level minus 10 dB
Acceptable noise level plus 1 dB	Acceptable noise level minus 8 dB
Acceptable noise level	Acceptable noise level minus 8 dB
Acceptable noise level minus 1 dB	Acceptable noise level minus 6 dB
Acceptable noise level minus 2 dB	Acceptable noise level minus 4 dB
Acceptable noise level minus 3 dB	Acceptable noise level minus 3 dB
Acceptable noise level minus 4 dB	Acceptable noise level minus 2 dB
Acceptable noise level minus 5 dB	Acceptable noise level minus 2 dB
Acceptable noise level minus 6 dB	Acceptable noise level minus 1 dB
< Acceptable noise level minus 6 dB	Acceptable noise level

1. ANL = recommended acceptable LAeq noise level for the specific receptor.

In assessing the noise impacts from industrial sources at residential receptors both criteria are considered. For each period (day, evening and night) the most stringent of either the intrusive or amenity criteria becomes the limiting criterion and forms the project-specific noise level for the industrial source.

If the existing ambient noise level is close to the acceptable noise level, a new source must be controlled to preserve the amenity of the surrounding area. If the overall noise level from the industrial source already exceeds the acceptable noise level for the affected area, the L_{Aeq} noise level from a new source should meet the conditions set out in *Table 2.2* of the INP.

B.1.2 INP - Project Specific Noise Levels

The INP states that the criteria outlined in *Table B.1* and *Table B.2* have been selected to protect at least 90 per cent of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90 per cent of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

Table B.3 presents the methodology for assessing noise levels which may exceed the INP PSNL.

Table B.3 Noise Assessment Methodology

Assessment Criterion	Project Specific Noise Level	Noise Management Zone	Noise Affectation Zone
Intrusive	Rating background level plus 5 dB	≤ 5 dB above project-specific criteria	≥ 5 dB above project-specific criteria
Amenity	INP based on existing industrial level	≤ 5 dB above project-specific criteria	≥ 5 dB above project-specific criteria

For the purposes of assessing the potential noise impacts the project-specific, management and affectation criteria are further defined in the following sections.

Project Specific Noise Level

Most people in the broader community would generally consider exposure to noise levels that achieve the project-specific criteria acceptable.

Noise Management Zone

Depending on the degree of exceedance of the project-specific noise level (1 dB to 5 dB) noise impacts in this zone could range from negligible to moderate. It is recommended that management procedures be implemented including:

- prompt response to any issues of concern raised by community;
- noise monitoring on-site and within the community;
- refinement of on-site noise mitigation measures and plant operating procedures where practical;
- consideration of acoustical mitigation at receptors; and
- consideration of negotiated agreements with property holders.

Noise Affectation Zone

Exposure to noise levels corresponding to this zone (more than 5 dB above project-specific criteria) may be considered unacceptable by some property holders and implementation of the following measures may be required:

- discussions with relevant property holders to assess concerns and provide solutions;
- implementation of acoustical mitigation at receptors; and
- negotiated agreements with property holders.

B.1.3 Sleep Disturbance

Refer INP Application Note *B.2.17*

NSW Environmental Criteria for Road Traffic Noise - Guidance

Further guidance on potential sleep disturbance impacts is provided in the Department of Environment, Climate Change and Water (formerly the EPA – Environment Protection Authority) NSW *Environmental Criteria for Road Traffic Noise* (ECRTN), May 1999, which states that:

- sleep disturbance occurs through two mechanisms: changes in sleep state and awakenings;
- awakenings are better correlated to subjective assessments of sleep quality than are changes in sleep state;
- factors (other than noise) that contribute significantly to awakening reactions include sleep state and subject age; and
- the maximum noise level, the extent that noise exceeds the ambient noise level and the number of noise events that contribute to sleep disturbance.

The ECRTN recommends that the assessment should include a calculation of the maximum noise levels, the extent to which the maximum noise levels for individual vehicle pass-bys exceed the L_{eq} for each hour of the night, and the number of maximum noise events. A substantial portion of the ECRTN provides a review of international sleep disturbance research, indicating that:

- maximum internal noise levels below 50–55 dB(A) are unlikely to cause awakening reactions; and
- one or two noise events per night with maximum internal noise levels of 65–70 dB(A) are not likely to significantly affect health and wellbeing.

Internal To External Correction Factors

Modelled noise levels (for operational and sleep disturbance aspects of a project) are typically calculated at the property boundary or external building façade, however the ECRTN specifies and internal noise level criteria for assessing maximum noise level events, as such an internal noise level equivalent must be determined, or the criteria adapted to assess a calculated external noise level.

In determining an external criteria equivalent for maximum noise level assessment, ERM conservatively applies a 20 dB noise level correction factor to the relevant internal criteria described in the ECRTN. This 20 dB correction factor is approximately equivalent to the acoustic performance of an outer building envelope with windows closed (light frame and single glazed window, refer Roads and Traffic Authority (RTA) – *Environmental Noise Management Manual* (ENMM), December 2001). This is considered reasonable as the maximum noise level assessment only applies at night, when windows would typically remain closed.

B.2 INP - APPLICATION NOTES

These application notes are provided to assist industry and acoustical consultants develop noise assessments and apply the provisions of the INP with the aim of reducing processing time. The DECCW require noise assessments to apply the provisions of the INP; alternative approaches are not acceptable. The process for identifying PSNL in *Section 2* of the INP must be followed.

The level of mitigation that can be applied to a project is based on what is feasible and reasonable within the circumstances of that project. Valid factors include costs, aesthetics, community preferences, noise reduction achieved, etc. Noise level requirements in a licence are based on what the project can achieve using feasible and reasonable mitigation.

B.2.1 Identifying the Existing Level of Noise from Industry

(See INP *Section 2.2* and *Section 3.2*)

Table 2.1 of the INP (Amenity Criteria p.16) sets out recommended cumulative noise levels for industry. In assessment of the amenity effects of noise from a new development it is essential that the level of noise already present be determined.

Where the ambient noise levels are below the Acceptable Noise Level (ANL), then ideally the measurement of the existing level of noise should include only noise from industrial sources. In these situations, however, it may be acceptable to include noise from other sources (for example, roads or neighbourhood). The reasons for this are that:

- including noise from other sources typically results in assessing the worst case for impacts on amenity; and
- strictly excluding noise from sources other than industry can be difficult and costly and may not be necessary if the development meets the criteria.

However, where ambient noise levels are above the ANL then noise from other sources should be excluded in establishing existing levels of industrial noise. Where the level of road traffic noise is high enough to make noise from an industrial source inaudible for the majority of the time or difficult to measure directly, it may be necessary to consider applying the assessment for areas of high traffic noise. (Application Note: '*Amenity criteria in high traffic noise areas*', provides further guidance on this).

B.2.2 Assessing Noise at Industrial/Commercial Receptors

(See INP *Section 2.2*)

The INP does not require that intrusive noise be assessed at industrial or commercial premises. For industrial/commercial receptors, only the amenity criteria apply. Amenity noise levels should be assessed at the most affected point on or within the property boundary. This approach also applies to other non-residential receptors, such as educational facilities, hospitals and places of worship.

B.2.3 When to Apply the Urban/Industrial Interface Amenity Category

(See INP *Section 2.2.1*)

The urban/industrial interface category in the INP recognises that the availability of noise mitigation measures might be limited for existing premises where residences are close to existing industries.

The urban/industrial interface amenity category applies only for existing situations (that is, an existing receptor near an existing industry) and only for those receptors in the immediate area surrounding the existing industry, that is, the region that extends from the boundary of the existing industry to the point where the noise level of the existing industry (measured at its boundary) has fallen by 5 decibels.

Beyond the interface region (that is, beyond the point where noise has fallen by 5 decibels) the receptor category that most describes the area (rural, suburban or urban) would apply[3].

[3] The wording on pages 18 and 67 of the INP does not fully clarify this and the word 'urban' should be deleted and replaced with the word 'applicable' on page 18 at line 6 of the 'Urban/industrial interface' category and on page 67 at line 9 of the first paragraph

For new developments of a limited nature (such as an extension to existing process or plant or when replacing part of an existing process or plant with new technology) on existing sites (where the urban/industrial amenity category applies) then the urban/industrial amenity category is the appropriate amenity category for the new development. However, where a new development on an existing site is of a substantial nature (such as demolition of the existing plant and replacement with current technology or different type of plant) and where replacement of the existing plant has a realistic potential to significantly reduce receptor noise levels through using feasible and reasonable noise mitigation (i.e. where the existing plant is the dominant or a significant contributor to receptor noise levels) then the applicable noise criteria for the new development is the appropriate (rural, suburban or urban) amenity criteria for the location.

In most cases the situation will be apparent but in some cases careful judgement will be required to determine whether the new development is of sufficient magnitude to effectively replace the existing plant. In situations where no clear conclusion on the magnitude of change created by the new development is possible then the urban/industrial amenity category should apply.

B.2.4 Identifying the Appropriate Receptor Amenity Category

(See INP *Section 2.2.2*)

Amenity criteria in *Table 2.1* of the INP vary depending on the type of receptor. INP *Section 2.2.2* provides guidance on identifying the appropriate receptor type. Where there is doubt or debate over which receptor category is appropriate, the proponent needs to seek the views of the relevant land use manager (for example, Council or Department of Planning). Once the land use manager has identified the land use (eg zone, allowable density of development and land use patterns), the appropriate amenity criteria can be assigned.

B.2.5 Amenity Criteria in High Traffic Noise Areas

(See INP *Section 2.2.3*)

In areas where traffic flow is continuous and noise from industrial sources is inaudible or difficult to measure due to a high level of road traffic noise, and where the $L_{Aeq\ (period,\ traffic)}$ noise level is more than 10 dB above the ANL presented in *Table 2.1*, the ANL is replaced by $L_{Aeq\ (period,\ traffic)}$ minus 10 dB and this becomes the new ANL for the receptor area. Once the new ANL is determined, the project-specific amenity criterion can be determined by following the modification process given in *Table 2.2* of the INP[4].

B.2.6 Identifying Which of the Amenity or Intrusive Criteria Apply

(See INP *Section 2.4*)

The INP notes that the PSNL is the more stringent of either the amenity or intrusive criteria. This is not necessarily just a matter of comparing the magnitude of the amenity criteria to the intrusive criteria because different time periods apply (intrusive criteria uses 15 minutes while the amenity criteria are over the day, evening or night period).

For example, where the same number applies to both of the amenity and intrusive criteria, the intrusive criteria would typically be more stringent because it is determined over a much shorter period.

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[4] **Example:** An industrial development is proposed adjacent to several existing industrial facilities. The measured ambient night-time LAeq noise level is 60 dB(A) at a receiver potentially affected by noise from the proposed industrial development. The residential receiving area of the assessment location has been identified as 'urban'. A nearby road dominates the night-time acoustic environment at the receiver and there are no other environmental or extraneous local noise sources. In these circumstances, the measured ambient LAeq noise level of 60 dB(A) can be taken to represent the LAeq (period, traffic). The night-time noise contribution from existing industry is estimated to be 46 dB(A). What is the project-specific amenity (night-time) noise criterion for the proposed industrial development?

Solution: The LAeq (period, traffic) minus 10 dB is greater than the night time ANL of 45 dB(A) as determined from Table 2.1 for urban areas not significantly affected by traffic noise. Therefore, the approach described in Section 2.2.3 of the INP can be applied and the new ANL becomes LAeq (period, traffic) minus 10 dB. As the LAeq (period, traffic) is 60 dB(A), then the new ANL becomes 50 dB(A). This is the amenity noise criterion for the total industry LAeq noise in the area. The project-specific amenity (night-time) noise criterion for the proposed industrial development is then determined by comparing the existing industry LAeq of 46 dB(A) to the new ANL of 50 dB(A) with respect to the modification process given in Table 2.2. This gives the project-specific amenity (night-time) noise criterion of 48 dB(A), that is, new ANL minus 2 dB(A).

Where the predicted amenity noise level is lower than the intrusive level for the proposed development, the proponent needs to ensure that both levels will be satisfied. In this situation, noise limits specified in the licence conditions will include both the intrusive and amenity noise levels predicted to be achieved by the proposal to ensure that the community is protected from intrusive noise impacts at all times.

B.2.7 Assessing Background Noise Levels

(See INP *Section 3.1*)

To determine the Rating Background Level (RBL) and existing industry-contributed L_{Aeq}, the measurement of ambient noise levels should be undertaken in the absence of noise from the development under consideration.

B.2.8 When the RBL for Evening or Night Is Higher Than the RBL for Daytime

(See INP *Section 3.1*)

The results of long term unattended background noise monitoring can sometimes determine that the calculated Rating Background Level (RBL) for the evening or night period is higher than the RBL for the daytime period. These situations can often arise due to increased noise from, for example, insects or frogs during the evening and night in the warmer months or due to temperature inversion conditions during winter. The objective of carrying out long-term background noise monitoring is to determine existing background noise levels at a location that are indicative of the entire year.

In determining PSNL from the RBL's, the community's expectations also need to be considered. The community generally expects greater control of noise during the more sensitive evening and night-time periods than the less sensitive daytime period. Therefore, in determining PSNL for a particular development, it is generally recommended that the intrusive noise level for evening be set at no greater than the intrusive noise level for daytime. The intrusive noise level for night-time should be no greater than the intrusive noise level for day or evening. Alternative approaches to these recommendations may be adopted if appropriately justified.

B.2.9 Maximum Noise Levels during Shoulder Periods

(See INP *Section 3.3*)

Noise levels in limit conditions for sleep disturbance would typically be set as a maximum noise level. The approach noted in the INP for developing intrusive criteria for the shoulder period is not appropriate for determining maximum noise levels for the shoulder period. That is, assigning a background noise level based on averaging daytime and night-time RBL's may be appropriate for determining intrusive criteria but it is not appropriate

for assigning maximum noise levels. The reason for this is that the day or night RBL is based around the 90th percentile of LA90's, which is quite different to an RBL based on an average. (Additionally, setting maximum noise levels for the shoulder period based on the lowest LA90 during the period is not practical as it can result in the maximum noise limit being set lower than the intrusive noise limit).

In order to generate a statistically valid data set to derive the 90th percentile of LA90's for the shoulder period, a much larger sampling time (than the one week typically applied) would be required, with associated cost and practicality implications. Therefore, a statistical approach to calculating the RBL for shoulder periods is not required by the INP.

It is the intention of the INP that appropriate noise targets for the shoulder period be negotiated with the regulatory/consent authority on a case-by-case basis. The focus of the INP is on avoiding or minimising noise of a high level and/or with intrusive characteristics, during the shoulder period, through the use of best practice.

Options available to the proponent for managing maximum noise levels during the shoulder period are to:

- avoid noise events during the shoulder period (or at least during the first half and then to meet RBL (shoulder period) +15 dB(A) during the second half of the shoulder period);
- collect sufficient data to calculate a statistically robust 90th percentile-based RBL for the shoulder period and use this to determine RBL+15 dB(A) as the maximum noise level limit; and
- conduct a detailed analysis of the number and noise level of noise events, and the exceedance of the background noise level, then, present a case comparing the results of the analysis and the research results contained in Appendix B of the ECRTN.

B.2.10 Tonality - Sliding Scale Test

(See INP *Section 4.2*)

The sliding scale test for tonality outlined in *Section 4* of the INP uses a linear (z-weighted) spectrum (that is, no frequency weighting on each of the octave or third octave bands).

B.2.11 Duration Correction

(See INP *Section 4.2*)

Section 4 of the INP provides guidance on the use of modifying factors to account for certain characteristics of a noise source. The duration factors in *Table 4.2* are intended to increase the criterion that is acceptable, whereas the modifying factor corrections in *Table 4.1* are intended to increase the measured or predicted level.

B.2.12 Determining What Weather Conditions Should Be Used When Predicting Noise

Background

(See INP *Section 5*)

The INP intends that the noise levels used in assessing noise impacts at the consent stage include the effects of any weather conditions that are a feature of the area when the development operates. This means that the effects of weather conditions such as temperature inversions and wind on the noise level experienced at sensitive receptors should be adequately assessed at the consent stage.

Wind can enhance noise propagation compared with calm conditions (where there is no wind). When a wind blows, friction causes the air to move more slowly close to the ground than at higher altitudes. This phenomenon of wind speed increasing with height is termed 'wind shear'. The increase in noise occurs because sound waves from the source are bent through this 'wind shear' back towards the ground.

Unlike temperature inversions, wind can enhance propagation during any time of the day, evening or night. Wind does not increase noise in all directions and can also reduce noise. For example, wind blowing from the south to the north (termed a 'southerly' wind) increases noise to the north of an industrial premise and also reduces noise to the south of that premises.

In some instances, where one or more significant weather conditions have been identified as part of a noise assessment, noise levels from the industrial premises under only these significant weather conditions have been assessed, but noise levels under calm conditions have not.

The INP describes in *Section 5* when weather is "significant" (i.e. it occurs more than 30% of the relevant time period) and how to apply this in the noise assessment. This approach may result in noise levels at some receptors being underestimated, as in the southerly prevailing wind scenario described above.

Recommended Approach

This application note clarifies that in all cases at each receptor:

- noise levels from the premises under calm conditions as well as any significant weather conditions as defined in the INP should be predicted or measured; and

- the highest of the noise levels from Step 1 (above) is to be used in the assessment for that receptor.

The intent of the INP is not to require that these conditions should be applied exclusively where the significant weather conditions act to reduce noise at a sensitive receptor.

For example, where a significant prevailing wind of speed less than three metres per second increases noise levels at a receptor to the north of a development (compared with those predicted under calm conditions), the noise levels predicted under that prevailing wind should be used at that receptor. For receptor(s) to the south of the same development, if the noise levels predicted under calm wind conditions are higher than those predicted under the significant prevailing wind, the noise levels predicted under calm wind conditions should be used at the southern receptor(s).

The DECCW has previously accepted (and will accept) noise predictions based on modelling noise emissions using long term weather data, as it can present a higher level of analysis than that required under the INP.

B.2.13 How Calm Is Defined

(See INP *Section 5.1*)

In the assessment of wind effects, the INP requires the assessment of wind speeds of up to 3 metres per second where these speeds are a feature of the area (they occur for 30% of the time or more) but does not specify the minimum wind speed that needs to be assessed. The calm condition is typically represented by wind speeds less than or equal to 0.5 metres per second as this is likely to be the lower limit of measurement.

B.2.14 Presenting Predicted Noise Impacts

(See INP *Section 6.3*)

In carrying out noise impact predictions for a particular development, predicted noise levels for calm conditions as well as any significant adverse weather conditions should generally be provided. It is particularly useful to provide predicted noise impacts for calm weather conditions where predicted noise impacts under adverse weather conditions exceed the PSNL. This allows for a better understanding of potential noise impacts from the development.

B.2.15 Prosecution Guidelines

(See INP *Section 11.1*)

The DECCW's approach to prosecuting offences is described in EPA prosecution guidelines, 2001, particularly *Sections 3.2* to *Section 3.6* under 'Discretion' which states that "*not every breach of the criminal law is automatically prosecuted*", "*The EPA has a discretion as to how to proceed in relation to environmental breaches*" and "*Each case will be assessed to determine whether prosecution is the appropriate strategic response*". *Sections 3.7* to *Section 3.8* under '*Factors to be considered*' in the Guidelines describe factors that are considered when determining whether prosecution is required, such as "*whether the breach is a continuing or second offence*", "*the availability and efficacy of any alternatives to prosecution*" and "*the prevalence of the alleged offence and the need for deterrence, both specific and general*".

B.2.16 Using Appendix D

Appendix D of the INP provides a rough guide for predicting the increase in noise due to inversion effects. The data provided is based on simple calculations performed using the Environmental Noise Model (ENM), assuming flat ground and no barriers.

The use of this Appendix may underestimate the effects of temperature inversions where a barrier or intervening topography is present. For detailed noise assessments, a more thorough analysis of noise impacts under temperature inversions is expected. Where a noise model such as SoundPlan or ENM is used to determine noise impacts from a development under calm conditions or during wind conditions, the model should also be used to determine potential noise impacts under inversion conditions, rather than using Appendix D of the INP.

B.2.17 Sleep Disturbance

Peak noise level events, such as reversing beepers, noise from heavy items being dropped or other high noise level events, have the potential to cause sleep disturbance. The potential for high noise level events at night and effects on sleep should be addressed in noise assessments for both the construction and operational phases of a development. The INP does not specifically address sleep disturbance from high noise level events.

DECCW reviewed research on sleep disturbance in the ECRTN. This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance.

From the research, DECCW recognised that current sleep disturbance criterion of an $L_{A1\ (1\ minute)}$ not exceeding the $L_{A90\ (15\ minute)}$ by more than 15 dB(A) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, DECCW will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required.

The detailed analysis should cover the maximum noise level or $L_{A1\ (1\ minute)}$ that is, the extent to which the maximum noise level exceeds the background level and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the appendices to the ECRTN. Other factors that may be important in assessing the extent of impacts on sleep include:

- how often high noise events will occur;
- time of day (normally between 10pm and 7am); and
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

The $L_{A1\ (1\ minute)}$ descriptor is meant to represent a maximum noise level measured under 'fast' time response. DECCW will accept analysis based on either $L_{A1\ (1\ minute)}$ or L_{AMax}.

B.2.18 Addressing Privately Owned Haul Roads

Noise from privately owned haul roads is to be assessed as an industrial noise source according to the INP. The practice of treating access roads as part of the industrial premises with which they are associated is a long established part of noise management in NSW, which the INP has not changed. The basis for treating vehicles on private access roads as part of an industrial noise source lies in the relationship between the enterprise and the noise, and the community's response to noise from vehicles operating on private roads.

The character of the noise is different to general road traffic noise: Traffic on access roads is solely related to the operation of the site served by the access road and is usually composed almost entirely of heavy vehicles, producing noise of a different character to the typical public roadway where smaller vehicles typically predominate.

Factors that influence community response are different compared to public roads: The distribution of benefits from the operation of a private access road is typically perceived to be different than from a public road. Affected members of the public have been reported as questioning the equity of truck noise degrading their amenity for the benefit of others.

The degree of control possible for traffic on a private access road is typically perceived as greater than for a public road. The result is a higher level of expectations that more can and should be done to reduce noise from the private road (than from a public one).

B.2.19 Determining Noise Limits for Licence Conditions

Where the proponent predicts that noise levels from the industrial development would be below the PSNL, then the noise limits specified in the licence/consent conditions should reflect the noise levels that the proponent states would be achieved (that is, the predicted noise levels, however a minimum intrusive criterion of 35 dB(A) still applies). This is for a number of reasons:

- to ensure that the best-management practices and best available technology described in the noise assessment report are actually adopted by the proponent;
- to ensure that the level of achievable performance presented by the proponent to the public, though public documentation such as Environmental Impact Statements, is achieved;
- to optimise the opportunity for further industrial development in the area without an unacceptable degradation of the acoustic amenity of the area; and
- to fulfil a general aim of the environmental assessment process to minimise environmental impacts.

It should be noted that noise limits would apply to the contributed noise levels from only the premises or site of concern. In setting noise limits, judgement needs to be made as to whether the predicted noise levels warrant noise limits on the licence/consent. Where the predicted noise levels from the premises of concern are well below the PSNL, there may be no need for noise limit conditions.

Any tolerances to the predicted noise levels should be addressed in the proponent's assessment of impacts so that the predicted noise levels can be applied in conditions.

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