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Environmental Noise Impact Assessment
New Service Station

Lot 1, 2 and 3 in DP 12560, Railway Parade
Henty, NSW 2568

Prepared for: -

North Manila Petroleum Pty Ltd
C/- R.J. Sinclair Pty Ltd
Suite B111 – Sky City, NorWest Business Park
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Attention: Mr Vaughn Pelias

Reference: 2105013E-R

Prepared by: -

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2nd September, 2021

Document Control Page

Revision	Author	Released By	Date
Draft	MH	MH	21/07/2021
Reviewed	RW		21/07/2021
Draft 2	MH	MH	25/08/2021
Final	MH	MH	02/09/2021

R.J. Sinclair Pty. Ltd., on behalf of North Manila Petroleum Pty. Ltd., commissioned Harwood Acoustics to carry out a noise impact assessment of a proposed service station to be constructed at Lot 1, 2 and 3 in DP 12560, Railway Parade, Henty, NSW.

Accordingly, Harwood Acoustics has prepared this report for the exclusive use of the Client identified on the title page. The report is prepared in accordance with the brief and scope of works agreed between the Client and Harwood Acoustics and may not be suitable for use beyond that scope.

Harwood Acoustics undertakes no duty nor accepts any responsibility to any third party who may rely upon this report.

Advice and recommendations provided in this report are in relation to acoustical issues only. No claims of expertise are made, and no liability is accepted, in relation to issues falling outside the field of acoustical consulting. These may include, but are not limited to, structural and waterproofing considerations, fire rating or thermal rating. Relevant authorities and / or experts should be consulted regarding areas other than acoustics.

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1. INTRODUCTION AND SUMMARY

North Manila Petroleum Pty Ltd proposes to develop a service station at Lots 1, 2 and 3 in DP 12560, Railway Parade, Henty, NSW (the Site).

The Site is located on the eastern side of Railway Parade (the Olympic Highway) at the corner of Sladen Street East and is currently vacant. The Site is bound to the east by residential premises, to the north by Sladen Street East with residences opposite and to the south by a laneway with an existing service station opposite. To the west is Railway Parade with the Main Southern Railway and the Henty Railway Station beyond. The closest residential receptors to the Site are adjoining to the east and opposite to the north. A location plan is shown in Figure 1.

It is proposed to establish the service station on the Site which will operate 24 hours per day, seven days per week. The service station will comprise a light vehicle refuelling area with four bowsers under a canopy in the centre of the Site; a sales building with provision for mechanical plant on the roof of the building; customer car parking to the north of the sales building and a heavy vehicle refuelling canopy on the southern side of the Site. Access to the Site will be via Sladen Street East and egress will be via Railway Parade. A site plan is shown in Figure 2 and full details can be seen in R.J. Sinclair Pty. Ltd.'s building design plans for Project Number 19-045 dated March 2021.

It is a requirement of Greater Hume Shire Council that an Environmental Noise Impact Assessment be prepared. The assessment is required to consider the potential for noise from the operation of the service station to impact existing residences as well as to provide mitigation measures to reduce noise emission, if necessary, and so far as is reasonably practicable.

Noise design goals at the nearest receptors are derived from the NSW EPA's *Noise Guide for Local Government* (2013) and the NSW EPA's *Noise Policy for Industry* (2017) is used to establish noise design goals for sleep disturbance at night. Consideration is also given to noise arising from on-road traffic attendant to the proposed service station.

The intrusiveness design noise goals are 44 dBA ($L_{eq,\ 15\ minute}$) during the daytime period from 7 am to 6 pm, 41 dBA ($L_{eq,\ 15\ minute}$) during the evening time period from 6 pm to 10 pm and 38 dBA ($L_{eq,\ 15\ minute}$) during the night time period from 10 pm to 7 am; for noise as-received at all residential receptors.

A noise model was developed for the Site and includes noise emission from customer vehicle movements, delivery vehicles and heavy vehicle movements as well as mechanical plant servicing the sales building.

Recommendations are made in Section 7 of this Report to reduce the level of noise emission from the Site to within the EPA's noise design goals, so far as is reasonably practicable. Recommendations include advice on the construction of acoustical screening along the eastern boundary of the Site and around the roof top mechanical plant platform. A further assessment of mechanical plant noise will be required prior to the issue of a construction certificate once final selections of all mechanical plant have been made. Noise emission from light vehicles attendant to the Site will be within the noise design goals at each receptor location based on assumed typical worst-case number of vehicle movements during each period of the day, evening and night.

Noise emission from heavy vehicles accessing the site will be within the EPA's noise design goals at all receptors during the day time period.

There is potential for the noise goals to be exceeded at receptor R2 during the evening time period and at each of the nearest receptors during the night time period.

The predicted noise levels from heavy vehicles attendant to the Site are lower than those from existing passing trucks on both the Olympic Highway and Sladen Street East. Council may consider that the occasional exceedances from truck movements at night on the Site are not significant impacts. This is discussed further in Section 5.3 of this Report.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The Site is located on the eastern side of Railway Parade (the Olympic Highway) at the corner of Sladen Street East and is currently vacant. The Site is bound to the east by residential premises, to the north by Sladen Street East with residences opposite and to the south by a laneway with an existing service station opposite. To the west is Railway Parade with the Main Southern Railway and the Henty Railway Station beyond. The closest residential receptors to the Site are adjoining to the east and opposite to the north.

The nearest receptors to the Site are shown in Figure 1 below, at addresses and distances as follows: -

R1 – 8 Sladen Street East (adjoining)	R2 – 7 Sladen Street East (circa 35 metres)
R3 – 10 Sladen Street East (circa 17 metres)	R4 – 4 First Avenue (circa 55 metres)

Figure 1. Location Plan – Railway Parade, Henty, NSW

(source: NSW Government Spatial Information Exchange ©)

All distances are based on the closest boundary of the Site to the receptor as a reference only. Various noise producing aspects of the Site are at varying distances from each receptor and this is considered in calculations and predictions in Section 5 of this report.

Receptor R2 is considered representative of the closest potentially affected dwellings to the north of the Site and R3 is considered in addition to R1 for the assessment of future noise control options discussed in Section 7.3 of this Report.

2.2 Development Description

It is proposed to establish the service station on the Site which will operate 24 hours per day, seven days per week. The service station will comprise a light vehicle refuelling area with four bowsers under a canopy in the centre of the Site; a sales building with provision for mechanical plant on the roof of the building; customer car parking to the north of the sales building and a heavy vehicle refuelling canopy on the southern side of the Site. Access to the Site will be via Sladen Street East and egress will be via Railway Parade.

A site plan is shown in Figure 2 and full details can be seen in R.J. Sinclair Pty. Ltd.'s building design plans for Project Number 19-045, dated March 2021.

Noise sources associated with the development will include customer light vehicle movements, activity at the petrol bowsers, delivery vehicle movements, heavy vehicle movements as well as the mechanical plant that will service the service station building.

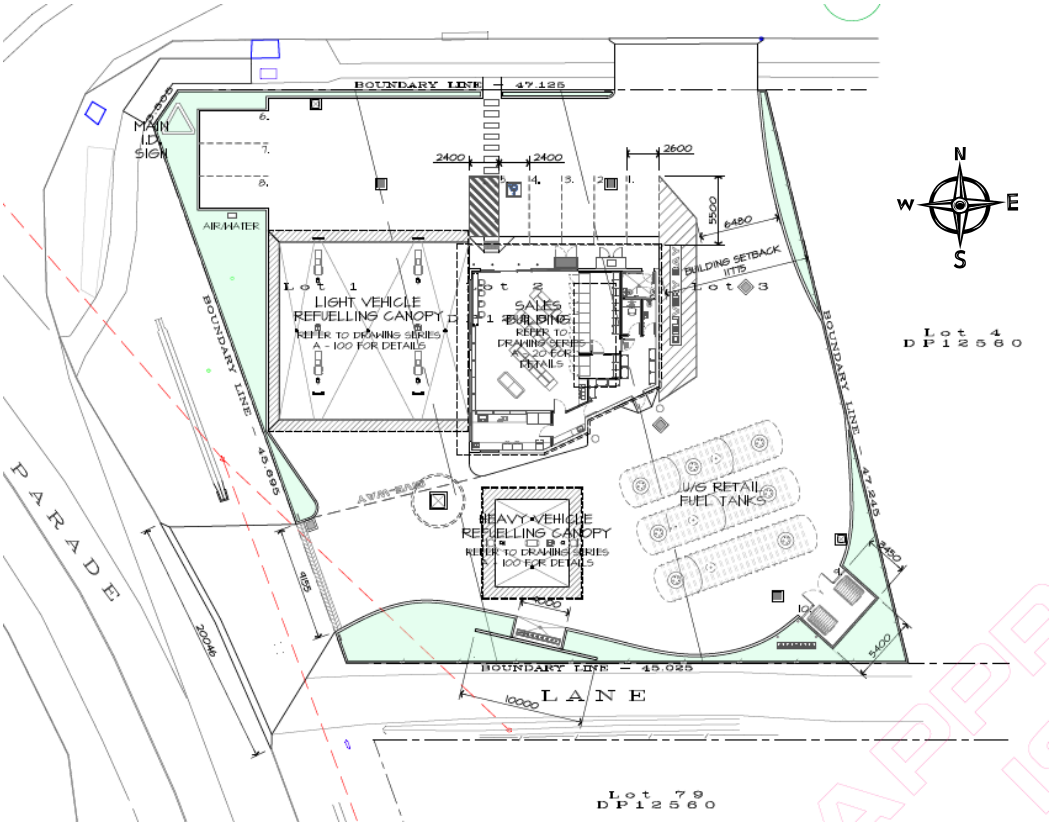

Figure 2. Site Plan – Cnr. Railway Pde. and Sladen St East, Henty, NSW

(source: R.J. Sinclair Pty. Ltd.'s building design plan A-03 for Project Number 19-045, dated March 2021)

A roof plan showing the proposed location of mechanical plant is shown in Figure 3 below.

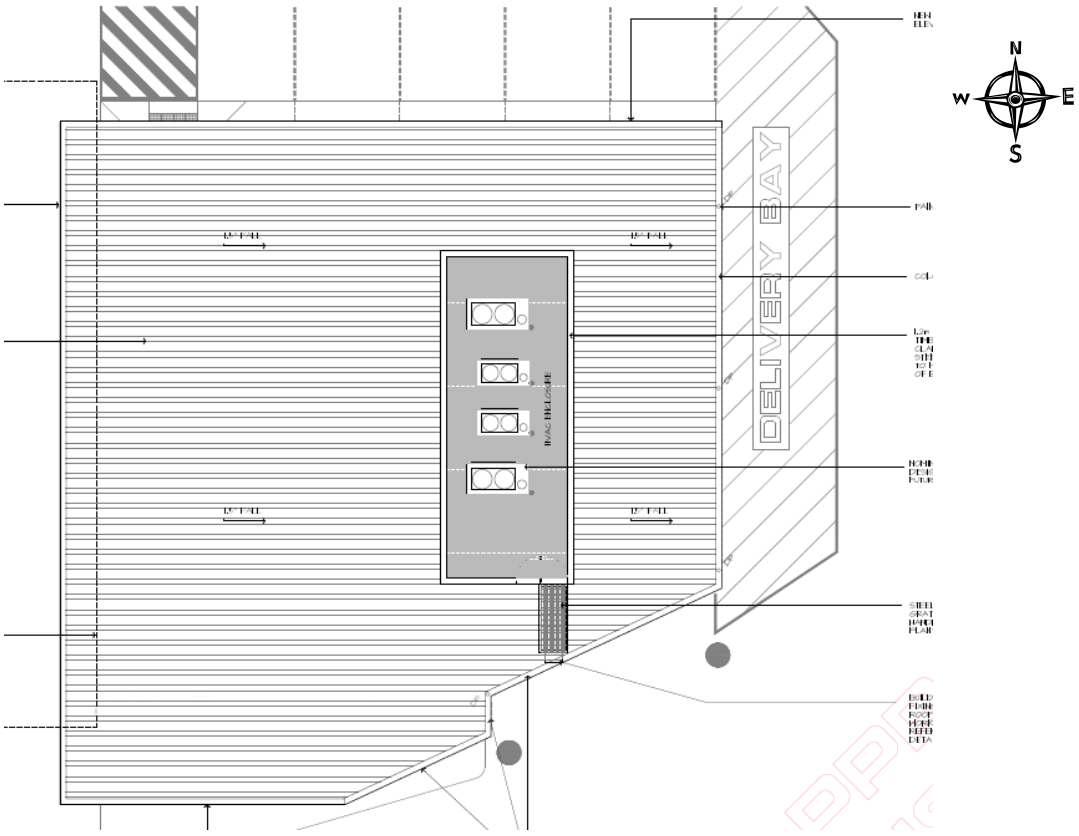

Figure 3. Roof Plan – Showing Mechanical Plant Platform

(source: R.J. Sinclair Pty. Ltd.'s building design plan A-22 for Project Number 19-045, dated March 2021)

3. NOISE CRITERIA

This section outlines the noise guidelines applicable to this proposal and establishes the project specific noise trigger levels and noise design goals.

3.1 NSW Environment Protection Authority's (EPA's) Noise Guide for Local Government

The Environment Protection Authority (EPA) published the *Noise Guide for Local Government* in June 2013. The policy is specifically aimed at assessing noise from light industry, shops, entertainment, public buildings, air conditioners, pool pumps and other noise sources in residential areas.

The EPA in Section 2.2.1 of the *Noise Guide for Local Government* states that a noise source is generally considered to be intrusive if the noise from the source, when measured over a 15-minute period ($L_{eq,\ 15\ minute}$), exceeds the background noise ($L_{90,\ 15\ minute}$) by more than 5 dB.

These criteria are in keeping with the EPA's *Noise Policy for Industry* (2017) Intrusiveness Criteria and generally consistent with NSW Councils' standard noise conditions.

The noise from the source is measured or assessed at the most affected point within the residential property boundary, or of that is more than 30 metres from the residence, at the most affected point within 30 metres of the residence. For upper floors the noise is assessed outside the nearest upstairs window.

3.2 NSW Environment Protection Authority's (EPA's) Noise Policy for Industry

3.2.1 Introduction

The NSW Environment Protection Authority (EPA) published the NSW *Noise Policy for Industry* in October 2017 (the Policy).

1. The policy is designed for large industrial and agricultural sources and specifies substantial monitoring and assessment procedures that may not always be applicable to the types of sources councils need to address.

The NPI Policy is not therefore strictly applicable to this development however it is used as a guide to determine an appropriate noise design goal for the commercial receptor at Receptor location R4 in the absence of such being provided in the *Noise Guide for Local Government*.

It is also used to provide a reference for the assessment of the potential for sleep disturbance events that can occur at night, again in the absence of such in the Noise Guide *for Local Government*.

This policy sets out the NSW Environment Protection Authority's (EPA's) requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

The *Noise Policy for Industry* is designed to assist industry and authorities to ensure that potential noise impacts associated with industrial projects are managed effectively.

The purpose of the policy is to ensure noise impacts associated with particular industrial developments are evaluated and managed in a consistent and transparent manner. It provides noise levels for assessing the potential impact of noise from industry and includes a framework for considering feasible and reasonable noise mitigation measures.

The objectives of the policy are to:

- provide the noise levels that are used to assess both change in noise level and long-term noise levels,
- provide a clear and consistent framework for assessing environmental noise impacts from industrial premises and industrial development proposals,
- promote the use of best-practice noise mitigation measures that are feasible and reasonable where potential impacts have been identified,
- support a process to guide the determination of achievable noise limits for planning approvals and/or licences, taking into account the matters that must be considered under the relevant legislation (such as the economic and social benefits and impacts of industrial development).

3.2.2 Amenity Noise Levels and Project Amenity Noise Levels

To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise levels within an area from **all** industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. (EPA NPI Table 2.2 is replicated in Table 1 below).

The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.

The **recommended amenity noise levels** represent the objective for **total** industrial noise at a receiver location, whereas the **project amenity noise level** represents the objective for noise from a **single** industrial development at a receiver location.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a **project amenity noise level** applies for each new source of industrial noise as follows:

> **Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB**

Table 1 Amenity Noise Levels (from EPA NPI Table 2.2)

Receiver	Noise Amenity Area	Time of Day	L_{Aeq}, dBA
(see Table 2.3 to determine which residential receiver category applies)			**Recommended amenity noise level**
Residential	Rural	Day Evening Night	50 45 40
	Suburban	Day Evening Night	55 45 40
	Urban	Day Evening Night	60 50 45
Hotels, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks *	See column 4	See column 4	5 dB(A) above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day
School classroom – internal	All	Noisiest 1-hour period when in use	35 (see notes for table)
Hospital ward internal external	All	 Noisiest 1-hour Noisiest 1-hour	 35 50
Place of worship – internal	All	When in use	40
Area specifically reserved for passive recreation (e.g. national park)	All	When in use	50
Active recreation area (e.g. school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5 dB(A) to recommended noise amenity area

Notes: The recommended amenity noise levels refer only to noise from industrial sources. However, they refer to noise from all such sources at the receiver location, and not only noise due to a specific project under consideration. The levels represent outdoor levels except where otherwise stated.

Types of receivers are defined as follows:

- rural residential
- suburban residential
- urban residential
- industrial interface – an area that is in close proximity to existing industrial premises and that extends out to a point where the existing industrial noise from the source has fallen by 5 dB or an area defined in a planning instrument. Beyond this region the amenity noise level for the applicable category applies. This category may be used only for existing situations.
- **commercial – commercial activities being undertaken in a planning zone that allows commercial land uses**
- industrial – an area defined as an industrial zone on a local environment plan; for isolated residences within an industrial zone the industrial amenity level would usually apply.

Time of day is defined as follows:

- day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
- evening – the period from 6 pm to 10 pm
- night – the remaining periods.

3.3 Sleep Disturbance Criteria

3.3.1 Noise Policy for Industry (2017)

Section 2.5 'Maximum noise level event assessment' states: -

"The potential for sleep disturbance from maximum noise level events from premises during the night time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Where the subject development/premises night time noise levels at a residential location exceed:

- *$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level event assessment should be undertaken.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise 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 NSW Road Noise Policy."

3.3.2 EPA's Road Noise Policy (2011) - (Sleep disturbance)

Section 5.4 of the NSW EPA's *Road Noise Policy* states: -

"Further studies by the enHealth Council (2004) and the guidelines published by the World Health Organisation (1999) were reviewed and analysed in terms of the guidance on noise exposure and sleep disturbance. The enHealth report states that:

'as a rule, for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) L_{Max} more than 10 or 15 times per night'."

3.3.3 Environmental Criteria for Road Traffic Noise (2009)

Appendix B5 of the NSW EPA's *Environmental Criteria for Road Traffic Noise* (ECRTN) reviews the current level of knowledge and concludes that maximum internal noise levels below 50–55 dBA are unlikely to cause awakening reactions, and that one or two noise events per night with maximum internal noise levels of 65–70 dBA are not likely to affect health and wellbeing significantly.

3.4 Measured Background Noise Levels

In order to establish the Intrusiveness Criteria, it is necessary to determine the background noise levels in the vicinity of all potentially affected residential receptors.

The background noise level is defined by the EPA as 'the underlying level of noise present in ambient noise when all unusual extraneous noise is removed' and is considered to be represented by the $L_{A90,\ 15\ minute}$ descriptor. This is a statistical measure of the sound pressure level that is exceeded for 90 % of the time.

The Rating Background Level (RBL) is the single-figure background noise level derived from monitoring $L_{A90,\ 15\ minutes}$ over a representative period of time. The Rating Background Level is established for the day, evening and night time periods and is used for assessment purposes.

When measuring background noise levels, it is important to undertake sufficient monitoring of background noise to allow intrusive noise to be assessed adequately.

The criteria and methodology provided in the guideline is derived from the NSW EPA's *Noise Policy for Industry* (2017). The policy provides minimum rating background noise levels (RBLS) for each period of the day, evening and night.

The minimum assumed RBLs result in minimum intrusiveness noise levels. These are shown in Table 2.1 in the Policy and are replicated in Table 1 below.

Table 1 Minimum Assumed RBLs and Project Intrusiveness Noise Levels (Derived from EPA NPI Table 2.1)

Period / Time of Day	Minimum Assumed Rating Background Level dBA	Minimum Project Intrusiveness Noise Level ($L_{eq,\ 15\ minute}$, dBA)
Day time period (7 am to 6 pm)	**35**	**40**
Evening time period (6 pm to 10 pm)	**30**	**35**
Night time period (10 pm to 7 am)	**30**	**35**

It has not been practicable to undertake noise surveys at the Site given the significant amounts of rainfall in the last two weeks of June and Covid 19 restrictions in early July and August.

Short-term attended background noise measurements have been undertaken at the Site on 27 July 2021 and the author has also previously undertaken a background noise survey near the Site in 2015, when a noise logger was placed approximately 100 metres to the south the Site, also shown in Figure 1.

A combination of current short term measurements and previously measured background noise levels have been used to establish the rating background noise levels provided in Table 2 below.

Table 2 Rating Background Noise Levels – Railway Parade / Sladen Street East

Period / Time of Day	Rating Background Level dBA ($L_{90,\ 15\ minute}$)	Average Ambient Noise Levels ($L_{eq,\ 15\ minute}$)
Day time period (7 am to 6 pm)	**41**	**59**
Evening time period (6 pm to 10 pm)	**36**	**58**
Night time period (10 pm to 7 am)	**33**	**54**

3.5 On-Road Traffic Noise Criteria – *Road Noise Policy* (2011)

The NSW EPA published the *NSW Road Noise Policy* in March 2011 (RNP) and the RNP replaced the *Environmental Criteria for Road Traffic Noise* in July 2011.

The Policy contains strategies to address the issue of road traffic noise from, among other things, traffic generating developments.

Section 2.3.1 of the Policy *'Noise assessment criteria – residential land uses'* sets out the assessment criteria for residences to be applied to particular types of project, road category and land use.

The relevant parts of the EPA's NPI Table 3 are replicated in Table 3 below.

Table 3 Road Traffic Noise Assessment Criteria (EPA RNP Table 3)

Road Category	Type of Project / Land Use	Assessment Criteria, dBA	
		Day (7 am – 10 pm)	**Night (10 pm – 7 am)**
Local Roads	6. Existing residences affected by **additional traffic** on existing local roads generated by land use developments	$L_{Aeq\ (1\ hour)}$ 55 (external)	$L_{Aeq\ (1\ hour)}$ 50 (external)

3.6 Project Specific Noise Goals

The most relevant noise design goals are as follows: -

Residential Receptors

- (41 + 5 =) **46 dBA** $L_{eq,\ 15\ minute}$ during the day time period,
- (36 + 5 =) **41 dBA** $L_{eq,\ 15\ minute}$ during the evening time period,
- (33 + 5 =) **38 dBA** $L_{eq,\ 15\ minute}$ during the night time period,
- (33 + 15 =) **48 dBA** L_{max} or $L_{1,\ 1\ minute}$ as an initial assessment for sleep disturbance outside residential premises,
- **45 dBA** to **55 dBA** L_{max} or $L_{1,\ 1\ minute}$ inside residential dwellings for further potential sleep disturbance assessment

On-Road Traffic Noise Goals – Residential receptors

- **55 dBA** $L_{eq,\ 1\ hour}$ from on-road traffic during the day, and
- **50 dBA** $L_{eq,\ 1\ hour}$ from on-road traffic during the night.

4. SERVICE CENTRE NOISE EMISSION

The main sources of noise associated with the proposed development will be as follows: -

- Customer vehicles and heavy vehicles attendant to the Site,
- Mechanical plant servicing the buildings, including for example: -
    - Air conditioning units,
    - Refrigeration compressor (potentially),
- Petrol tanker deliveries, store deliveries and garbage collection.

4.1 Mechanical Plant and Equipment Source Noise Levels

The mechanical plant has not yet been selected for this development; therefore, for the purpose of initial noise modelling of mechanical plant, typical noise levels were assumed.

Table 4 below shows the 'A' frequency weighted sound power levels, in decibels re: 1 pW, for typical plant and equipment.

The sound power levels are derived from previous assessments of similar developments undertaken by the author, including, as examples: -

- Coles Express / Shell Service Station, Hungry Jacks and Subway restaurants, Princes Highway, South Nowra,
- Caltex Service Station, Princes Highway, Bomaderry, and
- Liberty Service Station, Princes Highway, Moruya.

Table 4 $L_{eq,\ 15\ minute}$ Sound Power Levels – Typical Mechanical Plant & Equipment

Description	Individual Sound Power Levels $L_{eq,\ 15\ minute}$ (dBA)
Typical AC Unit – Small	**75 – 77**
Refrigeration Condenser / Compressor	**80**
Kitchen Exhaust Fan	**75 – 80**
Toilet Exhaust Fan	**70 – 75**

4.2 Motor Vehicle Noise Levels

A Traffic Impact Assessment has not been prepared at this stage. There are four (4) bowsers proposed to be located under the light vehicle canopy which will provide access for eight (8) customer vehicles at any given time.

Previous assessments of similar developments and the review of traffic impact assessments confirms that the peak hours typically occur from 8 am to 9 am in the morning and from 4 pm to 5 pm or 5 pm to 6 pm in the afternoon.

Previous assessments indicate that the traffic during the hours immediately either side of the peak hours typically generate traffic flows that are approximately 50 % of the peak hour flows. Night time hours and hours well outside of peak times typically generate traffic flows that are approximately 10 – 15 % of the peak hour flows.

Therefore, for the purpose of predicting noise levels for assessment against the ($L_{eq,\ 15\ minute}$) noise goals, it was assumed that each filling location may be used as followed: -

- twice in the busiest 15-minute period during the day time period, as a worst-case scenario.
- once in the busiest 15-minute periods during the evening and night time periods.

This equates to: -

- sixteen (16) customer vehicle movements in any given 15-minute period during the day time period, and
- eight (8) customer vehicle movements in any given 15-minute period during the evening and night time periods.

Harwood Acoustics has carried out numerous noise surveys of various motor vehicles over the past 19 years across various sites in NSW. Measurements include a range of vehicle movements including slow moving across petrol station forecourts, supermarket loading docks as well as driving on local roads and freeways at varying speeds.

These noise measurements have been used to establish energy average sound pressure levels assessed over a 15 minute period ($L_{eq,\ 15\ minute}$) and normalised to a distance of 10 metres for a range of vehicle types, relevant to service station activity.

These are shown in Table 5 below and the highest level in any range is used in noise modelling in this assessment.

The noise levels used in the modelling are derived from actual noise measurements of heavy vehicle movements attendant to refuelling stations.

Table 5 $L_{eq,\ 15\ minute}$ Sound Pressure Levels – Various Vehicles at 10 metres (single vehicle movement)

Vehicle Description	Individual Sound Pressure Levels $L_{eq,\ 15\ minute}$ (dBA) at 10 metres
Semi-Trailer / B Double movement	**54 – 56**
Delivery Truck	**48 – 50**
Ute / 4WD	**40 – 42**
Car	**38 – 40**

Table 6 below shows the $L_{1,\ 1\ minute}$ sound pressure levels of 'one-off' instantaneous potential noise sources that may occur during night time period hours from vehicles prior to 7 am or after 10 pm. Again these noise levels have been normalised to a distance of 10 metres.

Table 6 $L_{1,\ 1\ minute}$ Sound Pressure Levels – One-Off Noise Sources

Vehicle Description	$L_{1,\ 1\ minute}$ Sound Pressure Level (dBA) at 10 metres
Semi-Trailer / B Double movement	**70 – 72**
Car door closing	**53 – 55**
Car starting / accelerating	**58 – 60**

5. NOISE LEVEL PREDICTIONS

5.1 Modelling Equations

For all outdoor noise sources, the external noise level as-received at each receptor was calculated from the formula: -

$$L_{eq} = L_w + Dc - A$$

Where:

L_w is the sound power level of the noise source;
Dc is directivity correction; and
A is the attenuation that occurs during the propagation from source to receiver.

The term A in the equation includes attenuation from geometric divergence (distance loss), atmospheric absorption, ground absorption, barrier effects and other miscellaneous effects.

This model derives from the International Standard ISO 9613-2 (1996(E)) *'Acoustic – Attenuation of sound during propagation outdoors Part 2 General method of calculation'*.

The method described in the Standard is general in the sense that it may be applied to a wide variety of noise sources, and covers the major mechanism of sound attenuation. The method allows for worst-case propagation conditions with the wind blowing from the source to the receiver.

5.2 Predicted Noise Levels

The predicted noise levels at each receptor are shown in the Tables below, as follows.

- Table 7 - shows the predicted noise level from customer vehicles and mechanical plant, for assessment against the intrusiveness noise design goals for each period,
- Table 8 – shows the predicted noise level from customer vehicle movements for assessment against the potential for Sleep Disturbance trigger level.
- Table 9 - shows the predicted noise level from heavy vehicle movements, for assessment against the intrusiveness noise design goals for each period,
- Table 10 – shows the predicted noise level from heavy vehicle movements for assessment against the potential for Sleep Disturbance trigger level.

Table 7 Predicted L_{eq} Noise Levels – All Receptors – Customer Vehicles and Mechanical Plant

Time Period / Noise Source / Description	Predicted Noise Level $L_{eq,\ 15\ minute\ /\ period}$ (dBA) at Receptor Location			
	R1	**R2**	**R3**	**R4**
Design Noise Goal – Day	**46**	**46**	**46**	**46**
Customer vehicle movements (day)	30	36	24	20
Mechanical plant	33	32	29	24
Combined	35	37	30	25
Complies	Yes	Yes	Yes	Yes
Design Noise Goal – Evening	**41**	**41**	**41**	**41**
Customer vehicle movements (eve / night)	27	33	21	17
Mechanical plant	33	32	29	24
Combined	34	36	29	25
Complies	Yes	Yes	Yes	Yes
Design Noise Goal – Night	**38**	**38**	**38**	**38**
Complies	Yes	Yes	Yes	Yes

The predictions in Table 7 consider the following: -

- Distance loss to each receptor from various components of the Site,
- Traffic flows per Section 5.2,
- All mechanical plant operating simultaneously,
- Acoustical shielding from the sales building to receptors R1 and R3 for customer vehicles,
- Recommendations in Section 7 are implemented and adhered to, including
    - Construction of a 3.5 metre high fence / wall along the shared eastern Site boundary.

Table 8 Predicted $L_{1,\ 1\ minute}$ Noise Level (Sleep Disturbance During Night Time) – Customer Light Vehicles

Criterion / Vehicle / Description	Predicted Noise Level $L_{1,\ 1\ minute\ /\ period}$ (dBA) at Receptor Location			
	R1	**R2**	**R3**	**R4**
Sleep disturbance assessment trigger level	**48**	**48**	**48**	**48**
Customer vehicle movements	42	48	36	31
Complies	Yes	Yes	Yes	Yes

The predictions in Table 8 consider the following: -

- Distance loss to each receptor from various components of the Site,
- Cars traversing the driveway from the Sladen Street East entrance to the canopy,
- Doors closing and cars starting at the bowsers,

- Recommendations in Section 7 are implemented and continue to be adhered to, including
    - Construction of a 3.5 metre high fence / wall along the shared eastern Site boundary.

Table 9 Predicted L_{eq} Noise Levels – All Receptors – Heavy Vehicles Only (no noise controls)

Time Period / Description	Predicted Noise Level $L_{eq,\ 15\ minute\ /\ period}$ (dBA) at Receptor Location			
	R1	R2	R3	R4
Design Noise Goal – Day	**46**	**46**	**46**	**46**
B Double / Semi Trailer movement	41	45	39	35
Deliver vehicle (e.g. smaller rigid truck)	31	36	31	28
Complies	Yes	Yes	Yes	Yes
Design Noise Goal – Evening	**41**	**41**	**41**	**41**
Complies	Yes	No (exceeds by up to 4 dB)	Yes	Yes
Design Noise Goal – Night	**38**	**38**	**38**	**38**
Complies	No (exceeds by up to 3 dB)	No (exceeds by up to 7 dB)	No (exceeds by up to 1 dB)	Yes

The predictions in Table 9 consider the following: -

- Distance loss to each receptor from a heavy vehicle traversing the western side of the Site to the attend the refuelling station,
- Smaller delivery vehicles at the loading bay,
- Construction of a 3.5 metre high fence / wall along the shared eastern Site boundary.

Table 10 Predicted $L_{1,\ 1\ minute}$ Noise Level (Sleep Disturbance During Night Time) – Heavy Vehicles

Criterion / Vehicle / Description	Predicted Noise Level $L_{1,\ 1\ minute\ /\ period}$ (dBA) at Receptor Location			
	R1	R2	R3	R4
Sleep disturbance assessment trigger level	**48**	**48**	**48**	**48**
B Double / Semi Trailer movement	57	61	55	51
Complies	No	No	No	No

- Distance loss to each receptor from a heavy vehicle traversing the western side of the Site to the attend the refuelling station,
- Smaller delivery vehicles at the loading bay,
- Construction of a 3.5 metre high fence / wall along the shared eastern Site boundary.

5.3 Noise Assessment

It can be seen from the Tables 7 and 8 that the noise design goals can be complied with for this development from customer (light) vehicle movements and mechanical plant servicing the building during each of the day, evening and night time periods.

Table 9 shows that the noise design goal will be met for truck movements on the service station Site during the day time period.

There is potential for the noise design goals to be exceeded in the evening time period at receptor R2 and at receptors R1, R2 and R3 during the night time period at all receptors.

This section discusses truck noise impacts at each receptor locations during the night time period.

All discussions consider that the recommended sound barrier wall along the eastern boundary of the Site is constructed to a height of 3.5 metres.

During the noise surveys undertaken in July 2021, the level of existing truck noise emission was measured at the closest receptors to the Site.

Some examples of the results are shown in Table 11 below and compared to the predicted truck noise levels from the proposed development:-

Table 11 Existing and Predicted Truck Noise Levels at Receptors R1 and R2

Criterion / Vehicle / Description	Sound Pressure Levels (dBA) at Receptor Locations:-			
	Receptor R1		Receptor R2	
	$L_{eq,\ 15\ min}$	$L_{1,\ 1\ min}$	$L_{eq,\ 15\ min}$	$L_{1,\ 1\ min}$
Existing Noise From Truck Movements				
Semi-Trailer carrying livestock on Sladen Street turning in from Olympic Hwy	54	78	52	76
B Double gravel truck south bound on Olympic Highway	42	65	41	64
B Double tautliner north bound on Olympic Highway	45	65	44	64
B Double cattle truck (empty) exiting adjoining service station and turning north bound on to Olympic Highway	48	70	47	69
Predicted Noise From Truck Movements at Proposed Service Station				
B Double / Semi Trailer Movement on Site	41	57	45	61

Although there is potential for the EPA's noise design goals to be exceeded on occasion by individual truck movements on the service station site during the night time period, it can be seen from Table 11, that the predicted noise levels from truck movements is less than (or no greater than) existing noise levels from passing trucks.

Truck noise from heavy vehicle attendant to the service station would be indistinguishable from passing trucks on Sladen Street East, other than perhaps at Receptor R1.

It is worth noting that the dwelling at receptor R1 is a dilapidated property that is not currently suitable for occupancy. Although of course this may change in the future and any impact assessment is required to consider this property as an affected receptor regardless.

Council may consider that, with the construction of a 3.5 metre high barrier along the eastern boundary of the Site, that the potential exceedances of the noise goals from truck movements at night (on occasion) do not represent a significant impact when compared to current truck noise impacts at each affected receptor.

This position may also be supported especially when considering the potential for sleep disturbance, as discussed below.

Sleep Disturbance Discussion

The EPA recommends that where the external trigger level is exceeded, a detailed maximum noise level event assessment should be undertaken.

Consideration can therefore be given to the assessment of potential noise levels from vehicle movements as received within the nearest dwellings on Sladen Street East.

A reduction of approximately 10 dB occurs from outside to inside with windows partially open. With this consideration in mind, the predicted internal level from vehicle movements is shown in Table 12 below for both light vehicles and heavy vehicles respectively.

Table 12 Predicted $L_{1,\ 1\ minute}$ Noise Level Heavy Vehicles (Inside Dwelling)

Target Level / Vehicle Movements / Description	Predicted Noise Level $L_{1,\ 1\ minute\ /\ period}$ (dBA) at Receptor Location			
	R1	R2	R3	R4
EPA Target Noise Level (see below)	**45 – 55**	**45 – 55**	**45 – 55**	**45 – 55**
Heavy vehicle movements (Table 10 minus 10 dB)	(57 – 10 =) 47	(61 – 10) = 55	(55 – 10 =) 45	(51 – 10 =) 41
Within the target range	Yes	Yes	Yes	Yes

The *enHealth Council (2004) report states that:*

> *'as a rule, for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately **45 dB**(A) L_{Max} more than 10 or 15 times per night'.*

The NSW EPA's *Environmental Criteria for Road Traffic Noise (ECRTN)* concludes that maximum internal noise levels below 50 to 55 dBA are unlikely to cause awakening reactions, and that one or two noise events per night with maximum internal noise levels of **65 to 70 dBA** are not likely to affect health and wellbeing significantly.

6. ON-ROAD TRAFFIC NOISE EMISSION

In order to predict the level of noise emission from vehicles attendant to the development Site whilst on either Railway Parade or Sladen Street East, the following vehicle flows were assumed: -

- 50 vehicle trips per peak hour in the day time period,
- 25 vehicle trips per peak hour in the evening or night time periods,
- 4 truck movements in the peak hour in the day time period, and
- 2 truck movements in the peak hour in the night time period.

Formulae are given in the *Calculation of Road Traffic Noise* (CoRTN) from the UK Department of Transport and Welsh Office (1988) for the calculation of on-road vehicle noise. However, the calculation procedure given in CoRTN is untested for small traffic flows (under 200) and typically yields lower levels than occur in practice.

Therefore, a calculation based on the sound exposure level for various vehicles was carried out. The sound exposure level (L_{Ae}) is a summation of the sound energy produced during a single event (i.e. a motor vehicle pass-by, train pass-by, etc).

The average maximum measured sound exposure levels of a range vehicles, normalised to a distance of 10 metres is as follows: -

- Cars / utes / 4wds – 72 dBA,
- Semi trailers / B Doubles – 85 dBA.

Once established, a sound exposure level (L_{Ae}) can be used to calculate an energy average, sound pressure level ($L_{eq, time}$) using the following formula: -

$$L_{eq,\ 1\ hour} = L_{ae} - 10\ log_{10}\ (T) + 10\ log_{10}\ (N)$$

Where T is time in seconds and N is the number of vehicle trips. The calculated level can then be adjusted to various distances from the 10-metre location.

The closest dwelling to Sladen Street East is approximately 15 metres.

The predicted noise level from on-road vehicle movements during peak flows is shown in Table 13 below.

Table 13 Predicted $L_{eq,\ 1\ hour}$ Noise Levels – Passing Heavy Vehicles

Time Period / Description	Predicted Noise Level $L_{1,\ 1\ hour}$ (dBA) at Nearest Receptor Locations Sladen Street East (@15 metres)
Day Time Road Traffic Noise Limit	**55**
Predicted day time period traffic noise level	55
Complies	Yes
Night Time Road Traffic Noise Limit	**50**
Predicted night time period traffic noise level	52
Complies	No Exceeds by 2 dB

7. NOISE CONTROL RECOMMENDATIONS

The following noise controls are recommended to reduce the level of noise emission from the Site to within the noise design goals where possible and to minimise the noise impact to neighbours so far as is reasonably practicable.

7.1 Mechanical Plant

An assessment of mechanical noise emission should be undertaken prior to the issue of a construction certificate to ensure that adequate noise controls are implemented.

A combination of judicious selection of low noise producing plant and sound barrier screening, if required may be used to ensure that the noise design goals are complied with at all receptor locations during the day, evening and night time periods.

Predictions in this assessment assume that all plant is located on the roof of the building as shown in Figure 3 and comprises the following: -

- Three air conditioning units, and
- one refrigeration compressor.

Based on this configuration and the sound data provided in Table 5, an acoustical screen would be required to be built around the northern, eastern and southern sides of each of the plant.

Once the final selections are made a detailed noise control assessment can be provided to determine the extent to which any noise controls are required.

7.2 Eastern Boundary Screening

To minimise the noise impact from vehicles attending the Site and accessing the refuelling canopy from Sladen Street East: -

- Erect a sound barrier screen along the entire length of the shared eastern boundary of the Site to a minimum height of 3.5 metres above the highest finished ground level of the Site,
- The screen should return along the southern boundary for a minimum 15 metres as shown in Figure 4 below,
- The screen should be constructed from any impervious material such as masonry, lapped and capped timber, 9 mm (minimum) thick fibre cement sheet on both sides of steel posts, or any proprietary modular wall system with a weighted sound reduction index (R_w) value of no less than 20, or approved equivalent material,
- The screen should be constructed without holes or gaps other than a maximum 20 mm at the base for drainage or similar and only if required.

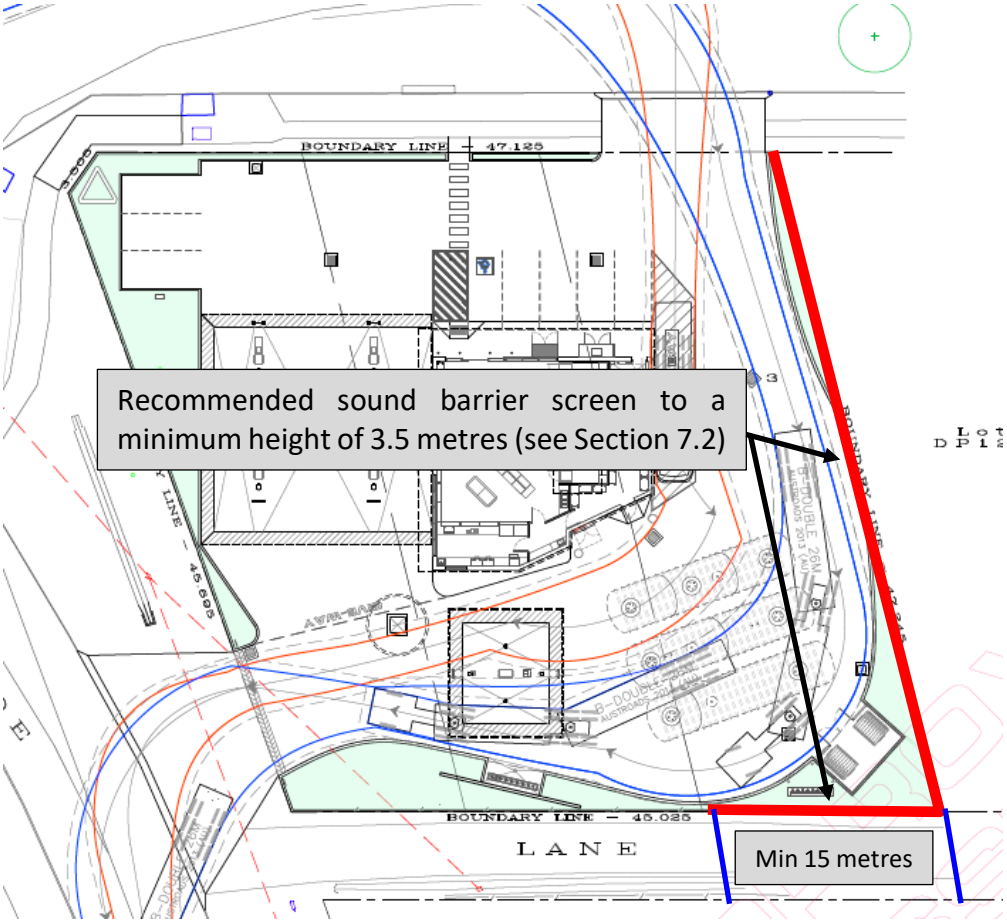

Figure 4. Recommended Sound Barrier Screen (not to scale)

8. CONCLUSION

An assessment of the potential noise emission arising from a service station to be constructed at Lots 1, 2 and 3 in DP 12560 Railway Parade, Henty was undertaken.

Recommendations are made in Section 7 of this Report to reduce the level of noise emission from the operation of the Site to within the NSW EPA's standard noise goals for commercial premises, so far as is reasonably practicable. The level of noise emission from customer's light vehicles and mechanical plant servicing the development can be sufficiently reduced through the construction of sound barrier screening and the judicial selection of mechanical pant.

There is potential for the noise goals to be exceeded when large heavy vehicles access the Site and options to reduce the noise impacts of semi-trailer and B Double movements are limited. However, Council may consider that the impacts from truck noise are not significant given the proximity of the Site to the Olympic Highway and other close by truck stops.

Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments: -
Important Note and Disclaimer
Appendix A – Noise Survey Instrumentation

Important Note

All products and materials suggested by Harwood Acoustics are selected for their acoustical properties only.

Recommendations made in this report are intended to resolve acoustical problems only, therefore all other properties such as aesthetics, air flows, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, fumes, grout or tile cracking, loading, shrinkage, smoke, ventilation etc. are outside Harwood Acoustic's fields of expertise and ***must*** *be checked with the supplier or suitably qualified specialist before purchase.*

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Opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

Noise Survey Instrumentation	Appendix A

The instrumentation used during the noise survey consisted of the following

Description	Model No.	Serial No.
Brüel & Kjaer Sound Level Meter	2250	3009198
SVANTEK Sound Level Meter	977A	92178
ARL Ngara Noise Logger	Ngara V2	878150
Brüel & Kjaer Acoustical Calibrator	4231	1839108

The Brüel & Kjaer Model 2250 sound level meter conforms to Australian Standard AS IEC 61672.1-2004: 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter and has an accuracy suitable for both field and laboratory use.

SVANTEK Model 977A sound level meter conforms to Australian Standard AS IEC 61672.1-2004: 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter and has an accuracy suitable for both field and laboratory use.

The ARL Ngara logger conforms to Australian Standard AS1259.1:1990, and AS1259.2:1990 "Acoustics - Sound Level Meters", as a Type 1 sound level meter. The Ngara logger also conforms to IEC 61672.3:2006 Standard as a Class 1 sound level meter and has an accuracy suitable for field and laboratory use.

The calibration of the sound level meters and noise logger was checked before and after the measurement periods. No significant system drift occurred over the measurement periods.

The sound level meters, noise logger and calibrator were previously checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates as required by the regulations.